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# Observations on Stengelioid Species of *Vernonia*

Agriculture Handbook No. 396

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NATIONAL SOIL CONSERVATION SERVICE

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Agricultural Research Service  
UNITED STATES DEPARTMENT OF AGRICULTURE

# Observations on Stengelioid Species of *Vernonia*

by  
C. Earle Smith, Jr.  
Plant Science Research Division

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Mrs. Regina Hughes prepared the line drawings. I am very grateful for her contributions to my paper.

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Dr. S. B. Jones, University of Georgia, Athens, has very generously provided me with a number of unpublished chromosome counts for species of section *Stengelia*. I thank him very much.

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# Observations on Stengelioid Species of *Vernonia*

By C. Earle Smith, Jr.,<sup>1</sup> *botanist*,  
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The present treatment of the species purported to belong to section *Stengelia* had its inception with the discovery of epoxyoleic acid in the achene oil of *Vernonia anthelmintica*. In its native Ceylon, and in India and Pakistan, *V. anthelmintica* is semicultivated, i.e., it is allowed to persist in field borders because it is favored as a home remedy. In spite of the industrial potential of the epoxyoleic oil fraction, this species has proven, so far, to be agronomically unsuitable in the United States.

Consequently, a collection program was instituted to find related species. All of the relatives of *V. anthelmintica* are found in Africa. None of these species of *Vernonia* are in cultivation although specimen labels indicate that certain African species are encouraged by Africans who use them for medicinal or culinary purposes. Until the discovery of the potential

value of the achene oil, no oil analyses had been made for the species of section *Stengelia*. Preliminary study of borrowed herbarium specimens of species said to be members of section *Stengelia* pointed up the impracticality of a nomenclatural revision without field observations. This also afforded an opportunity to procure achene samples for oil analysis.

Exploration for species of section *Stengelia* was begun in northern Ethiopia and continued southward through most of the eastern African countries, and through South Africa. When mature achenes were found, samples were collected for analysis. Herbarium specimens were prepared of all species encountered. Observations made in the field are used in interpreting the variation within species in the species descriptions.

## History of the section *Stengelia*

The first mention of *Stengelia* in botanical literature was in an advertisement for centuries of Ethiopian specimens that had been collected by Wilhelm Schimper (Hochstetter, 1841).<sup>2</sup> In the list, on page 26, under b. Eupatorinae, are listed 4 species of *Vernonia*. Following these is the entry "*Stengelia*, n. g., *adoënsis* C. H. Schultz. B. (318)" indicating that *Stengelia* is a new genus with the species *adoënsis*. The number in parentheses is Schimper's collection number. Nowhere in the article are the new

taxa described, and the generic and specific names are *nomina nuda*.

In August, 1841, (see Stafleu, 1967) Steudel's Nomenclator listed *Stengelia adoënsis* C. H. Schultz and *Stengelia kotschyana* Hochstetter (Steudel, 1841). Again, all names are *nomina nuda* because the reference for *S. adoënsis* is the publication cited above and the reference for *S. kotschyana* is an exsiccatae list of Kotschy specimens.

Finally, W. G. Walpers (1843) published the species as *Vernonia adoënsis* and *V. kotschyana*, citing *Stengelia* in synonymy. Under the International Code of Botanical Nomenclature (Lan-jouw, 1966), publication in synonymy is ruled invalid. The first validation by published description of the name *Stengelia*, so far as I am

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<sup>2</sup> References to Literature Cited (p. 85) are indicated by the name of the author (authors) or title of the publication followed by the year of publication.

aware, is in a footnote in Peters (1862-4) "Reise nach Mossambique." The treatment, prepared by J. Steetz, unfortunately excludes Schultz's original species, *V. adoensis*, but includes *Vernonia abyssinica* (as *Stengelia controversa*). Thus, the type of the genus *Stengelia* is *Stengelia controversa* Sch.-Bip. ex Steetz = *Vernonia abyssinica* Sch.-Bip. ex Walp. Because the latter name was validly published in 1843, Steetz was mistaken in setting up the first species; he should have transferred the specific name, *abyssinica*, to *Stengelia*. Be that as it may, it has little bearing on the current use of *Stengelia*. The species to which Schultz originally applied the generic name were placed by Steetz in *Ascaricida* Cass.

The use of *Stengelia* as a sectional name was not clearly stated until 1873 to the best of my knowledge. However, to understand the rise of the sectional name, it is necessary to go to A. P. De Candolle (1836). In handling the nearly 300 species of *Vernonia* which he listed, De Candolle divided the genus into sections, the ninth and last of which was "IX *Ascaricida* Less." Within his section, he grouped species in subsections (unnamed) on the basis of the characteristics of the phyllaries. In § 2. *Involucris squamis exterioribus angustioribus*, he placed *V. bojeri*, *V. anthelmintica*, and *V. pauciflora*, the second being the one species growing outside of Africa which is today considered to be a species of section *Stengelia*. The other two species are African and both have been associated with the stengelioid species by several authors.

Walpers (1843) followed the arrangement of the *Prodromus* in presenting the species of *Vernonia*. In the supplement (p. 946) he specifically writes, "Sectio IX, *Ascaricida* Less. § 2. *Involucris squamis exterioribus angustioribus*." And he adds, "A. *Involucris squamis exterioribus oblongo-lanceolato-linearibus in appendicem foliaceam variae magnitudinis expansis, quandoque foliis nonnullis, caulinis simplicibus circumdatis, achaeniis columnari-turbinatis, pappi bi- v. pluriserialis radiis paleaceis, complanatis.* (= *Stengelia* C. H. Schultz Bipont. mss.)." He then describes *Vernonia adoensis*, *V. kotschyana*, and *V. abyssinica*. The establishment

of subsection *Stengelia* could not be much clearer. I select *Vernonia adoensis* Sch.-Bip. ex Walp. as the type species of subsection *Stengelia* (fig. 1). By inference, since Walpers did not list all of the *Prodromus* species covered by De Candolle but only species added after 1836, the De Candollean species are included.

Although it is not significant for the purposes of this report, Lessing (1831) defined his section *Ascaricida* to include those species which De Candolle admitted. In a broad sense, Lessing's section is the basal point from which section *Stengelia* sprang.

With the publication of the Bentham and Hooker (1873) "Genera Plantarum," *Stengelia* Sch.-Bip. was formally recognized as Section 3 of *Vernonia*. The diagnostic characters of *Genera Plantarum* are essentially those of the Walpers subsection, and the first cited literature reference is the Walpers publication.

O. Hoffman in Engler and Prantl (1889) rearranged the sections of *Vernonia*, making *Stengelia* section 2. The diagnostic characteristics are almost the same as those of prior publications except that they are brief and somewhat less specific. The only species mentioned is *Vernonia anthelmintica*.

Through the latter half of the 19th century and the early part of the 20th century many collections went to Europe from Africa. Numerous botanists described new species of *Vernonia* and often placed them to section at the time of publication. Needless to say, *Stengelia* received its share of new species. During this period, the only publication broad enough to include a large number of the species of section *Stengelia* was the Oliver and Hiern's *Compositae* in the "Flora of Tropical Africa" (Oliver, 1877). The authors used a revised grouping of the sections in which *Stengelia* became section 6. Within the section, they recognized 17 species which have since been allowed to remain there by other authors. Even then, the group was causing trouble because they had to key out *V. purpurea*, *V. nigritana*, and *V. filigera* in the key to sections, rather than in that part of the species key covering section *Stengelia*.



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Figure 1.—*Vernonia adoensis* Sch.-Bip. ex Walp. is the lectotype species of Subsection Stengelia Sch.-Bip. ex Walp. and Section Stengelia (Sch.-Bip. ex Walp.) Benth. & Hook. f. Drawn from *Schimper 318* (Isotype, *V. adoensis*, US) and *Pappi 528* (FI).

No other treatment has covered this section on so broad a geographic range. Most of the species added after the "Flora of Tropical Africa" was published have never been critically evaluated for inclusion in a flora and they have never been monographed. At the time that they were described, many of the species

were distinguishable, but the collections amassed in the intervening years have erased the boundaries between many of the species. My study of the stengelioid group has necessarily been limited by interest in the achene oil, and I cannot do the overall survey of African *Vernonia* which is now required.

### Section Stengelia today

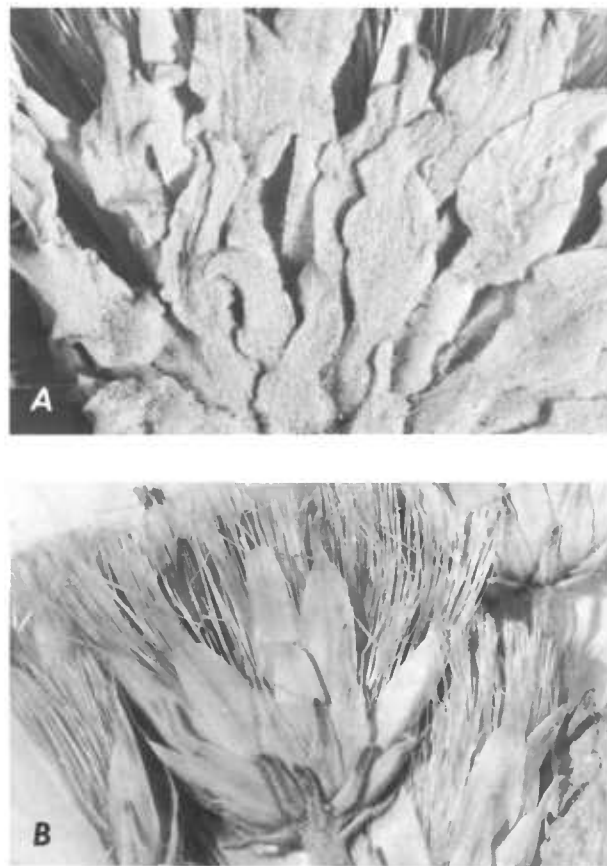
At the present time, section Stengelia may or may not include as many as 120 taxa. I have traced references to species and intraspecific entities, and I have literature references to 120 names which have been placed in the section at one time or another. Some were later removed by one or another botanist, and I am sure that I have missed many of these transfers in my quest for prime references. In recent years, very few new species have been described in the section, but there has been some rearranging of taxa within the section.

The boundaries of the section have not been redefined since the publication of subsection Stengelia by Walpers in 1843. Therefore, the characters given by Hoffman in Engler and Prantl (1889) still stand—"Inner involucre bracts with membranous, colored appendages (fig. 2); . . .; outer pappus bristles or scales short, inner sometimes scattered." These are Walpers' criteria (see above) in a slightly abbreviated statement. The section is now a heterogeneous melange of species groups which share the sectional characters. In 1915, De Wildeman reported the following in discussing the characters of *V. bukamaensis* and its sectional affinity, "Les bractées involucreales sont relativement peu modifiées dans leur partie supérieure. Ce caractère est d'ailleurs un plus ou moins; fréquemment, les plantes que l'on doit rapporter à ce sous-genre, ne présentent pas d'une façon nette la transformation foliacée de l'extrémité de la bractée, de sorte que l'on pourrait les rapporter au sous-genre Decaneuron qui possède parmi ses représentants des passages indiscutables vers les Stengelia."

Unfortunately, the sectional characters have led to a strange mixture of plants which are morphologically different and have many different growth habits. The lectotype species, *V. adoensis*, is an herbaceous perennial that grows to 2 m. tall from a large root crown. *V. guineensis* and its allies produce shorter above-ground shoots yearly from a root crown from which radiate tuberous roots. Several other species are woody shrubs that grow to 4 or 5 m. tall. Two species are trees which reach 10

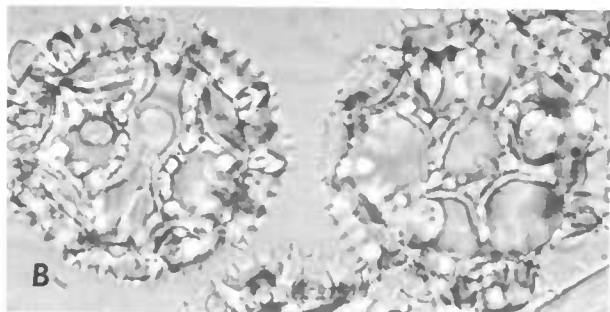
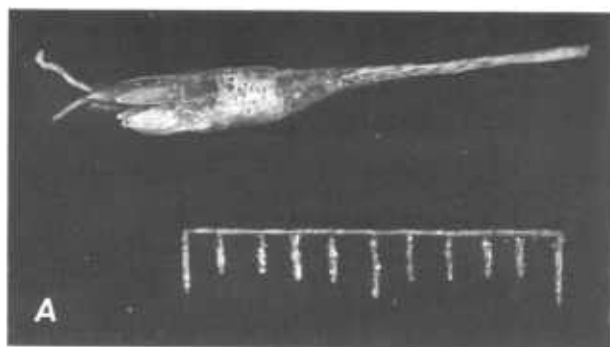
m. ultimately. Another complex of stengelioid species produces a root crown bearing a rosette of leaves above which are borne nearly naked scapes which support the heads. Still others in this group produce the leaves at one season and the inflorescences separately at another season.

The stengelioid species of *Vernonia* can be separated into 2 large groups on morphological characters. The herbaceous perennials, shrubs, and trees all have florets with a narrow tube which is as long as the limb or longer; the limb widens abruptly at the top of the tube, is urceolate and has relatively short deltoid or short



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Figure 2.—Two extremes of phyllary differentiation are illustrated by (A) the large, often white phyllary tips of *V. adoensis* and (B) the phyllaries of *V. abyssinica* with small herbaceous tips and large, exposed coriaceous bases.



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Figure 3.—The upright, herbaceous perennial and woody species of section *Stengelia* usually share (A) florets (*V. abyssinica*) with a distinct narrow tube flaring into the limb with deltoid or short lanceolate lobes and B, pollen grains (*V. guineensis*) with a heavy, often regular, reticulum.

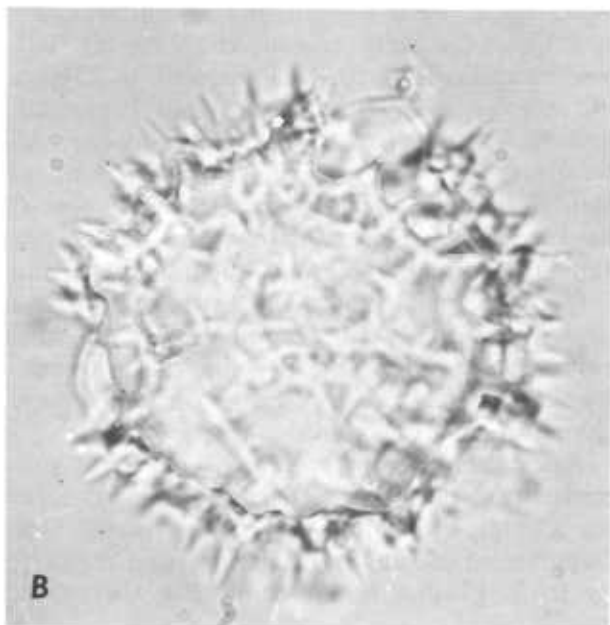
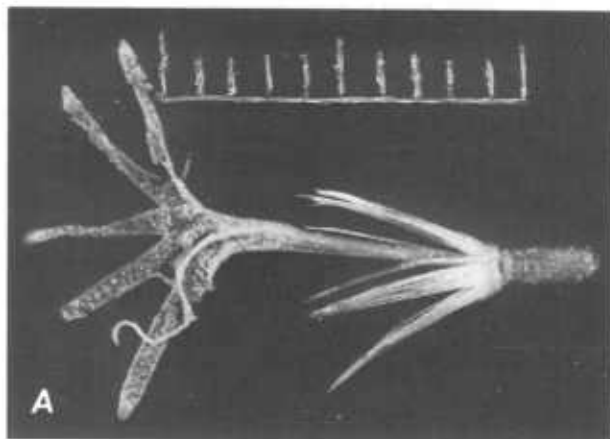
lanceolate lobes, which are firm in texture. Pollen grains of this group usually have a regular, heavy reticulum (fig. 3).

The rosette group of the stengelioid species of *Vernonia* generally have flowers with little or no tube which widens gradually into the conical limb with long, lanceolate, thin lobes. The pollen grains of many of these species are decorated with a thin, irregular reticulum (Smith, 1969) (fig. 4).

Within these 2 major groupings, other less well-defined groups appear. For example, *V. guineensis* and the species which I have placed immediately thereafter all seem to have tuberous roots, lanate under surfaces on the leaves, and phyllaries so arranged that the coriaceous basal portion is prominent at maturity. Such groups may indicate only an incomplete isolation of species and the continuing gene flow

among them; introgression may be occurring due to disturbance in habitats in recent times; or they may be truly valid species complexes, sharing a common ancestry and might be considered subsections.

My study of the stengelioid species of *Vernonia* is too limited to establish effective sec-



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Figure 4.—The species of section *Stengelia* with a basal rosette of leaves often have (A) florets (*V. acrocephala*) in which the tube gradually enlarges into the limb with thin, long, lanceolate lobes and (B) pollen grains (*V. praemorsa*) with a thin, irregular reticulum.

tion limits. This would entail the study of many species from other sections, some of whose species approach the stengelioid species closely. In fact, *Vernonia afromontana* and its relatives are so similar to the stengelioid species that I made herbarium specimens and achene collections whenever I found them. Oil analysis discloses a high epoxy acid content in the achene oil of *V. afromontana*, which may or may not be an indication of relationship. This complex of species is generally separated from *Stengelia* because the phyllary tip is not expanded, although it is herbaceous.

Until a major revision of all the African species of *Vernonia* is undertaken, section *Stengelia* will have to remain a heterogeneous mixture. My own experience suggests that the vast number of species of *Vernonia* will have to be reduced to biologically valid taxa that take into account all of the more recent tests for species validity. Morphological characteristics alone will no longer provide the sole evidence for their separation. However, the number of described species is large, and the revision of the sections of *Vernonia* cannot be accomplished without a prior consideration of the species.

### Chemical constituents of stengelioid *Vernonia* species

Interest in section *Stengelia* was originally sparked by the discovery of epoxyoleic acid in the oil from achenes of *V. anthelmintica*. Therefore, so far as it was possible, I collected samples of achenes from native populations in eastern Africa. To the south, the season was late and I was too early, so collections for oil analysis were made by D. B. Fanshawe in Zambia (7 samples analyzed), Mrs. Mell in Transvaal, and W. Duthie in Natal (1 sample each). All analyses were made by the Northern Utilization Research and Development Division staff at Peoria, Ill. Unfortunately, the figures obtained are badly skewed by immature and insect-damaged achenes. Until new supplies are grown and analyzed, the oil analysis figures cannot be published as they may be very misleading. However, some samples contained more than 70-percent epoxyoleic acid.

Among samples of species of *Vernonia* submitted to Cancer Chemotherapy, National Service Center, National Cancer Institute, U.S. Department of Health, Education, and Welfare, by R. E. Perdue, botanist in ARS, USDA, *V.*

*hymenolepis* was found to have an antitumor constituent. The compound, vernolepin, a sesquiterpene dilactone, was extracted and isolated from leaves by S. M. Kupchan and his colleagues (Kupchan and others, 1968). When tested against Walker intramuscular carcinosarcoma 256 in rats, 12 mg. of the vernolepin per kg. of body weight produced significant inhibition of the cancer. Subsequent experimentation (Sequeira and others, 1968) has shown that vernolepin acts as a plant growth inhibitor against wheat coleoptiles. The growth-inhibiting effects can be reversed by treatment with indole acetic acid.

Although the initial interest in the achene oil chemicals was centered in epoxyoleic acid, two other constituents have been isolated from achenes of *V. anthelmintica*. (Krewson and others, 1962). Krewson and his colleagues isolated trivernolin and 1, 3 divernolin which, along with epoxyoleic acid, it was suggested might be of interest for experimental determination of their utility in plastic formulations and in the preparation of chemical derivatives.

### Ecology of *Vernonia* species in eastern Africa

The Ethiopian highlands are largely treeless grasslands or brushlands except where they are under cultivation. In Eritrea, *V. abyssinica* is often a prominent component of the low,

weedy vegetation of the much mistreated land. (See fig. 17, p. 30.) On the scarp rising from the Red Sea, *V. abyssinica* is found near the top in areas which have been denuded of forest

and where the soil is disturbed. The plant forms a scraggling open shrub with small, scattered leaves and, unless it is in fruit, is difficult to differentiate from other vegetation. The flowering heads are small and are not colorful enough to be conspicuous. Wherever cultivation of the soil is abandoned for several years, plants of *V. abyssinica* are apt to be found, but they do not appear to persist where natural vegetation, including scattered trees, becomes well grown.

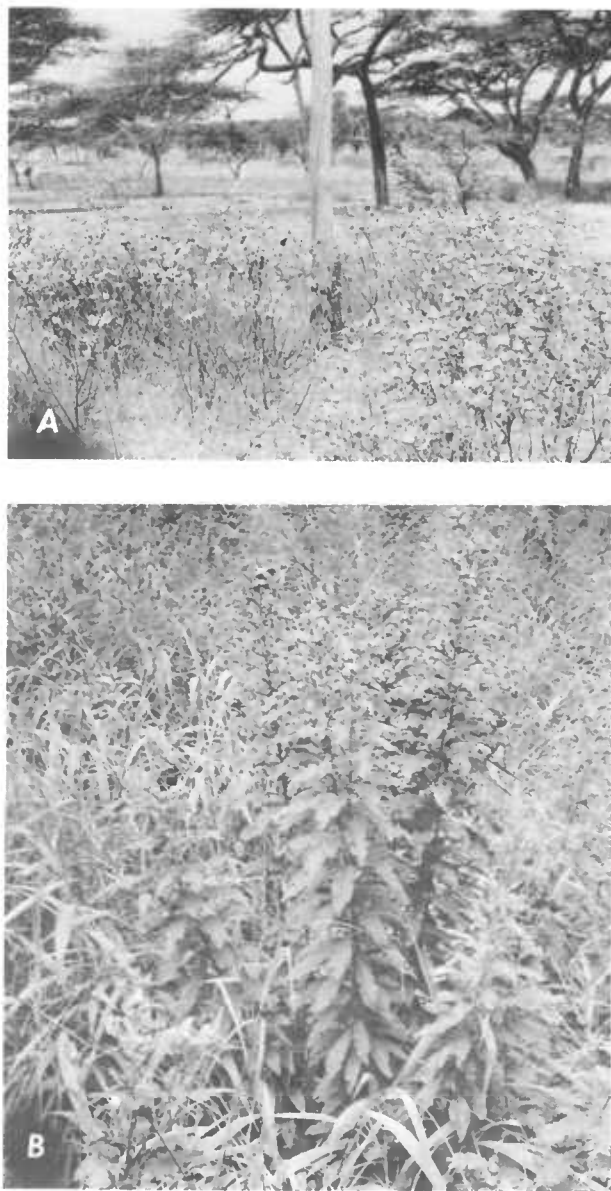
Farther south, and southwest of Addis Ababa, in areas of open Acacia forest and grassland, *V. adoensis* (fig. 5A) appears to prefer disturbed soil. While it is perennial from a large root crown, the thickest colonies occupy areas along road grades. It may be growing in almost open grassland or it may compete with other perennials and shrubs of about the same stature, but I did not find it under shade.

In east Africa, *V. adoensis* occupies similar habitats, but to the southward in Zambia and South Africa, I have seen it in situations where soil moisture is somewhat greater. Here the stems become much taller and the leaves are usually somewhat larger. Even in these areas, though, it grows in open sunlight, usually where the soil has been disturbed (fig. 5, B). Unless the white phyllary tips are well developed, the plant is inconspicuous among other vegetation.

*Vernonia hymenolepis* is a plant of somewhat higher rainfall areas than the species which were discussed above (fig. 6). Around Jimma, Ethiopia, in an area where much of the land has been disturbed, this species grows in hedgerows and on ground which has been abandoned for some time. The lanky shrub may become more heavily branched because of constant trimming by passers-by. In a more natural habitat with other shrubs in lightly wooded areas and often on slopes, the shrub stands upright to equal or overtop other vegetation (fig. 6, B).

To the south in east Africa, *V. hymenolepis* remains much the same in habitat preference and in habit. When it is in flower, the white phyllary tips are the most conspicuous part of the inflorescence. I have not seen it growing where it was overtopped by trees (fig. 6, A).

The several collections which I have made of *V. lasiopus* were all growing in areas which



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Figure 5.—*Vernonia adoensis* growing in disturbed soil. A, Among roadside vegetation near Adamitullo, Ethiopia, the plant is conspicuous even though most of its leaves have dried and fallen (Smith, Desta, & Sesai, 4566). B, Near Duiwelskloof, Transvaal, South Africa, *V. adoensis* is a component of the vegetation along a well-watered roadside (Smith, 4675).

were less disturbed than those generally occupied by the species discussed so far. The plant is persistent in pastures where the brush is not cut, but colonies are often found in little dis-





PN-2026

Figure 6.—*Vernonia hymenolepis* growing in eastern Africa. A, Just off the road north of Hoey's Bridge, Kenya, *V. hymenolepis* forms an open shrub in the disturbed soil (Smith & Njeroge, 4632). B, Near Sheshemene, Ethiopia, where the forest has been high-graded for wood but the undergrowth is little disturbed, *V. hymenolepis* becomes a tall shrub in competition with surrounding species (Smith, Desta, & Sesai, 4564).

turbed, open areas of native shrubs and grass where there is adequate moisture. The plant is somewhat spreading and forms a mass among competing vegetation, but it apparently does not tolerate shading (fig. 7, B). *V. lasiopus* seems to require more available moisture than the species previously discussed. I have found it only in topographical situations where moisture accumulates from nearby slopes. The label data on herbarium specimens bears this out.

Although *V. afromontana* is not a member of the section as currently constituted, I collected it several times in Kenya. I have found it only in upland areas of higher rainfall. It is abundant on the slopes of Mount Kenya and also

grows on the slopes of Mt. Elgon. Often, the colonies are in thick brush where they are difficult to distinguish because the colonies do not seem to overtop the surrounding plants. It is shade tolerant, being found under the open canopy of forested areas where individual plants are directly exposed to sunlight for only a short period each day. In such situations, the blue flowers and sordid pappus of mature heads are very difficult to see.

I found that the relatively open *Brachystegia* woodlands of Zambia are rich in stengeloid *Vernonia* species early in the year (see fig. 7, A). In flat areas in the region of Abercorn, *V. sciaphila* is showy and abundant. On



better-drained slopes, *V. guineensis* is less common and scattered. *V. subaphylla* and *V. filipendula* are infrequent, occurring generally as individual plants. In the Abercorn area, *V. superba*, which does not belong to section *Stengelgia* but may be closely related to *V. afromontana*, grows with *V. sciaphila* and is fairly common.

All of these species are partially shade tolerant, growing with associated grasses, herbs, and shrubs among the scattered forest trees. They grow only in little disturbed sites away from roadside banks and cultivated patches. While some sorting of the species by habitat preference occurs, the factors responsible are not immediately evident.

From Ethiopia to the Transvaal, all of the species of section *Stengelgia* which I observed shared a common habitat characteristic, with the exception of those growing on permanently moist, montane slopes. During the dry season, most of the habitats are subject to fires. At two localities, achenes of *V. adoensis* were gathered at the margin of a recent burn. *V. lasiopus* may

generally escape burning because it is in areas of higher moisture. The others, particularly the species growing annually from a perennial rootcrown, are subject to periodic, low intensity fires. Burning obviously does not seriously damage the underground portions of the plants, but it could well damage achenes that are still attached or that have dispersed and fallen among the nearby grasses and herbs. At the same time, achenes may well be caught in the updraft from a fire and become widely distributed over many miles. Thus, the same agent that destroys propagules can also be beneficial in maintaining a favorable habitat for the species and may also serve to disseminate achenes.

Unfortunately, I was not in Africa at an appropriate time to observe and collect species of the group with thin, long-lobed florets and, usually, a basal rosette of leaves. From the label data, I find that these species are restricted to savannas and plains over most of the continent. In some species, the flowering and fruiting heads remain on ground level; other species have heads elevated on scapes and are no taller



Figure 7.—A, *Vernonia guineensis* growing in open *Brachystegia* woodlands in the Luano Forest Reserve near Chingola, Zambia. B, Individual plants of *V. lasiopus* near Mbarara, Uganda, are full and overtop surrounding vegetation (Smith & Wood, 4627.)

than the grasses in which they grow. Thus, the plant is difficult to find, which accounts for the paucity of herbarium specimens. Also because these plants are so inconspicuous except when in flower, several of the species have not been collected with mature achenes. All of these

species grow in habitats strongly influenced by fire, as is shown by the specimens themselves and the label data for many of them. The wide distribution of a number of these species may well be the result of airborne achenes that were lofted by the updraft from fires.

### Biological units within section *Stengelia*

The arrangement of the species in this paper does not imply any phyletic order. Naturally, those species which are most similar morphologically are grouped. The association of species is otherwise strictly fortuitous.

I have begun the presentation with *V. adoensis*, the type species for section *Stengelia*, primarily because it is the one species I am sure belongs to the section. Actually, morphologically similar species which follow *V. adoensis* probably are members in good standing of the section. For many of the species, my only reason for listing them is that an earlier botanist said that they belong to the section. I shall leave the task of defining the section to someone with sufficient time to investigate in detail the bulk of the African species of *Vernonia*. Only in this way can the sectional lines be drawn with assurance.

Until recently, no chromosome counts have been reported for *Vernonia* species belonging to section *Stengelia*. The most recent atlas known to me (Bolkhovskikh, Z., et al., 1969) lists the following counts:

<i>V. anthelmintica</i>	2n = 20	Mehra, P. N., et al., 1965. <sup>1</sup>
	2n = 54	Parameswar, 1960. <sup>1</sup>
<i>V. guineensis</i>	2n = 20	Mangenot, S. & G. Mangenot. 1958 & 1962. <sup>1</sup>
<i>V. kotschiana</i> (= <i>V. adoensis</i> )	2n = 18	Miège. 1960a. <sup>1</sup>
<i>V. primulina</i> (= <i>V. gerberiformis</i> )	2n = 20	Mangenot, S. & G. Mangenot. 1958 & 1962. <sup>1</sup>

<sup>1</sup> Complete citations may be found in the compendium cited.

Three of the five reported counts show that n=10. The count of 2n=54 for a plant identified as *V. anthelmintica* may be due to misidentification of the plant counted. It is also possible that it was a count on a plant from a

polyploid population, but this seems unlikely in view of counts made recently. The count of 2n=18 for *V. kotschiana* (sic *V. kotschyana*) may represent aneuploidy, but, again, it may be based on incorrectly identified plant material.

In 1969, S. B. Jones (personal communication) counted several species of section *Stengelia*. All of these counts have proven to be n=10. One of these was a recount of *V. anthelmintica*, strengthening further my feeling that the count of 2n=54 is based on an incorrectly identified plant. The remainder of Jones's count are as follows:

<i>V. adoensis</i>	n = 10
Ethiopia. Perdue 6441. Smith, Desta & Sesai 4566.	
South Africa. Duthie s. n.	
<i>V. abyssinica</i>	n = 10
Ethiopia. Smith & Andemeskal 4531.	
<i>V. anthelmintica</i>	n = 10
Pakistan. P. I. 283729.	
<i>V. lasiopis</i>	n = 10
Uganda. Smith, Wood & Perdue 4612.	
<i>V. filipendula</i>	n = 10
Zambia. Fanshawe 10,018.	

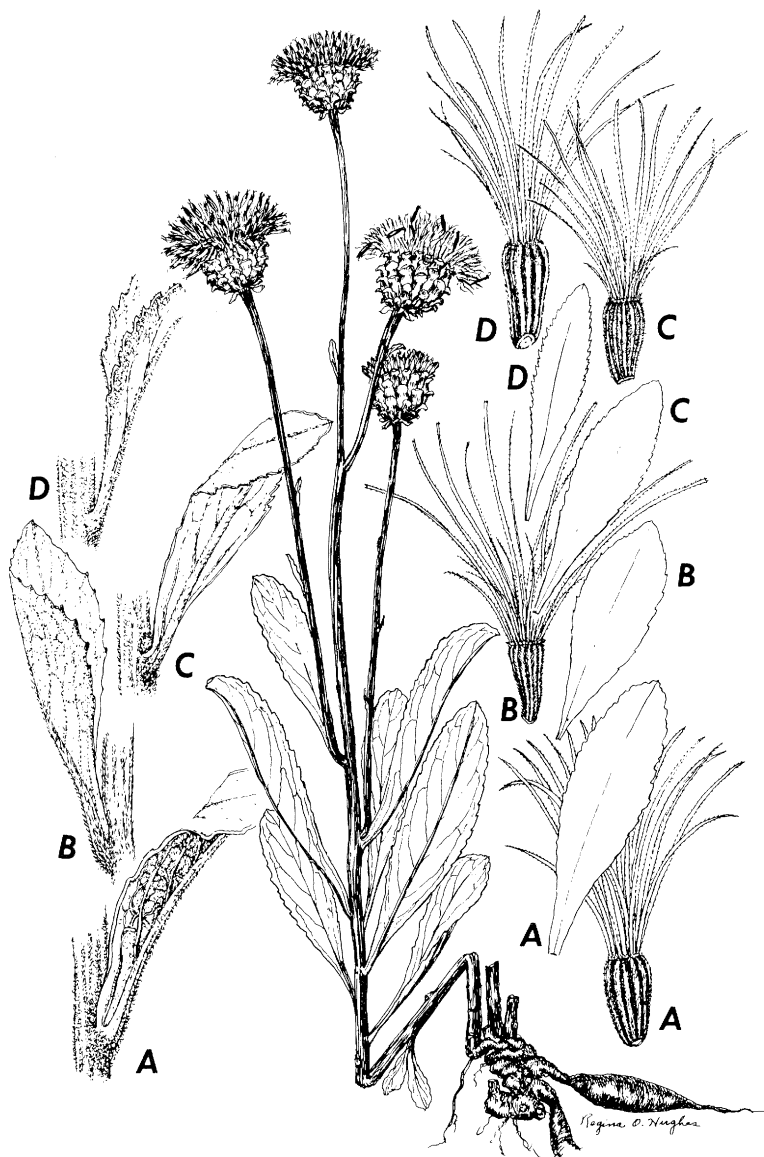
Enough counts have now been made over a wide enough representation of section *Stengelia* to assure me that the basic chromosome number for the species of this section must be n=10. However, I suspect that polyploidy may account for some observations which I have made. For instance, *V. procera*, which others have submerged in *V. guineensis*, is a much larger and more robust plant with the same basic morphology whose size may be attributable to a higher ploidy level. Both the size of the plant parts and the pollen characteristics indicate the possibility that the entities formerly called *V. calvoana* and *V. insignis* may be polyploid members of the group in which they have been placed.

Section *Stengelia* appears to be composed of

currently evolving complexes mixed with a few relatively stable taxa of limited distribution. The latter are easily defined geographically and morphologically. It is the complexes in a state of flux which have bothered earlier botanists and which bother me today. It is the usual story of variability almost without limit. Variation in *Vernonia* section *Stengelia* is amply illustrated in figure 8. The tendency among

some earlier workers, with far fewer specimens to indicate the overlapping of morphological characteristics, has been to name relatively small variants. I tend to another extreme of placing all morphologically similar specimens in the same group.

The latter course has its pitfalls as surely as does the naming of all variants. However, I feel that it more nearly represents the actual



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Figure 8.—Variation in a single collection of *V. filipendula* Hiern. Habit from *E. A. Robinson 4036* in the Federal Herbarium of Rhodesia and Nyassaland. Details are from the same collection from specimens deposited as follows: *A*, SRGH; *B*, K; *C*, EA; and *D*, PRE. Details of pubescence (left), leaf size and marginal variation and achene variation (right).

biological situation. My impression of Africa today, on the eastern side of the continent, is that the whole vast area from the Red Sea to Capetown is ecologically disturbed. In Ethiopia, apparently the disturbance dates far in the past over much of the plateau area. Disturbance of the natural vegetation in the area south of Ethiopia appears to be more recent, but sufficiently long ago to have opened up new habitats into which the vegetation has differentiated. Species of section *Stengelia* frequently grow in obviously disturbed areas or in areas of second growth vegetation.

A prime example is the type species, *V. adoensis*, which I have seen growing only where the native vegetation has obviously been disturbed. Colonies of this species exhibit a notable amount of variation which is perhaps more striking toward the southern end of its geographical range than at its northern end in Ethiopia. Once it has been seen in the field, there is no doubt that the southern and northern variants are of the same species, in spite of the rather wide differences in the plants at the margins of the range. This led to their recognition as different species at an early date.

Another factor lending variability to populations of stengelioid *Vernonia* species may be nearly complete interfertility. While I have no experimental evidence to support my speculations, I have seen many areas of *Brachystegia*

woodland in Zambia in which the populations of *Vernonia* species are unusually variable. Among these plants, it was easy to find characteristics (alien to the species as a whole) which suggest a species growing sympatrically. This appears to be particularly true of *V. guineensis* and related species, many of which appear to have interbred with non-stengelioid species of *Vernonia* such as *V. superba* and *V. glabra*. When I visited central and northern Zambia, I saw many of the herbaceous perennial species blooming at nearly the same time so that crossing would have been readily possible if no barrier to the reception of foreign pollen were present.

Even among the shrubby species, variation by any other mechanism in populations of *V. hymenolepis* and *V. lasiopus* is difficult to explain. Generally, the variation is completely intergrading within a species population so it would not seem to be a question of misinterpretation of species lines. Rather, the intergradation of *V. hymenolepis* and *V. lasiopus* is probably due to hybridization whenever plants of the two species grow in close proximity. This is readily seen in western Uganda, where I found variable populations of *V. lasiopus* in which some plants are difficult to distinguish from *V. hymenolepis*. Of course, the ecological disturbance in eastern Africa has provided ample habitats for the development of intergrades.

## Preparation of the report

This series of observations on the species of section *Stengelia* is based partly on field observations and partly on a study of herbarium specimens and pertinent literature. Field work was carried out in eastern Africa from Eritrea in Ethiopia in the north to Durban, Natal, South Africa, in the south. *Vernonia* populations were observed in the field, herbarium specimens were prepared and achene samples were collected for oil analysis whenever mature achenes were available. During most of the year following my visit to Zambia, Dr. Dennis B. Fanshawe, Principal Scientific Officer, Forestry Department, Ministry of Natural Resources and Tourism, continued to collect her-

barium specimens and achene samples for this study. I am most grateful for his wholehearted cooperation.

Herbarium specimens were borrowed from several European collections and from many African herbaria. In addition, when it became apparent that I must deal with many more names than I had originally thought necessary, many institutions were very cooperative in furnishing photographs of type collections in their care. All of the type collections were verified insofar as authors cited specimens. The specimens were studied in detail and finally sorted into my interpretation of the biological units.

In preparing the following descriptions, herbarium specimens, chosen for their relative completeness, were used. Characteristics and measurements were tabulated and the descriptions were written from the tables. This is not a comprehensive monograph on the species of section *Stengelia*, and the descriptions are intended only to differentiate one species from another.

Certain characteristics are common to all or most of the species accepted as belonging to the section. In all of the species, the phyllaries are differentiated into a basal, usually chartaceous, portion and an herbaceous tip. The flowers of the cauline species are generally clearly differentiated into an elongate tube and an enlarged limb with triangular lobes. Most of the species of the rosette-leaved group differ in that the flowers enlarge gradually from the base and the lobes are lanceolate and thin. Achenes of all of the species are costate, tapered from the base and usually are pubescent or pilose. Pappus ranges from short on the outside to long on the inside; the setae are numerous, usually cream color and variously pubescent or ciliate for the most part. Setae are generally more or less deciduous although the shortest outer setae are sometimes slightly broader and tend to persist after the longer setae have been lost. These characteristics will not be noted in the descrip-

tions unless some feature differs sufficiently to be notable.

Measurements reported here were all made on dried herbarium specimens which had not been restored by soaking or boiling. The measurements for fresh material may be somewhat greater than I have reported. Leaf length includes the apex and petiole; leaf width was measured at the widest part of the blade, regardless of shape. Head height was measured from the top of the peduncle to the top of the pappus and did not include phyllary tips or flowers which often extended beyond. Head diameter was less accurate because I attempted to adjust it for the lateral expansion caused by pressing. Flower length is the length of the corolla exclusive of the anther tube or style which is often exerted; amount of exertion of reproductive structures is largely dependent upon the age of the flower and is very unreliable for comparison purposes. Achene length is from the point of basal attachment to the point of attachment of the setae; pappus length is that of the longest setae on the achene measured. I have reported maximum lengths primarily. Many species of this group appear to respond markedly to environmental conditions and all plant parts will be much smaller when conditions are poor.

### Selection of lectotypes

This study is not intended as a definitive monograph; it cannot be definitive until related sections have been thoroughly studied. Yet, some of the early authors of species cited several collections without designating a type. From among these I have selected the specimen most representative of the description from those cited specimens which I have seen. However, in many instances, I have not seen all of the collections cited with the original description, and specimens may exist among which one may be a better lectotype.

Where I have been reasonably certain that I have seen the material studied by the author of a new species, I have designated the holotype by placing an exclamation mark (!) after the

initial designating the herbarium. The type collections of species described by Spencer Moore provided a problem in that Moore worked in London and the same collection is often in the herbarium of the British Museum as well as in the herbarium at Kew Garden. Moore probably had both specimens in hand and did not designate the holotype (the concept is relatively young). I have probably done an injustice to the British Museum, but I have designated the Kew specimen as holotype when it was available to me and the specimen in the British Museum was not. In other instances, the only specimen is in the British Museum and the museum has kindly furnished photographs for my use. These specimens, of course, are the holotypes.

The destruction of many collections of the Berlin (Dahlem) herbarium has posed another problem. Type collections deposited there may be represented by isotypes in other herbaria, but this will require an on-the-spot search of thousands of specimens in all of Europe's major herbaria. My request to many herbaria for type

photographs disclosed only a few specimens in type collections, but I am sure that others rest, unrecognized, in general herbaria where the staff has been unable to spare the time to look for them. Unfortunately, I was unable to undertake the search myself. I would recommend that future students of African *Vernonia* plan to spend considerable time in such a search.

### Systematic treatment

*Vernonia* Schreb., Section Stengelia (Sch.-Bip. ex Walp.) Benth. & Hooker. Gen. Pl. 2:227 1873.

Subsection Stengelia Sch.-Bip. ex Walp. Repert. Bot. Syst. 2: Suppl. 1, 946. 1843.

Inner involucre bracts with membranous, colored appendages; heads medium large; outer pappus bristles or scales short, inner sometimes scattered.

Lectotype species: *Vernonia* (Stengelia) *adoensis* Sch.-Bip. ex Walp.

As currently constituted, the section includes annual herbs, perennial herbs, shrubs, and trees to 10 m. tall. Leaves whorled (species with a basal rosette) opposite, or generally, alternate. Heads borne singly, terminal, to many, terminal or lateral, aggregated in paniculate to corymbose groups; phyllaries various, but the inner always composed of a coriaceous basal portion and an herbaceous tip which may be green, white, or variously colored; flowers inseparable from those of species of *Vernonia* in other sections; achenes generally with basal callus light in color, the fruit increasing in size upward, often costate, sometimes variously pubescent and/or glandular, with pappus in several series, the outermost of which is sometimes very short, scalelike and persistent, inner generally long, flattened or filiform, usually variously pubescent, sometimes early deciduous.

Geographical distribution: Continental Africa south of the Sahara Desert to Natal, South Africa, one species also in Yemen, one species restricted to the Indian subcontinent.

The following key to species described in this paper is completely artificial. In spite of the similarities between some of the species, they frequently appear widely separated in the key because of contrast in some characteristic which may otherwise be unimportant.

- |   |                               |
|---|-------------------------------|
| 1. Plants with erect stems.   | 2.                            |
| 2. Trees or shrubs with woody bases and branches.   | 3.                            |
| 3. Trees to 10 m. tall with single trunk, sometimes shrubby.  | 4.                            |
| 4. Heads to 3.0 cm. high; phyllaries to 3.5 cm. long.   | 3. <i>V. adolfi-frederici</i> |
| 4'. Heads to 1.5 cm. high; phyllaries to 1.3 cm. long.  | 11. <i>V. oxyura</i>          |
| 3'. Shrubs.   | 5.                            |
| 5. Upright, moderately branched shrubs to as much as 5 m. tall; heads to about 3.0 cm. in diameter; achenes not noticeably glandular.   | 6.                            |
| 6. Leaves predominantly lanceolate; achenes to 0.45 cm. long, generally black, glabrous; pappus markedly early deciduous.   | 4. <i>V. hymenolepis</i>      |
| 6'. Leaves predominantly ovate; achenes to 0.35 cm. long, medium brown, moderately pubescent; pappus persistent.  | 2. <i>V. bracteosa</i>        |
| 5'. Shrubs to 2.5 m. tall or less; heads to 2.0 cm. in diameter; achenes glandular or so densely pilose that the surface is not visible.  | 7.                            |
| 7. Shrub not more than 1.0 m. tall, densely branched; leaves crowded; heads strict, taller than broad; achenes densely white or golden pilose.  | 14. <i>V. vallicola</i>       |
| 7'. Shrubs 1.5 to 2.4 m. tall, moderately to openly branched; leaves moderately to openly spaced; heads as broad or broader than tall; achenes glabrous to pilose, glandular surface visible through hairs. | 8.                            |

8. Openly branched; leaves to 5.0 cm. long, scattered on branches; tube and limb of flower about equal. **6. *V. abyssinica***
- 8'. More compact shrubs; leaves more than 5.0 cm. long, stems and branches leafy; tube up to twice as long as limb. 9.
9. Stems to 1.5 m. tall or less, perhaps more herbaceous than woody; phyllary tips often attenuate and conspicuously spreading. (Known only from Ethiopia.) **9. *V. petitiana***
- 9'. Stems to 2.4 m. tall, sometimes more, woody; phyllary tips small to petaloid, lanceolate, sometimes reflexed or spreading. **10. *V. lasiopus***
- 2'. Annual herbs or plants with herbaceous shoots produced annually from a perennial root crown. 10.
10. Annual herbs. 11.
11. Outer phyllaries not conspicuously long. Plant of India, Ceylon, and Pakistan. **8. *V. anthelmintica***
- 11'. Outer phyllaries often conspicuously long, spatulate. Widely distributed in southern and eastern Africa. **7. *V. stenolepis***
- 10'. Perennial root crowns from which herbaceous tops are produced annually. 12.
12. Heads borne on scapes separate from and before leafy stems. **28. *V. pumila***
- 12'. Heads borne on leafy stems. 13.
13. Leaves densely lanate beneath. 14.
14. Heads single or few, to 2.5 cm. high, 4.0 cm. in diameter. **13. *V. procera***
- 14'. Heads usually numerous, to 1.5 cm. high, 2.0 cm. in diameter. **12. *V. guineensis***
- 13'. Leaves pilose or pubescent, but not lanate beneath. 15.
15. Outer phyllaries to 4.0 cm. long, lanceolate, yellow-green without, dark red within. **18. *V. nigritana***
- 15'. Phyllaries less than 2.5 cm. long, not bicolored as above. 16.
16. Basal callus confluent with costae on achenes. **19. *V. sciaphila***
- 16'. Basal callus discreet. 17.
17. Phyllary tips conspicuously veiny. 18.
18. Stem foliage closely investing the several heads. **17. *V. campicola***
- 18'. Stem foliage separated from the single or few heads by a short peduncle. **5. *V. buchingeri***
- 17'. Phyllary tips various, but not conspicuously veiny. 19.
19. Phyllaries with marked midribs. **20. *V. sclerophylla***
- 19'. Phyllaries various, but lacking marked midrib. 20.
20. Branches originating at leaf axils shortly below heads so that the older heads are partially hidden, heads terminal on main stem and branches.
- 1. *V. adoensis***
- 20'. Branching shorter and the upper smaller so that the several heads are crowded, but none are hidden or the heads long pedunculate. 21.
21. Leaves lanceolate, glandular above and below; heads to 1.5 cm. high, 1.5 cm. in diameter. **15. *V. benguelensis***
- 21'. Leaves oblanceolate, glandular beneath only; heads to 2.5 cm. high, 3.5 cm. in diameter. **16. *V. filipendula***
- 1'. Rosette plants from perennial root crowns (except 21. *V. gerberiformis* sometimes caulescent). 22.
22. Flowers produced before leaves. 23.
23. Single scape produced from each root crown. **27. *V. praecox***
- 23'. Several scapes produced from each root crown. 24.
24. Only one head borne on each scape. **29. *V. chthonocephala***
- 24'. Several heads in an open panicle borne on each scape. **26. *V. denudata***
- 22'. Flowers borne above a rosette of foliage (except 21. *V. gerberiformis* sometimes caulescent). 25.
25. Several heads borne on each scape. 26.
26. Heads borne in an open panicle; phyllary tips scarious. **25. *V. subaphylla***
- 26'. Heads closely crowded at summit of scape; phyllary tips herbaceous. **24. *V. praemorsa***
- 25'. A single head borne on each scape. 27.
27. Leaves largely immature at time of anthesis; phyllaries usually nearly 1.0 cm. wide. **23. *V. acrocephala***
- 27'. Leaves well developed at time of anthesis; phyllaries lanceolate, narrow. 28.
28. Leaves 23.0 cm. long by 6.0 cm. wide; scapes to 0.4 m. tall; heads to 3.0 cm. in diameter; plants sometimes caulescent. **21. *V. gerberiformis***
- 28'. Leaves to 9.0 cm. long by 1.5 cm. wide; scapes to 0.15 m. tall; heads to 2.0 cm. in diameter; always acaulescent. **22. *V. nyassae***

1. *Vernonia adoensis* Sch.-Bip. ex Walp. Rep. Bot. Syst. 2:946. 1843. (Figs. 9, 10, and 11. See also figs. 1, 2A, and 5.)  
 Type Coll: *Schimper* 318. In inferiore et media regione septentrionali montis Scholoda [Scelloda Mt.] 1 Dec., 1837. (BM, CAL, FI, G, K, US).  
*Stengelia adoensis* Sch.-Bip. ex Hochst. Flora 24: Intelligenzbl. 1841. I (2): 26. 1841.  
*Nomen nudum*.  
*Vernonia kotschyana* Sch.-Bip. ex Walp. Op. cit. 947.  
 Type Coll: *Kotschy* 290. In valle prope pagam Cordofanum Millees. 4 Dec., 1839. (BM, BR, CAL, G, GH, K, NY).  
*V. macrocephala* A. Rich. Tent. Fl. Abyss. 377. 1847. (non Less.) *Nom. illeg.* (later homonym).  
 Type not seen. Synonymy fide Oliver & Hiern, Fl. Trop. Africa 3:291. 1877.  
*Ascaricida adoensis* (Sch.-Bip. ex Walp.) Steetz in Peters. Reise nach Mossambique, etc. 358. 1862-64.  
*A. richardi* Steetz in Peters. Loc. cit.  
*Vernonia grantii* Oliv. Trans. Linn. Soc. London 29:92. 1873.  
 Type Coll: *Grant s. n.* In Unyoro forests. Nov., 1862. (K!).  
*Candidea grantii* (Oliv.) Stapf. Bot. Mag. 149: t. 5689, 7255. 1923.  
*V. tenoreana* Oliv. Loc. cit.  
 Type not seen.  
*V. polymorpha* var. *accedens* Vatke. Linnaea 39:477. 1875.  
 Type Coll: *Schimper* 817. Auf Bergen, Amba Sea 6,500' über Meer. 22 Nov. 1862. (BM, K).<sup>1</sup>  
*V. polymorpha* var. *adoensis* (Sch.-Bip. ex Walp.) Vatke. Op. cit. 476.  
*V. polymorpha* var. *ambigua* Vatke. Op. cit. 477.  
 Type Coll: *Schimper* 817? Ebene Hamedo dicht am Mörebb Thel 4,200' über Meer. (BM).  
*V. shirensis* Oliv. & Hiern in Oliver. Fl. Trop. Africa 3:291. 1877.  
 Type Coll: *Meller s. n.* Lower valley of river Shire. Zambesi. May, 1861. (K!).  
*V. tigrensensis* Oliv. & Hiern in Oliv. Op. cit. 290.  
 Type Coll: see *V. polymorpha* var. *accedens* Vatke.  
*V. woodii* O. Hoffm. Bot. Jahrb. Syst. 38:198. 1906.  
 Lectotype Coll: *Wood* 8155. Near Pinetown, Natal. Apr., 1901. (K, NH).  
*V. integra* S. Moore. J. Bot. 46:39. 1908.  
 Type Coll: *Eyles* 277 Rhodesia. Mazoe. Bernheim Hill. 4,300-4,800 ft. Mar. 1906. (SRGH).  
*Vernonia latisquama* Mattf. Bot. Jahrb. Syst. 59: Beibl. 133:5. 1924.  
 Type Coll: *Milbraed* 8364. Kamerun Übergangsund Kampfgebeit die Savanne an der Nordgrenze der Hylaea südlich des Sanaga zwischen Jaunde und Dengdeng unweit der Vereinung von Lom (Sanaga) und Djerem. Etwa 155 km. N. O. Jaunde. Feb., 1914. (K).  
*V. fulviseta* S. Moore, J. Linn. Soc. Bot. 47:266. 1925-27.  
 Type Coll: *Buchanan* 1297. Nyassaland. 1891. (Photo — BM!).  
*Candidea stenostegia* Stapf. Bot. Mag. 149: t. 8981. 1923.  
 Type Coll: *Robbins s. n.* Narawassa Prov., Nigeria (Grown from seed at Edinburgh Botanic Garden). (K!).  
*Vernonia stenostegia* (Stapf) Hutch. & Dalz. Fl. W. Trop. Africa 2:164, *in clavi*, 166. 1931.

<sup>1</sup> Also the type of *Vernonia tigrensensis* Oliv. & Hiern.



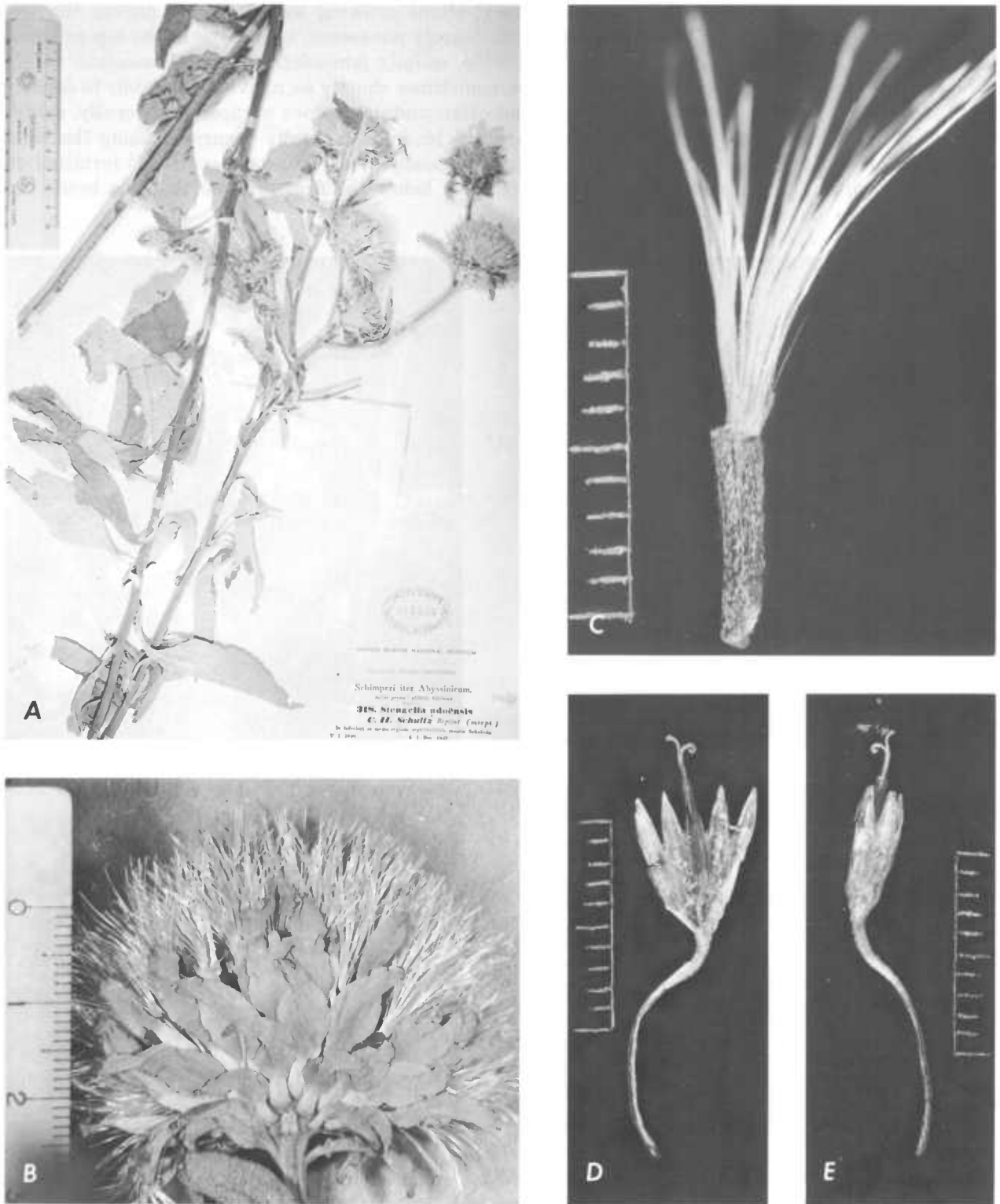


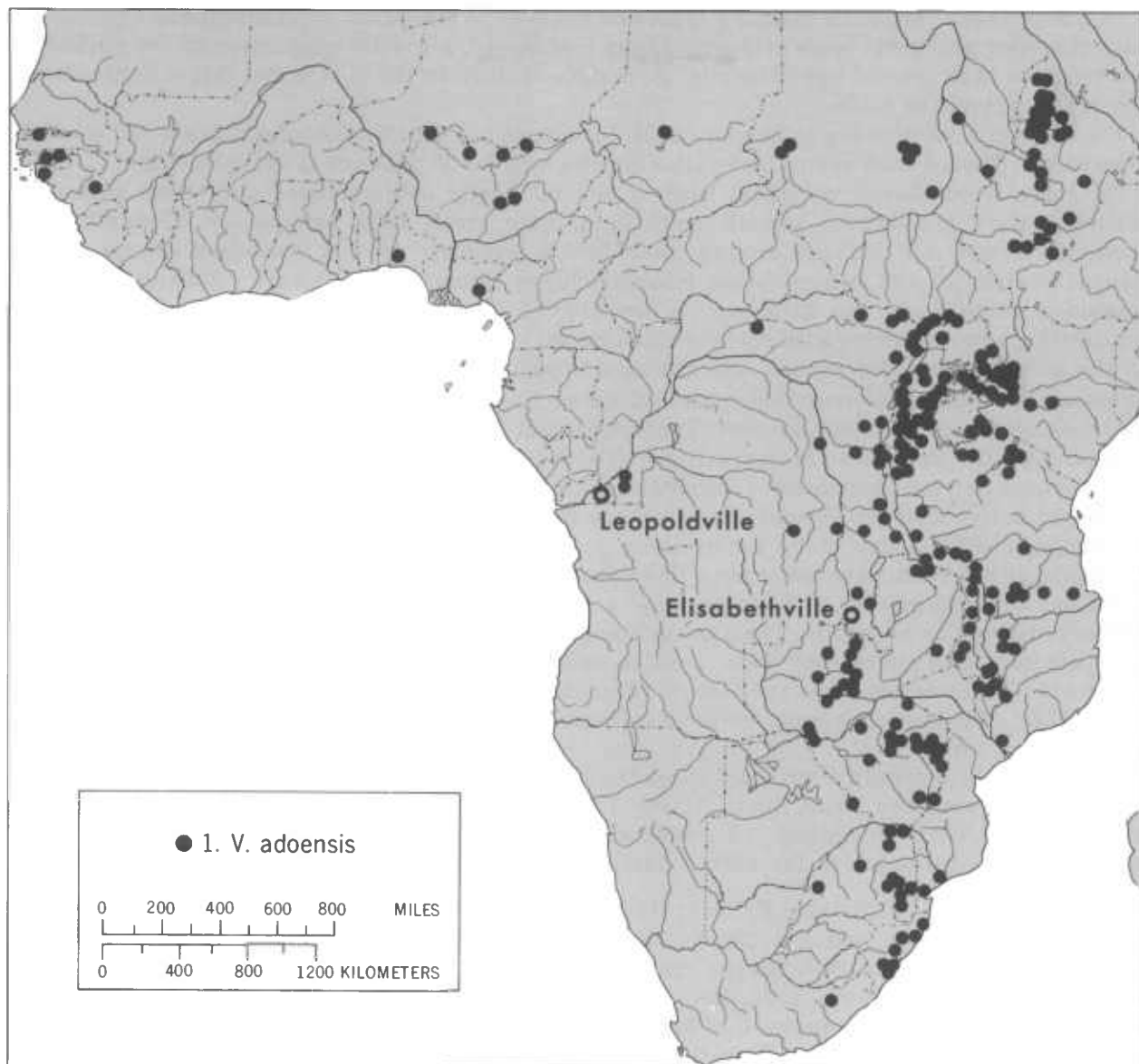
Figure 9.—Type collection of *V. adoensis* Sch.-Bip. ex Walp. A, Habit (US); B, detail of head (G); C, achene (US); D, flower, dissected and E, unopened (expanded in water) (G). Scales in millimeters.

Herbaceous perennial from a large root crown; stems growing to 2.5 m. tall during the wet season. Stems rarely glabrate to, usually, thinly to densely pubescent, branching at the top as heads are produced. Leaves to 26.5 cm. long, to 8 cm. wide, usually lanceolate to ovate-lanceolate, rarely ovate; blade scattered pilose to moderately pilose, sometimes shortly so, above, moderately to densely pubescent below; margin irregularly dentate and often undulate; apex obtuse to, generally, acute; base acute, rarely abruptly acute, usually cuneate, the blade occasionally decurrent along the sides of the petiole to the stem; petiole to 2.5 cm. long, frequently 1 cm. long or less. Heads terminal on the main stem and on branches produced immediately below the first head so that the heads are



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Figure 10.—A, Plants of *V. adoensis* along the roadside at the edge of a plain near Kasese, Uganda (Smith, Wood & Perdue 4626). B, Ato Desta and Ato Sesai collecting achenes from a roadside colony near Adamitullo, Ethiopia (Smith, Desta & Sesai 4566). C, Flowering heads of a plant near Abercorn, Zambia (Smith & Richards 4673). Note the similarity to (D) flowering heads of plants in the colony shown in B.

Figure 11.—Distribution of *V. adoensis*.

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often cymosely arranged, few to many, to 2.5 cm. high, to 3.5 cm. in diameter; longest phyllaries to 2.4 cm. long, lanceolate, outer usually green, uniformly herbaceous, pubescent, inner chartaceous, glabrous below, herbaceous, rarely puberulent above and the latter portion frequently broadly ovate, white, rarely pink or green; flowers to 2.3 cm. long, tube long and generally glandular, rarely scattered pilose, where the corolla abruptly expands, lobes triangular-lanceolate to lanceolate; achenes to 1.7 cm. long, usually ca. 1.4 cm. long, light to dark brown, scattered to thickly pubescent, usually 20 costate, sometimes with alternate 10 costae prominent, sometimes light in color; callous tip discreet; pappus to 1.4 cm. long, flat, obtuse to usually acute, often ciliate at tip, sometimes finely pilose overall; phyllaries extending laterally in drying.

In the northern part of its range, *V. adoensis* tends to be somewhat shorter and more pubescent with the outer phyllaries more evidently green. Southward, a greater proportion of the phyllaries are broad or bear colored tips. The most noticeable feature in the field is the large, light-colored phyllaries around the heads.

For those species growing in Zambia, D. B. Fanshawe has provided notes which are too valuable to be edited. Thus, I shall quote these verbatim. His note for *V. adoensis* is the following:

"A stout, woody-based, perennial herb or shrub, usually multistemmed with erect spreading branches. Bark grey-brown, smooth, lenticillate, slash green, thin, soft, sappy. Flowering and fruiting virtually all the year around. Distribution territory wide. A secondary species on the fringes of riparian and swamp forest, miombo, chipya, munga and Kalahari woodland as well as roadsides, waste places, etc. In Malawi, a decoction of roots and pounded leaves are used to treat indigestion, a root infusion with roots of *Cissampelos mucronata* to treat VD and leaves with those of the same *Cissampelos* rubbed into the skin to reduce swellings (authority Williamson). The Zulus use an infusion to treat influenza and stomachache, a leaf infusion for chronic cough and a root decoction for pains in the chest. The Zulus inject the infusion as an enema in feverish conditions and use the plant as an antiparasiticide. The Jindwe rub a powder made from the burnt wood into incisions to treat rheumatism (authorities Watt and Brandwijk.)"

Several native uses for *V. adoensis* have been recorded. Grover reports (herbarium label) that the natives use the hollow stems for drinking pombe (native beer) near Port Victoria, Kenya. In Tanzania, it has been reported several times that the roots are used as treatment for abdominal pains and tuberculosis (R. E. S. Tanner). The leaves (Nioka, Congo) and the roots (Masai, East Africa) are used as an emetic. The Tanzanians also use the roots to treat gonorrhea; and they cut the roots into small pieces, soak them in water, and use the water to wash children with skin disease (Tanner). White reports that the Chewa (Zambia) make a salt called "chikungu" from the ash of the plant. The species is reported to be cultivated by the natives as a medicinal plant in Natal, South Africa (Wood).

*V. adoensis* is generally distributed along the eastern side of the African continent from Eritrea in Ethiopia to southern Natal, South Africa. Through the equatorial region, it is usually found at elevations of 1,000 m. or higher. It has been collected infrequently westward through the Republic of the Congo, Nigeria, and as far west as Gambia (see fig. 11, p. 19).

*Selected Collections:* ETHIOPIA: Eritrea; Hamasen, Abrascido. A. Fiori. 1729. Feb. 16, 1909. (FI). Da Halibanet ad Amba Derho. A. Tellini 1010. Dec., 1902. (FI). Scioa; Ambo. 2,000 m. G. Giordano 2126 (FI). Addis Ababa-Shashemene road near Adamitullo. Ca. 5,400 feet. C. Earle Smith, Jr., Desta Hundesa & Ato Sesai. 4566. Dec. 28, 1966. (BR, EA, FI, K, MO, US). Amhara; Dembia. Boscaglia rocciose presso Asosa. G. Chiovenda 2726. Oct. 27, 1909. (FI). Gojam; Boscaglia ad ouest del villaggio di Selcién. R. Pichi-Sermolli 962. Feb. 8, 1937. (FI). SUDAN: South of El Obid, Nuba Mts. C. E. Lugard 41. Aug. 11, 1921. (BM, MO). Darfur Prov.; Kebkabiya-Zalingei Road. 900-1,000 m. J. E. Dandy 29. Jan. 1, 1934. (BM, MO). Equatoria; near Upper Nile. Along the Bahr el Jebel between Nimule and Gondokoro. E. A. Mearns 3051. Feb. 4-25, 1910. (GH, K, NY, US). KENYA: Eldoret District, Elgeyo Escarpment. 8,000 feet. R. L. Harger s. n. 1926. (BM). Central Kavirondo District, Escarpment, Kisumu-Mutet Road about 4 mi. N. of Kisumu. R. B. Drummond & J. H. Hemsley 4482. Sept. 27, 1953. (K). Western Region, Port Victoria. G. P. Glasgow 45/35. Sept. 28, 1945. (EA). UGANDA: West Nile Distr. Maracha County, in valley  $\frac{3}{4}$  mi. S.E. of Maracha rest camp. 4,600 feet. R. J. Chancellor 126. Aug. 7, 1953. (K). Mbale Distr., Eastern Prov., 1 mi. S. of Nsola River in W. Bugwe L. Forest Reserve. 3,850 feet. G. H. S. Wood 234. May 5, 1951. (BR, K). Western Prov., south of Mubuku on the Kasese road. 3,500 feet. C. E. Smith, Jr., D. Wood & R. E. Perdue 4626. Jan. 19, 1967. (BM, EA, FI, K, PRE, US). Livengo, Buddu. A. P. G. Michelmores 1301. Mar. 12, 1936. (BR, EA). RUANDA: Biumba. Region du Mutara, environ de Nyakagenge, colline Nyakagenge. 1,420 m. G. Troupin 7124. Apr. 17, 1958. (MO). Parc National de la Kagera. J. Lebrun 9813. 1938. (BR). BURUNDI: Rive orientale du Lac Kivu, à Mushao.

1,460–1,500 m. *H. Humbert* 8448. May, 1929. (BR). TANZANIA: Bugene, Bukoba Distr., 5,000 feet. *A. E. Haarer* 2335. Oct., 1931. (EA, K, NY). Mara Region, Musoma Distr. Hambe ya Mwakenylui, S. boundary. 4,800 feet. *P. J. Greenway & M. Turner* 10370. June 7, 1961. (EA, PRE). Tabora Region, Mwanza Distr., Usagara, Bukumbi. 3,700 feet. *R. E. S. Tanner* 1217. Feb. 19, 1953. (BR, K). Ufipa, L. Kwela. 5,100 feet. *A. A. Bullock* 2968. July 5, 1950. (K). Iringa Prov., Mporoto Mts., 7,000 feet. *C. G. McGregor* 23. Aug. 1, 1936. (EA). Rungwe Distr. Near Matema village and Lake Nyassa. 900 m. *H. M. Richards* 9844. May 21, 1957. (K). ZAMBIA: Northern Prov. In cañon near Abercorn. *C. E. Smith, Jr. & H. M. Richards* 4673. Feb. 22, 1967. (EA, K, SRGH, US). Kitwe Distr., Kitwe. *D. B. Fanshawe* 10141. July 16, 1967. (NDO, US). Eastern Prov., Fort Jameson, Ndolo Forest Reserve, 12 mi. S. of Katete. *F. White* 2446. Aug. 22, 1952. (BR, K). Broken Hill Distr., Broken Hill. 4,000 feet. *F. A. Rogers* 8124. May, 1909. (SRGH). Mt. Makulu, Makulu Res. Sta., 10 mi. S. of Lusaka. *M. Lister* 92. Dec. 14, 1957. (SRGH). Southern Prov. Ca. 12 mi. W. of Livingstone. *C. E. Smith, Jr.* 6474. Mar. 1, 1967. (K, NDO, SRGH, US). RHODESIA: Vicinity of Umvukwe Mts., 5 mi. N. of Banket. *R. J. Rodin* 4389. Apr. 23, 1948. (K, PRE, SRGH). Sebungwe Distr., near Gunyankas Pan. *O. West* 2352. May 28, 1947. (SRGH). Inyanga Distr. Pungwe River near P. E. A. border. 3,300'. *N. C. Chase* 6451. Apr. 19, 1957. (K, SRGH). Inyanga Distr. Honde Valley. *J. B. Phipps* 1125. Apr. 18, 1958. (BR, SRGH). Sabi-Lundi Junction near Lundi River. 800'. *H. Wild* 3444. June 7, 1960. (BR, PRE, SRGH). MALAWI: Kota Kota Distr. Nchisi Mt. 1,600 m. *L. J. Brass* 17059. July 31, 1946. (BR, K, SRGH). Central Prov. Namitete River above bridge on Lilongwe-Ft. Jameson Road. 1,150 m. *N. K. B. Robson* 1476. Feb. 5, 1959. (BM, K, SRGH). Zomba-Blantyre Road. *P. O. Wiehe* N/446. Mar. 17, 1950. (SRGH). MOZAMBIQUE: Niassa-Massangulo. *Pedro i Pedrogão* 3555. June 15, 1948. (EA). Delgoa Bay, Lourenço Marques. *H. Junod* 12. 1890. (BR, G). Umbeluzi flood plain. *A. J. W. Hornby* 3822. (PRE). SOUTH AFRICA: Transvaal; Between Duiwelskloof and Tzaneen. *C. E. Smith, Jr.* 4676. Mar. 5, 1967. (K, PRE, SRGH, US). Transvaal; Letaba. 3,250 feet. *J. C. Scheepers* 129. Feb. 22, 1958. (EA, K, SRGH). Transvaal; Barberton Distr. Barberton. 1,300 feet. *J. Thornecroft* 94. Apr. 20, 1956. (EA, K, PRE, SRGH). Swaziland. Mbabane. Black Mbuluzi Valley, 4,000 feet. *R. H. Compton* 25707. Mar. 3, 1956. (MBA, K, PRE). Natal; Durban. Spring Grange. *J. M. Wood* 441. Apr. 21, 1887. (CAL). CHAD: Between Lake Chad & Bornu. *P. A. Talbot* 1015. Feb., 1911. (BM). REPUBLIC OF CONGO: Mt. Adjigu (Terr. Mahagi). 1,800 m. *Taton* 447. Mar. 18, 1947. (BR). Entre Faradje et Aba. *J. Lebrun* 3414. July, 1931, (BR, K). Kibali-Ituri Prov. 10 km. S. de Mahagi, tete de source de l'Ori. *R. Germain* 4223. Aug. 10, 1945. (BM, BR, K). Kivu-Central. Bulenga. *L. Lily* 810. Oct. 22, 1953. (BR). Plaine de la Ruzizi, Luvungi. *R. Germain* 6190. Oct. 20, 1950. (BR). NIGERIA: Bauchi Prov. Sabon Gari, Tama, Lame Distr. 2,800 feet. *G. V. Summerhayes* 34. Aug. 24, 1954. (K). Bauchi. *H. V. Lely* P160. Feb., 1929. (K). Oyo Prov. Along the Ibadan-Ijebu Ode motor road. *S. Tamajong FHI* 19512. Aug. 5, 1946. (K). GUINEA: Timbo. *H. Jacques Felix* 1911. Oct., 1937. (K, P). PORTUGUESE GUINEA: Bambadinca. Bafata. *Espirito Santo* 3833. Dec. 20, 1945. (K). Falacunda. São João. *Espirito Santo* 2225. Oct. 24, 1945. (BR, K). Buba, Lagoa de Cufada. *J. d'Orey* 214. Jan. 24, 1954. (K). GAMBIA: Abeokuta. *Rowland s. n.* Jan., 1893. (K).

*V. adoensis* is the taxon on which the section *Stengelia* is based. The name, *Stengelia adoensis*, was published as a *nomen nudum* in a list advertising Schimper's collections in 1841. It was validated as *Vernonia adoensis* by Walpers in 1843 who defined the section (as a subsection) at the same time. Steetz transferred the name to the segregate *Ascaricida* in 1862–64, but this placement was not accepted by other workers. The type of A. Richard's *V. macrocephala* (illegitimate because it is a later homonym) was examined by Oliver and Hiern and placed in synonymy of *V. adoensis* in 1877. This automatically placed Steetz' *Ascaricida richardi* (a *nomen novum* for *V. macrocephala*) in synonymy. Vatke's conglomerate *V. polymorpha* of 1875 consists largely of *V. adoensis*.

The remaining synonyms were erected on the basis of small morphological differences and geographical isolation which was valid at the time they were proposed. All of them are now known to be a part of a large complex of intergrading plants which cannot be satisfactorily kept apart.

This species is not liable to be confused with related species, although snippets from the branch ends of *V. bracteosa* and the tops of *V. adoensis* from the southern end of the range of the latter may resemble one another. *V. bracteosa* is a shrub and *V. adoensis* grows annually from a perennial rootcrown. Furthermore, the lower portion of the outer phyllaries of *V. adoensis* are usually green and strongly curved giving the heads an appearance which is duplicated by no other species known to me.

2. *Vernonia bracteosa*. O. Hoffm. Bot. Jahrb. Syst. 30:421. 1901. (Figs. 12 and 13.)

Type Coll: Goetze 793. Uhehe. (Photo — BM).

Shrub to 4.5 m. tall. Stems generally scattered pilose, rarely glabrate, often more densely pubescent on specimens from the southern end of the range; leaves to 17 cm. long, 5.5 cm. wide, ovate to long ovate; margin irregularly dentate to, rarely, few dentate; blade scattered pilose above, generally moderately pilose, rarely scattered pilose and glandular below; apex acute, base frequently abruptly acute, rarely nearly cuneate, blade decurrent along the petiole as a very narrow flange of tissue, thus the free petiole seldom more than 1 mm. long. Heads terminal, cymosely arranged for the most part, smaller, more closely crowded and irregularly arranged in plants to the southward, generally ca. 2 cm. high, 2.5 cm. in diameter, rarely to 3 cm. by 3.5 cm.; phyllaries to 2.1 cm. (exceptionally, 2.8 cm.) white to pink, mauve or purple tipped; flowers to 1.4 cm. long, white, mauve or purple; achenes to 0.35 cm. long, medium brown, moderately pubescent for the most part, only rarely with alternate costae larger and lighter in color, callus discreet; pappus to 1.3 cm. long, flattened, long acute, ciliate, usually without single very short outer row.

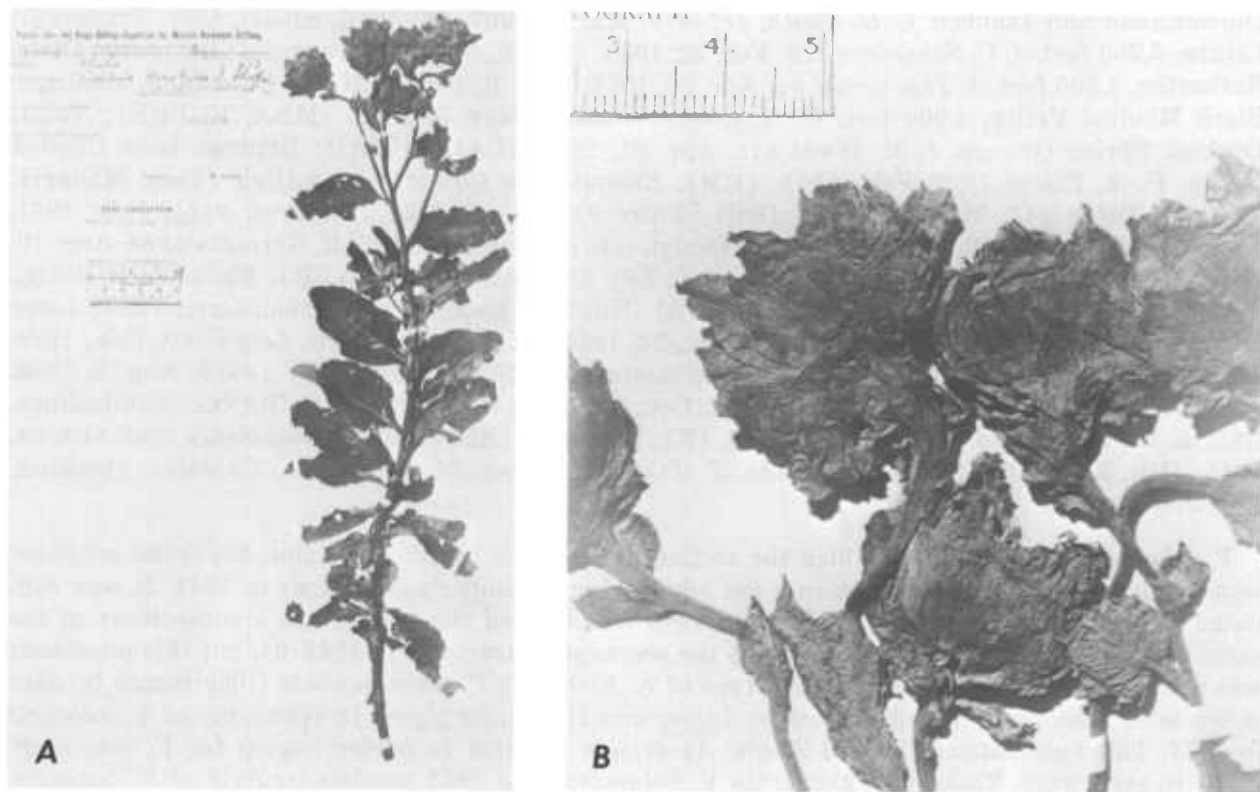
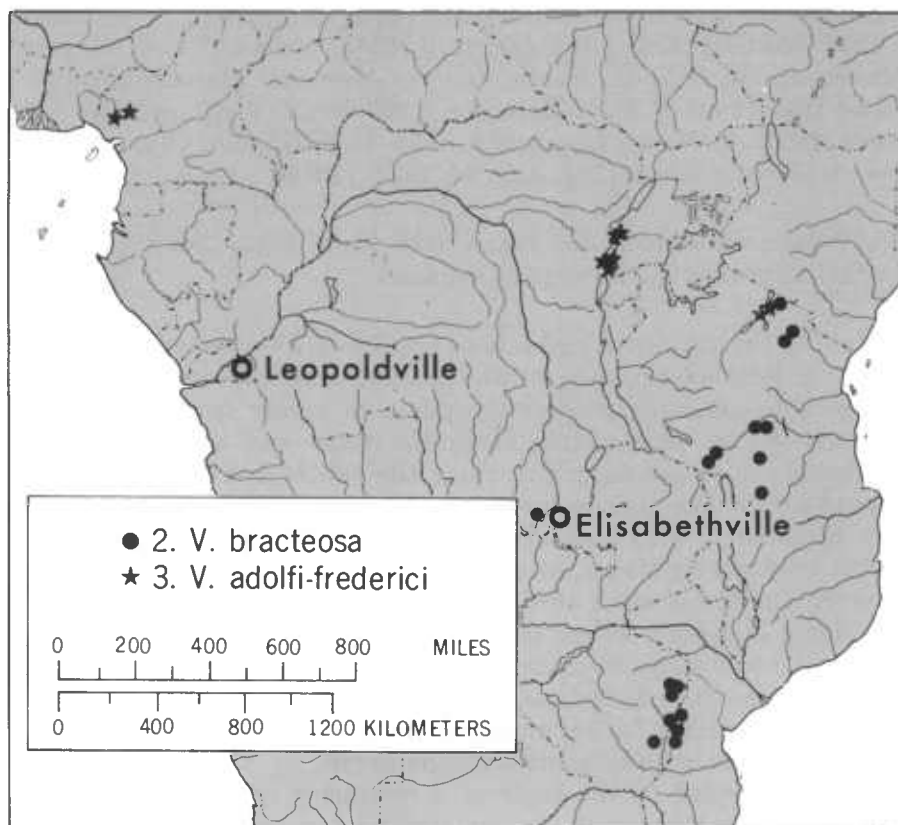


Figure 12.—Type collection of *V. bracteosa* O. Hoffm. A, Habit; and B, detail of heads. (Photos, BM.)



PN-2033

Figure 13.—Distribution of *V. bracteosa* and *V. adolfi-frederici*.

*V. bracteosa* an eastern African species which, to judge from label data, grows only where water is generally available. Toward the southern end of its range in Rhodesia and Mozambique, specimens become quite variable with smaller heads irregularly arranged and the bottoms of the leaves more densely tomentose. Without experimental data, this is impossible to prove, but it looks as though *V. lasiopus* may be strongly influencing the phenotype.

The roots of *V. bracteosa* are reported to be used as medicine for elephantiasis in Tanzania (Carmichael).

*V. bracteosa* is restricted to highland areas south of the equator in eastern Africa with its greatest concentration in Rhodesia. (See fig. 13.) I may have misplaced the Congo collection because of scant label information. It apparently is not abundant anywhere.

*Selected Collections:* UGANDA: Muhavura-Mgahinga Saddle. G. Schaller 49. Nov. 28, 1959. (EA). TANZANIA: Arusha Distr. Mt. Meru, south slope. 5,800 feet. P. J. Greenway 10394. July 2, 1961. (EA). Lushoto Distr. Shagai Forest near Sunga, West Usambaras. 1,950 m. R. E. Drummond & J. H. Drummond 2578. May 17, 1953. (BR, EA, SRGH). Shume Forest Reserve, Usambara Mts. 5,000–6,000 feet. E. D. Mabes 149. July, 1924. (K). Southern Highlands Prov. Iringa Distr. Isata. 6,000 feet. W. Carmichael 393. Mar., 1954. (EA). Kyimbila Distr. N. of Lake Nyassa. A. Stoltz 2469. (GH, K, NY, SRGH). Songea Distr. Matengo Hills. About 1.5 km. N. of Miyau on River Utili. E. Milne-Redhead & P. Taylor 9003. Mar. 2, 1956. (EA, K). REPUBLIC OF CONGO: Kapanda.



(Katanga). *W. Robyns* 1805. 1926. (K). RHODESIA: Umtali. Stapleford Forest Reserve. *F. L. Orpes* 11/56. Aug. 18, 1956. (SRGH). Chirinda outskirts. 3,700–4,000 feet. *C. F. M. Swynnerton* 273. 1906. (K, SRGH). Melsetter. Mt. Selinda. *Queen Victoria Memorial Herbarium* 6773 Dec. 23, 1931. (SRGH). Melsetter Distr. 2 mi. N.W. of Melsetter. 5,000 feet. *L. Methuen* 134 a & b. Aug. 24, 1961. (K). Chimanmani Mts. *R. C. Munch* 126. June 2, 1948. (SRGH). MOZAMBIQUE: Vumba Mt., region of Manica. 900 m. *A. Gomez e Sousa* 4783. Aug. 24, 1962. (PRE).

3. *Vernonia adolfi-frederici* Muschler. Bot. Jahrb. Syst. 46:68. 1911. (See fig. 13.)

Type Coll: Not selected. Specimens not seen.

Trees to 10 m. tall, or shrubs. Stems glabrate to usually velvety, sometimes with trichomes intermixed; leaves to 31 cm. long, 6.5 cm. wide, ovate-lanceolate, rarely ovate; margin apiculate-dentate; blade nearly glabrous to generally moderately pilose to rarely densely pilose above, scattered glandular, moderately pilose, particularly along the veins and venules to densely floccose or pubescent below; blade sometimes decurrent along the petiole and forming auricles at the stem; otherwise, petioles to 4.0 cm. long, pubescent to densely velvety. Heads borne terminally, rarely few, frequently closely crowded in a cymose arrangement, to 3.0 cm. high, to 3.5 cm. in diameter, phyllaries to 3.5 cm. long, rarely longer, often lanceolate acute and externally pilose or puberulent or ciliate, the shorter sometimes more abruptly acute and proportionally broader, white to pink; flowers to 1.7 cm. long, glandular where the tube expands near the top, petals lanceolate, often with glandular tips without, white to mauve, rarely purple; achenes to 0.45 cm. long, brown or dark brown, scantily pubescent to densely so, often lightly glandular, costae about 15, rarely lighter in color, frequently topped with a flaring margin of light colored tissue, callus discreet; pappus to 1.4 cm. long, flat, acute, ciliate, without short single outer ring.

*V. adolfi-frederici* is accepted on the basis of 2 specimens from Kew Herbarium which were annotated as having been compared with the type which I have not seen. Habitat data indicate that this is a montane species which seems to have been collected primarily at Ngorongoro Crater, the Rumenzori Mountains and Mount Bambutu in the Cameroons at elevations from 6,500 to 9,800 feet above sea level (see fig. 13). It is separable from *V. bracteosa* by its large shrub to tree habit and the apiculate dentations of the leaf blades; from *V. hymenolepis* by its pubescent achenes.

Dunlap has reported that the leaves of *V. adolfi-frederici* are eaten by the natives in Cameroons.

*Selected Collections:* CAMEROON: Mt. Bambutu. 2,450 m. *M. R. Letouzey* 37. Nov. 3, 1946. (P). Cameroon Mts., above Buea. 1,800 m. *J. Milbraed* 10817. Dec. 21, 1928. (AAH). UGANDA: Western Prov. Toro Distr. Ruwenzori, Nyamleju. 3,200 m. *H. A. Osmaston* 3681. Jan., 1951. (K). Western Prov. Kigezi Distr. Virunga Mts. Mghinga. 10,300 feet. *G. Taylor* 1938. Nov. 22, 1934. (BM). Kigezi, Bufumbira. 9,800 feet. *Norrison* 36. Sept. 9, 1952. (EA). Ngorongoro Crater, west and south summits. 7,500–8,000 feet. *B. D. Burt* 4294. Sept. 23, 1932. (EA, K). S. of Meru. 6,500 feet. *G. W. Irens* 764. (EA).

4. *Vernonia hymenolepis* A. Rich. Tent. Fl. Abyss. 1:378. 1847. (Figs. 14, 15, and 16. See also figs. 1 and 7.)

Type Coll: *Petit s. n.* Choa (Shoa, Ethiopia). (K).

*Stengelia calvoana* Hook. f. Proc. Linn. Soc. Bot. 7:199. 1864.

Type Coll: *Mann* 1238. Camer. Mount. Elevat. 2,500–7,000 ft. Dec., 1861. (K!).

*Stengelia insignis* Hook. f. Loc. cit.

Type Coll: *Mann* 1925. Camer. Mount. 3,000–7,000 feet. Dec., 1862. (GH, K!).



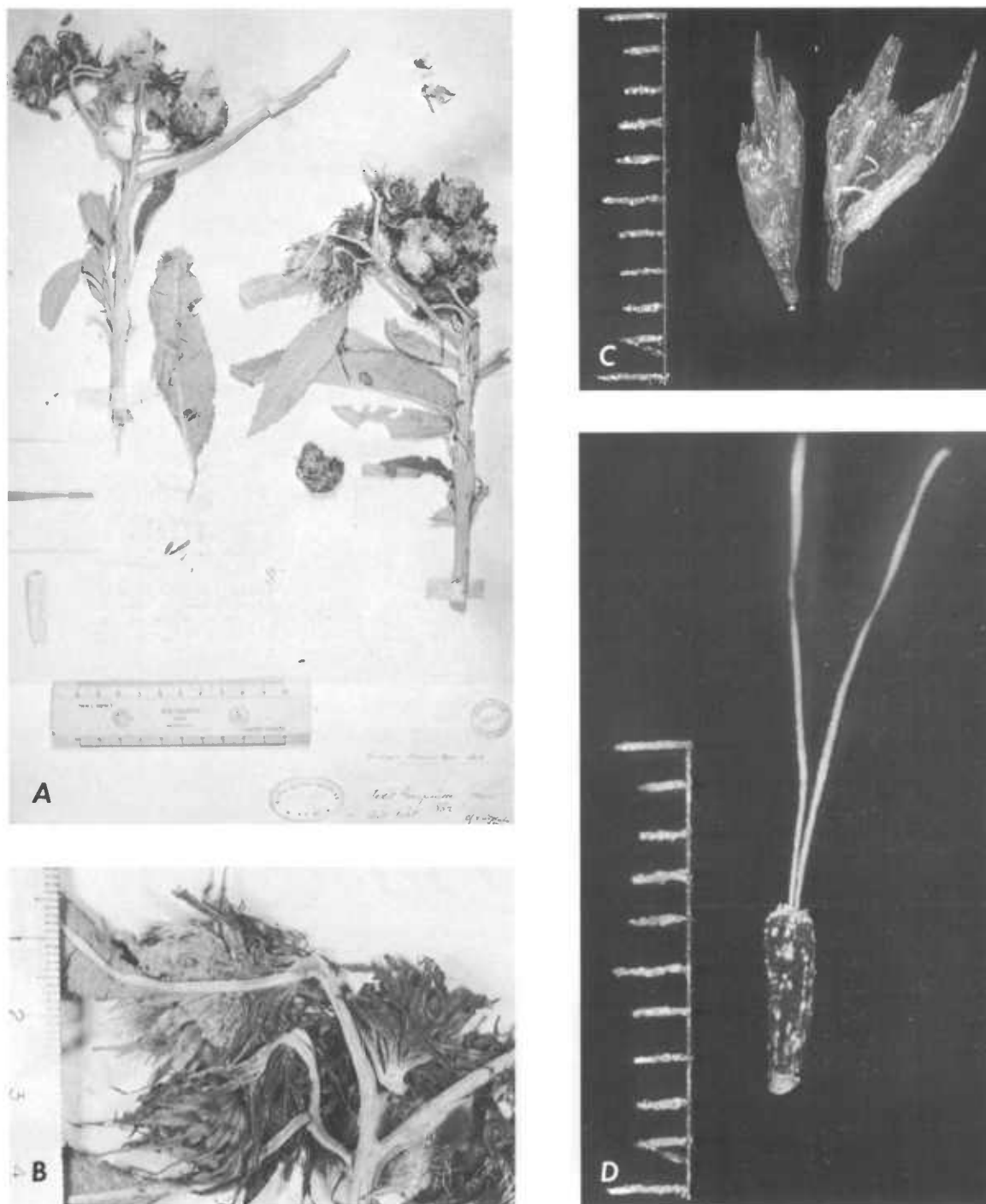


Figure 14.—Type collection, *V. hymenolepis* A. Rich. A, Habit; B, detail of heads; C, broken flower unopened and dissected (expanded in water); and D, achene (immature, but dehiscence of pappus is typical). (K). Scales in millimeters.

PN-2034



PN-2035

Figure 15.—*A*, A well-developed shrub of *V. hymenolepis* in little-disturbed forest on the slope of Mt. Elgon, Kenya (Smith & Njeroge 4638). *B*, Plant heads in bloom near Shashemene, Ethiopia (Smith, Desta, & Sesai 4565). *C*, Plant heads in bloom near Borie, Ethiopia (Smith, Desta, & Sesai 4559). The phyllaries in this specimen are reflexed; those in *B* are upright. *D*, Colony of upright, open plants (as in *C*) in a disturbed roadside habitat near Borie; and *E*, mature heads on a plant in the same colony.

*Vernonia calvoana* (Hook. f.) Hook. f. Bot. Mag. 94:t. 5698. 1868.

*V. insignis* (Hook. f.) Oliv. & Hiern in Oliv. Fl. Trop. Africa 3:292. 1877.

*V. rothii* Oliv. & Hiern in Oliver, Fl. Trop. Africa 3:293. 1877.

Type Coll: *Roth 346*. Ankober. Nov., 1841. (K!).

*V. leucocalyx* O. Hoffm. Bot. Jahrb. Syst. 30:422. 1901.

Type Coll: *Goetze 928*. Deutsch-Ostafrika: Ukinga-Berge. 1898–1901. (K).

*V. homilocephala* S. Moore. J. Linn. Soc. Bot. 35:322. 1902.

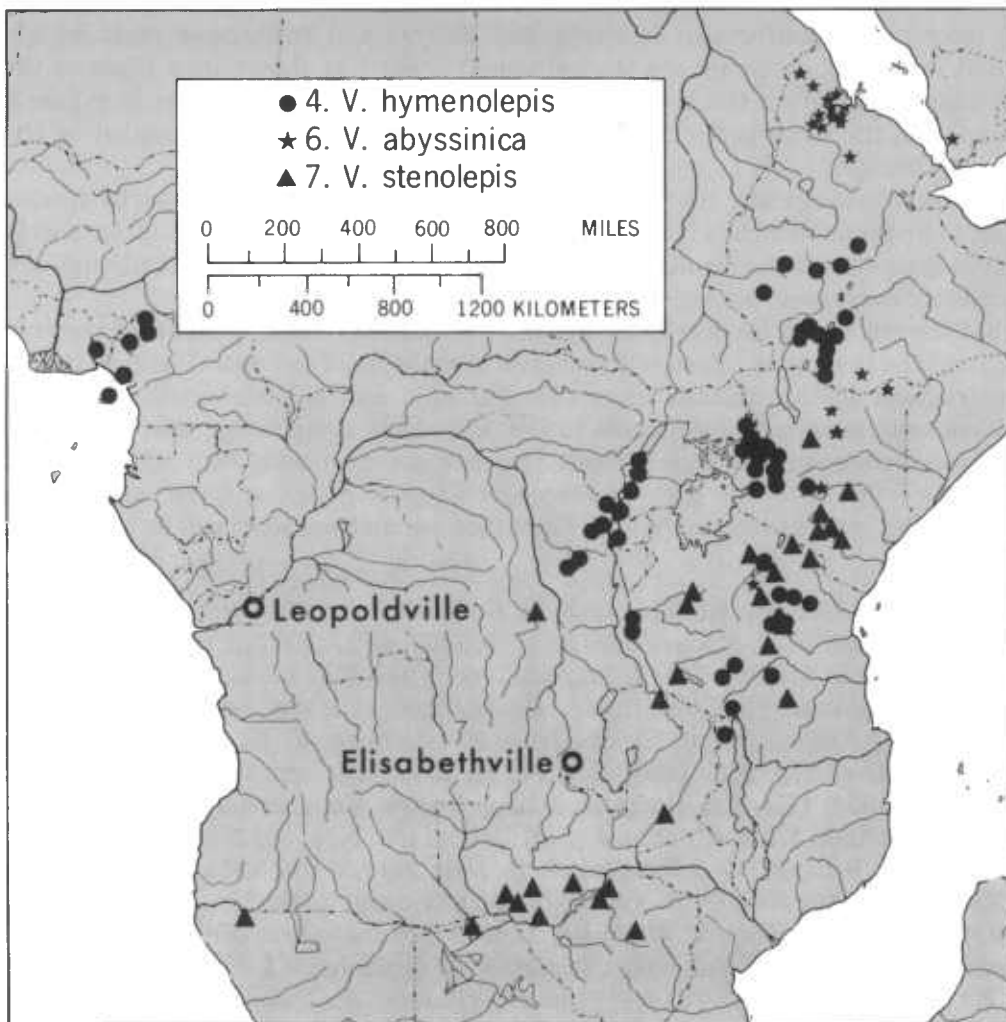
Type Coll: *Elliot 7058*. Mau to Nologoseri. 7,000 feet. Dec. (K!).

*V. calvoana* var. *microcephala* Adams. J. W. African Sci. Assoc. 3:118. 1957.

Type Coll: *Lightbody FHI26259*. Cameroon: mile 110, Nkambe-Misage road. Alt. 6,000–7,000 feet. Sept. 1950. (K!).

*V. leucocalyx* var. *acuta* Adams. J. W. African Sci. Assoc. 3:120. 1957.

Type Coll: *Keay & Lightbody FHI28366*. Cameroon: Bamenda Prov. Bafut-Ngemba F. R. near Lake Bambulue. Alt. c. 6,200 feet. Jan., 1951. (P).



PN-2036

Figure 16.—Distribution of *V. hymenolepis*, *V. abyssinica*, and *V. stenolepis*.

Shrub to about 5 m. tall, usually less. Stems densely short pubescent to glabrate, rarely with intermixed trichomes; leaves to 20 cm. long, often less, to 7.0 cm. wide, lanceolate to ovate-lanceolate, infrequently ovate; margin apiculate dentate, blade glabrous to scattered puberulent or pilose (rarely glandular) above; often densely pubescent, sometimes scattered pilose or pilose only on veins, then sometimes glandular beneath; apex generally acute, sometimes apiculate, base cuneate acute or acute, usually decurrent on petiole, sometimes strongly so and forming auricles at stem. Heads terminal in more or less crowded cymose or paniculate arrangement; to 2.5 cm. high, to 3.0 cm. in diameter (most frequently about 1.5 by 1.5 cm.), phyllaries upright or the herbaceous tip reflexed, to ca. 2.3 cm. long, usually 1.2 to 1.5 cm. long, white, lanceolate to (less frequently), broadly lanceolate, acute, sometimes somewhat pubescent or lightly glandular without; flowers to 1.5 cm. long, tube only about  $\frac{2}{3}$  of total length, glandular and/or slightly pilose at top of tube, white to mauve; achenes turbinate, to 0.45 cm. long, glabrous, rarely with a few hairs, generally nearly black, less often medium brown, occasionally with lighter costae, sometimes glandular, callus discreet, usually small; pappus to 1.4 cm. long, usually 0.7 to 0.9 cm. long, flat, ciliate, strongly deciduous.

*V. hymenolepis* is most nearly uniform in Ethiopia and Kenya; and it becomes more widely variable southward and westward. Not only are the individual heads less showy than those of the species previously discussed, but often the coriaceous basal portion of the phyllaries is exposed. In the larger-headed species, the basal portion of the phyllaries is generally well concealed by the herbaceous portion of the bracts.

Perhaps the most general characteristic that separates *V. hymenolepis* from other nearby species is the ease with which the pappus detaches from the turbinate achene. The achene is often nearly black, glabrous, small in diameter at the small callus and increasing in diameter gradually upward until the diameter suddenly decreases just before the attachment of the pappus.

Johnson reports that the wood and leaves of this species are burned, water is strained through them and evaporated, and the residue is mixed with tobacco to make snuff in central Africa.

*V. hymenolepis* is frequent in the uplands of central Ethiopia and is distributed southward through Tanzania. Some collections have been made in the uplands of Ruanda and eastern Congo. While the collections from Cameroon are larger overall, they are not morphologically distinct from the eastern collections (see fig. 16). The high incidence of aborted pollen and the large pollen diameters of about half of the grains indicate that the Cameroon populations may well be polyploids.

*Selected Collections:* ETHIOPIA: Uallaga. Ghimbi. 1,820 m. *R. Milchersich* 112. Dec. 12, 1908. (FI). Anfilo near Dembidollo. 6,300 feet. *H. F. Mooney* 6881. Mar. 5, 1957. (FI). Keffa Prov. Near Agaro. *C. E. Smith, Jr. Desta Hundesa & Ato Sesai* 4560. Dec. 25, 1966. (BM, EA, FI, K, US). Near Borie close to Beleta Forest on Bonga road. *C. E. Smith, Jr., Desta Hundesa & Ato Sesai* 4559. Dec. 25, 1966. (BM, EA, FI, K, US). Arussi. About 10 km. from Shashemene. *C. E. Smith, Jr., Desta Hundesa & Ato Sesai* 4564. Dec. 27, 1966. (BM, EA, FI, K, US). Irgallem. Sidamo, 5,770 feet. *H. F. Mooney* 5321. Dec. 29, 1953. (K). Tra Dorzé en il Lago Regina Margherita. *A. Vatova* 1773. Feb. 7, 1938. (FI). Agheremariam. 1,750–2,100 m. *J. B. Gillett* 14482. Nov. 30, 1952. (BR, EA, FI, K, PRE). KENYA: Marakwet Hills. 8,500–9,500 feet. *I. R. Dale* 3413. June, 1935. (BR, EA, K). Trans Nzoia Distr. Mt. Elgon. 7,800 feet. *C. E. Smith, Jr. & D. Njeroge* 4638. Jan. 27, 1967. (BM, EA, FI, K, US). 5 mi. N. of Hoey's Bridge. *C. E. Smith, Jr. & D. Njeroge* 4632. Jan. 25, 1967. (BM, EA, FI, K, US). North Kavirondo Distr. Kakamega Forest. *R. B. Drummond & J. H. Hemsley* 4748. Oct. 15, 1953. (BR, EA, FI, K). Kisumu. Victoria Nyanza. Tindoret. *P. Davoli* 16. 29 Nov. 1936.

(FI). Mt. Nyiri. 8,000 feet. *O. Kerfoot* 2041. July 27, 1960. (EA). UGANDA: Northern Prov. Karamoja Distr. Moroto Mt. *M. S. Phillip* 762. Dec. 1954. (K). Mt. Debasien. 8,200 feet. *W. J. Egging* 2807. Jan., 1936. (BR, K). Near Bulucheke, S. W. Elgon. 7,000 feet. *I. R. Dale* U87. Dec., 1939. (BR, EA). Rubaya S. Kigezi 7,000 feet. *J. W. Purseglove* 2571. Dec., 1947. (K). TANZANIA: Morogoro, Uluguru Hills. 1,500 m. *H. C. Schlieben* 4226. Aug. 11, 1933. (BM, BR, G). Northern Prov. Ngorongoro. 6,500 feet. *R. E. S. Tanner* 3258. Nov. 17, 1956. (K). Iringa Prov. Idodi. *E. G. Ward* 18. Oct. 1936. (EA). Western Prov. Kigoma Distr. Lumbye River, Mahali Mts. 2,800 feet. *J. Newbould & T. G. Jefford* 1179. July 30, 1938. (K). Tanga Prov. Lushoto Distr. Shume-Magamba Forest. 6,000 feet. *J. Benedicto* 68. Sept. 29, 1955. (EA). Southern Highlands Prov. Rungwe Distr. Maroka Crater. *Geilinger* 2617. Sept. 25, 1932. (K). Mbozi. 5,000 feet. *H. Horsbrugh-Porter* s. n. June, 1935. (BM). MALAWI: North Nyassa Distr. Nyika Plateau. 2,300 m. *L. J. Brass* 17174. Aug. 11, 1946. (K). RUANDA: Shangugu Terr. Astrida-Bukavu road near Uwinka. 2,400 m. *G. Troupin* 11126. Sept. 23, 1959. (EA). REPUBLIC OF CONGO: Kivu. Rumangabo. *R. Germain* 3018. Dec. 15, 1924. (BR, K). Mts. W. of Lake Kivu, Tshibinda. 2,000 m. *H. Humbert* 7362. March, 1929. (K). Mt. Kahuzi, Bukavu-Walikali highway. *G. Schaller* 129. June 9, 1959. (EA). Van Geysel to Pepa, Section de Mulongoshi. *Thienpont* 23. Aug., 1946. (BR). NIGERIA: Ogoja Prov. Obundu Div. Sonkwala area north of Koloishe. 5,000 feet. *H. Savory & R. Keay* FHI25069. Dec. 20, 1948. (K). Oban. *P. A. Talbot* 396. 1911. (BM). CAMEROON: Adamwa Div. Mambila Distr. Mambila Plateau. 1500 m. *F. N. Hepper* 1671. 1958. (K). Bamenda Distr. Lakora. 6,000 feet. *H. S. Maitland* 1485. Apr., 1931. (K). Victoria Distr. Cameroon Mts. 5,700–6,000 feet. *R. W. J. Keay* FHI28647. Jan. 15, 1951. (K). Musake above Buea. 6,000 feet. *F. W. H. Migeod* 49. Nov. 4, 1927. (BM). FERNANDO Poo: Near Musola. *E. Guinea* 1638. Jan. 20, 1938. (K).

5. *Vernonia buchingeri* (Sch.-Bip. ex Steetz in Peters) Oliv. & Hiern in Oliver. Fl. Trop. Africa 3:289. 1877. (Figs. 17 and 18.)

*Ascaricida buchingeri* Sch.-Bip. ex Steetz in Peters. Reise nach Mossambique, etc. 359. 1862–64.

Type Coll: *Schimper* 386. Abyssinia. (BM, G, K, P!).

*Vernonia nimbaensis* C. D. Adams. J. W. African Sci. Assoc. 8:139. 1964.

Type Coll: *Chevalier* 21023. Guinée française: Pays de Guerzes. Montagne de N'Zo, entre 1,200 m. et 1,400 m. d'alt. Mar., 1909. (K, P!).

Herb to 1 m. tall from thickened perennial rootstock. Stems scattered pilose, glandular. Leaves sessile, to 8.5 cm. long, 2.5 cm. wide, ovate or ovate-lanceolate; margin blunt or apiculate dentate; blade scattered pilose, glandular above (one collection strongly raised reticulate), veins lightly pilose, surface glandular below (one collection strongly raised reticulate); apex subacute, base obtuse. Heads terminal, single or several, to 2.5 cm. high, to 3.0 cm. in diameter, phyllaries to 2.3 cm. long, herbaceous tip broad and strongly veined in both type collections; flowers to 2.2 cm. long, tube about 2.3 times longer than urceolate top; achenes to 0.6 cm. long, brown, densely pubescent, pappus broadly flat, stiffly outcurved, to 1.5 cm. long.

I have no doubt about the conspecificity of *V. nimbaensis* and *V. buchingeri* in spite of the disjunction in distribution. The former has strongly raised reticulate venation in the foliage, but this is hardly sufficient to distinguish it. The paucity of collections of this species may be an indication that it is only an atypical variant of a more common species. Until more specimens are available and more is known of its biology, I prefer to recognize it as a separate species.

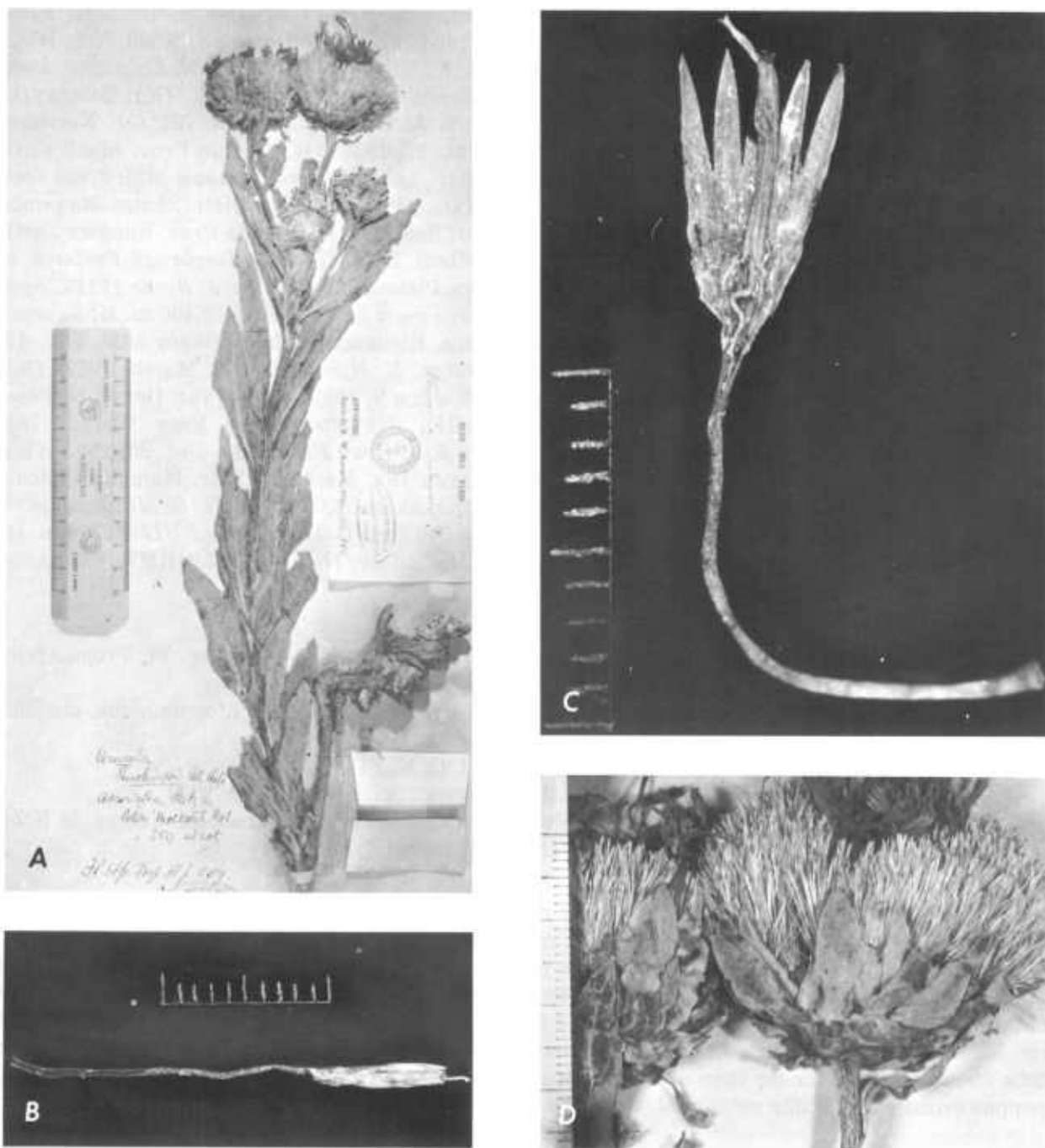


Figure 17.—Type collection of *V. buchingeri* (Sch.-Bip. ex Steetz in Peters) Oliv. & Hiern. *A*, Habit; *B* and *C*, flower, unopened and dissected (expanded in water); and *D*, detail of heads. (K). Scales in millimeters.

PN-2037



Figure 18.—Holotype of *V. buchingeri* in the Museum d'Histoire Naturelle, Laboratoire de Phanerogamie, Paris. A, Detail of heads; and B, habit.

PN-2038

6. *Vernonia abyssinica* Sch.-Bip. ex Walp. Rep. Bot. Syst. 2:947. 1843. (Figs. 19 and 20. See also figs. 2, 3A, and 16.)

Type Coll: *Schimper 389*. In vallibus prope Adoam. Sept., 1837. (BM, BR, CAL, FI, G, GH, K, NY).

*Teichostemma fruticosum* R. Br. ex Salt. Voy. to Abyss., etc. Append. IV:lxv. 1814.  
*Nomen nudum*.

Type Coll: *Salt s. n.* Abyssinia. (BM!).

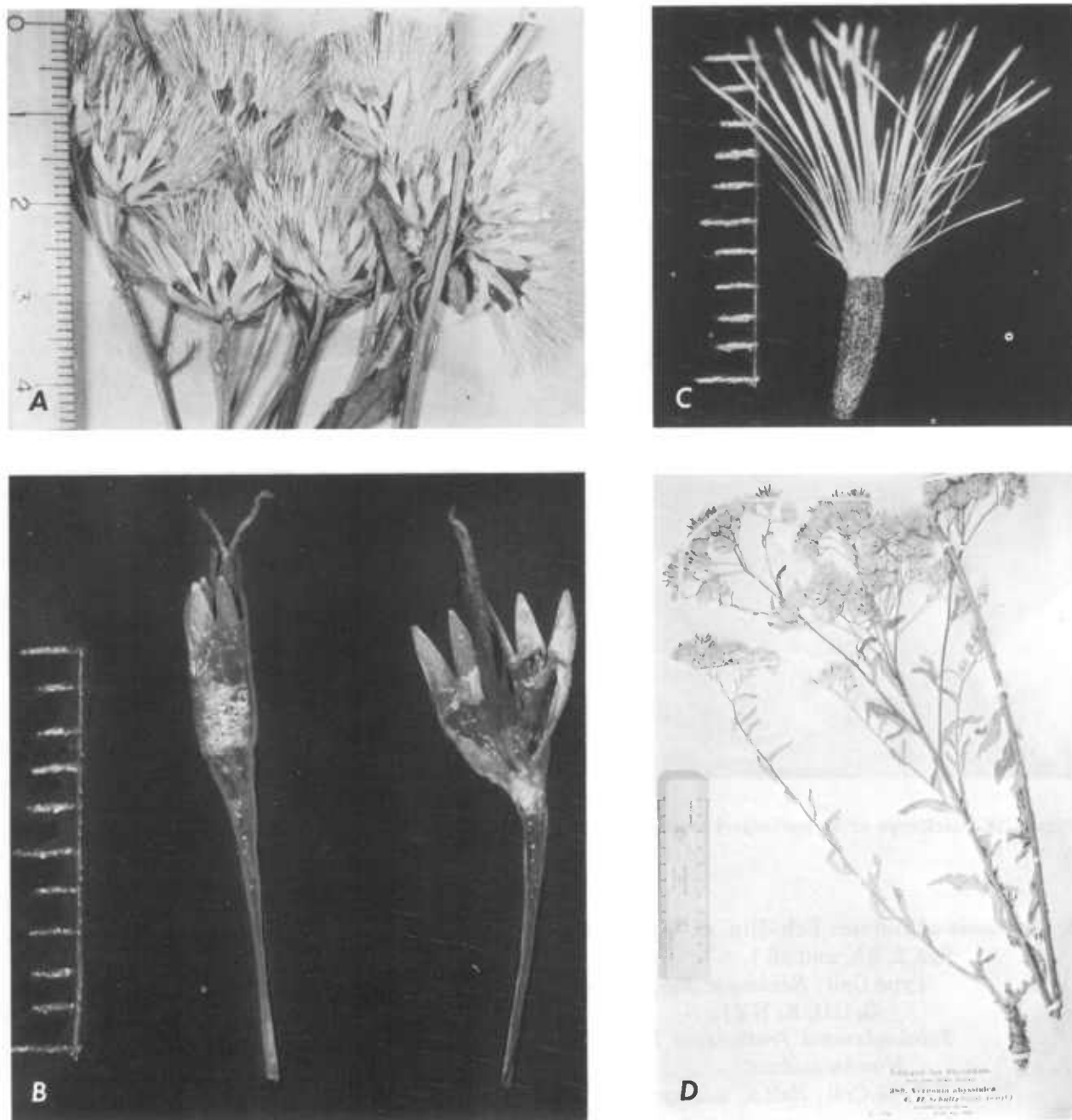
*Vernonia polymorpha* var. *microcephala* Vatke. Linnaea 39:477. 1875.

Type Coll: *Schimper 581*. An sterilen Erden auch auf Brat Akern von 4,000–7,500' ... Höhe. Anadehr 7,300' über Meer. 20 Oct. 1862. (BM, NH).

*V. abyssinica* var. *vestita* Cuf.

Lectotype Coll: *Corradi 1966*. Neghelli, Ethiopia. 26–29 Sept., 1939. (FI!).





PN-2039

Figure 19.—Type collection of *V. abyssinica* Sch.-Bip. ex Walp. A, Detail of heads (NY); B, flower, entire and dissected (expanded in water) (NY); C, achene (GH); and D, habit. (BM). Scales in millimeters.

Upright, branched shrub to 2 or more m. tall. Stems striate, pubescent or puberulent, older stems with tan bark longitudinally split. Leaves gray-green, sessile, to 5.0 cm. long, to 1.4 cm. wide, lanceolate; margin dentate; blade puberulent, scattered glandular above, pubescent to floccose, glandular beneath; apex and base acute. Heads borne terminally, paniculately to cymosely arranged; to 1.4 cm. high, to 2.0 cm. in diameter; phyllaries to 1.1 cm. long, herbaceous tip small, lanceolate,



often strongly reduced, gray-green to yellowish green, herbaceous tip often strong glandular without, coriaceous basal portion prominent in more mature heads; flowers to 1.2 cm. long, tube and limb about equal, rose-violet to lilac to white, often glandular at the top of the tube and on the tips of the petals without; achenes to 0.5 cm. long, brown, alternate costae sometimes lighter in color, frequently glandular, moderately to densely softly pilose; pappus to 0.9 cm. long, flat.

*V. abyssinica* is an open shrub that is relatively common in the weedy flora of field margins and abandoned land of the drier areas in eastern Ethiopia and northern Kenya on the slopes and



Figure 20.—A, A straggling shrub of *V. abyssinica* in the much-disturbed land at Scitchity, Eritrea, Ethiopia. The heads (B), when flowering are inconspicuous; but the plants (C) are frequently recognizable when they are in fruit. (All Smith & Andemeskal 4531.)

plateaus (see fig. 16, p. 27). Except for the conspicuous balls of pappus on mature heads, it is relatively inconspicuous. This is the only species of *Vernonia* in this section that is strikingly distinct, although some specimens from the southern portion of its range closely related to *V. glabra* have been mistakenly identified as *V. abyssinica*.

*Selected Collections:* SOMALI REPUBLIC: Ourano. *E. Chedville* 331, 561. June 6, 1953. (FI). Allurioni del Baidoa. *G. Paoli* 1257. Oct. 29, 1913. (FI). ETHIOPIA: Eritrea. Asmara. Mt. Lesa. *A. Pappi* 4905. Apr. 25, 1902. (AAH, BM, FI, G). Ansaba valley, 15 mi. N. of Keren. 4,000 feet. *P. R. O. Bally* 86640. Mar. 21, 1949. (EA). Sarae. Gaza Gebo. 1,800–2,000 m. *A. Pappi* 209. Oct. 7–10, 1902. (FI). Mensa. Aba Maitan, Dada. *A. Terracciano & A. Pappi* 1962. Jan. 8, 1893. (FI). Along Massaua road to Nefasit. 6,000 feet. *C. E. Smith, Jr. & Ato Andemeskal* 4536. Dec. 18, 1966. (BM, EA, FI, K, US). About 1/2 way between Asmara and Adi Ugri at Scitchity. 7,700 feet. *C. E. Smith, Jr. & Ato Andemeskal* 4531. Dec. 17, 1966. (BM, EA, FI, K, US). Sidamo. Neghelli. *H. F. Mooney* 7352. July 11, 1958. (EA). KENYA: Marsabit, road to Lake Paradite. *P. R. O. Bally* 35477. (EA). TANZANIA: Near Manyoni N. of Kilimatinde. *T. B. Kiwnaga* 336. Feb., 1929. (BM, GH).

7. *Vernonia stenolepis* Oliv. Trans. Linn. Soc. London Bot. 2:337. 1887. (Fig. 21. See also fig. 16.)  
Type Coll: *Johnston s. n.* Kilimanjaro. 5,000 feet. (K!).

Annual herb to 2 m. tall, stems single or openly branched. Stems with scattered hairs or, rarely, pubescent; leaves ovate to ovate-lanceolate, thin, to 18 cm. long, 5.0 cm. wide; margin scarcely apiculate to sharply serrate; blade few pilose, sometimes glandular above, few pilose, particularly along the veins, glandular below; apex acute, base cuneate; petiole generally none, sometimes to 0.3 cm. long. Heads few to several in an open panicle, to 1.7 cm. high, 2.0 cm. in diameter; phyllaries to 1.6 cm. long, outer often long, spatulate, sometimes scattered pilose or pubescent, green to pink or reddish; flowers to 1.2 cm. long, tube often 3 times longer than limb, lobes long, lanceolate, thin, white to purple; achenes to 0.6 cm. long, dark brown to black, surface often pappilose, few to moderately pilose, glandular, callus small, discreet, yellow to brown or black; pappus to 1.0 cm. long, filiform or narrowly flattened, acute.

*V. stenolepis* is apparently found in damp, shady habitats in local colonies. Under poor conditions, the plants reach maturity when only a few centimeters tall. The long spatulate outer phyllaries clearly distinguish this species from other African species in the section. They are very similar to the phyllaries on some of the collections of *Vernonia anthelmintica* from Asia. This species cannot be confused with the strikingly different *V. nigrimana* which has deeply colored phyllaries.

"Occurs in *Baikiaea* dry deciduous forest in large colonies to 8' high and 3/4" diameter. Flowering February, March, April. Fruiting March, April, May. Also on fringes of evergreen thicket as you saw at Chisamba. Apparently always associated with forest or thicket." D. B. Fanshawe *Zambian notes*.

*V. stenolepis* is confined to eastern Africa in the equatorial zone but it grows westward in Rhodesia and the westernmost collection is from South West Africa (see fig. 16, p. 27). Colonies of this species probably only appear in years in which the weather conditions are optimal for germination of the achenes.

*Selected Collections:* KENYA: Isiolo to Mathews Range and Mt. Nyiru. Ol doinyo Lengiyu. 5,000 feet. *J. G. Newbould* 3515. Dec. 20, 1958. (K). Ukamba-Garissa road at the turning to Sosoma. 2,000 feet. *P. R. O. Bally* 9480. Jan. 24, 1954. (EA). Macjakos Distr. Nairobi-Mombasa road. *J. Ossent* 536. Dec. 26, 1960. (EA, K). Yatta Plateau, Ndalani Ranch. *Hale s. n.* Apr. 11, 1954.

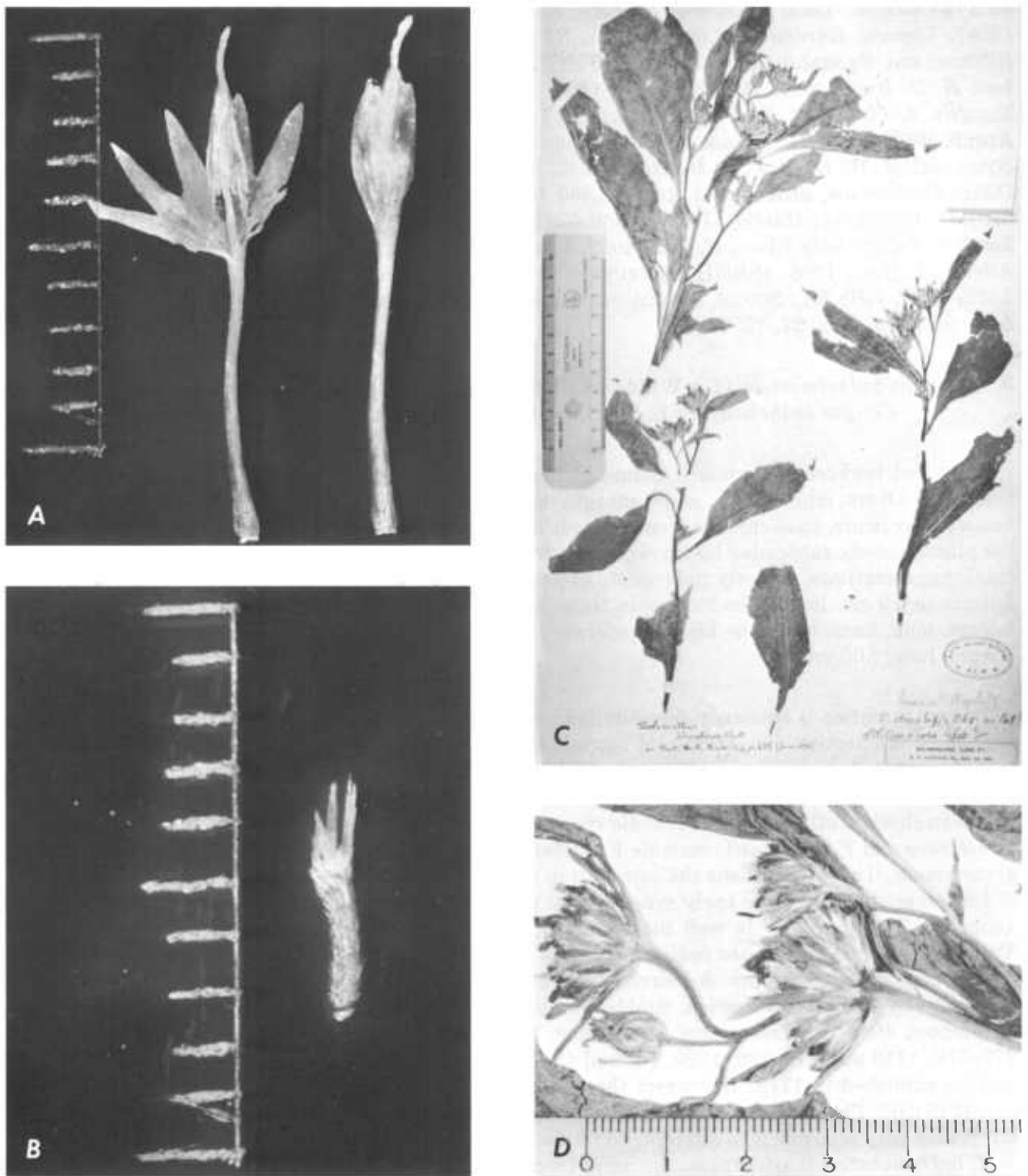


Figure 21.—Type collection of *V. stenolepis* Oliv. A, Flower, dissected and unopened (expanded in water)  
 B, Achene (immature); C, habit; and D, detail of heads. (K). Scales in millimeters.

PN-2041

(EA). UGANDA: Lodo Keteminit, Moroto, Karamoja. 4,200 feet. *O. Kerfoot* 943. Apr. 26, 1959. (EA). Loyoru, Karamoja. 4,000 feet. *A. S. Thomas* 3771. June 9, 1940. (EA, K). TANZANIA: Kilimanjaro, Pangani. *G. Volken* 481. July, 1893. (BM, G). Kondoa Distr. Sambala Hills. 5,000 feet. *B. D. Burt* 2061. May 21, 1929. (EA, K). Iringa Prov. Iringa. *H. E. Emson* 564. (EA). Kongwa. 4,500 feet. *B. Anderson* 427. Apr. 3, 1949. (EA). ZAMBIA: Abercorn. *H. M. Richards* 1611. Apr. 9, 1952. (SRGH). Masese. *D. B. Fanshawe* 5460. Mar. 11, 1960. (SRGH). Eastern Prov. River Nyamadzi. *A. W. Exell, F. A. Mendonça & H. Wild* 1172. Mar. 25, 1955. (BM, SRGH). Barotseland Distr. Shangombo, near Mashi River. 3,400 feet. *L. E. Codd* 7425. Aug. 7, 1952. (BM, K, PRE, SRGH). RHODESIA: Hartley. Poole. 4,000 feet. *H. Wild* 1004. Apr. 3, 1946. (K, SRGH). Urungwe, Zambesi Valley, Rifa River. *H. Wild* 4059. Feb. 25, 1953. (K, MO, SRGH). Victoria Falls. *C. E. F. Allen* 131. Nov., 1906. (SRGH). REPUBLIC OF CONGO: Luapula. 970 m. *W. Robyns* 1934. Apr. 9, 1926. (BR, GH, K). SOUTH AFRICA: Southwest Africa. 6 mi. W. of Ohopoho. *B. de Winter & Leistner* 5215. Mar. 27, 1957. (K).

8. *Vernonia anthelmintica* (L.) Willd. Sp. Pl. 3:1634. 1803.  
*Conyza anthelmintica* L. Sp. Pl. (ed. 2) 1207. 1763.

Branched herbaceous annuals. Stems glabrate to moderately pubescent; leaves sessile, usually ovate, to 13.0 cm. long. 5.0 cm. wide; margin dentate; blade few pilose above, glandular, veins pilose below; apex acute, base cuneate, acute. Heads borne in a loose panicle arrangement on the top of the plants closely subtended by leaves, heads to 1.5 cm. high, 1.5 cm. in diameter; phyllaries to 1.2 cm. long, sometimes scarcely pubescent, green, inner sometimes with reddish margin, lanceolate; flowers to 0.9 cm. long, tube 2 or more times longer than the limb, mauve or lavender; achenes to 0.5 cm. long, dark brown or black, moderately pubescent, callus small, yellow, discreet, pappus to 0.9 cm. long, filiform.

*V. anthelmintica* is obviously very similar, morphologically to *V. stenolepis*. Inasmuch as all other species of the section are African, I suspect that *V. anthelmintica* originated in Africa and was transferred to Asia as a semicultivated plant for medicinal use. It may well have been derived from *V. stenolepis*.

I have checked other Indian *Vernonia* species and find that *V. gardneri*, *V. ornata*, *V. pulneyensis*, *V. setigera* and *V. thwaitesii* resemble *V. anthelmintica* only superficially. They cannot be considered synonymous. This strengthens the supposition that *V. anthelmintica* is, indeed, a foreigner in India.

I attempted to check the early synonymy of this species. *Ascaricida indica* Cass. Dict. Sci. Nat. 3 (suppl.): 38 apparently is well placed here. The specific name was apparently taken from the Vaillant reference to *Conyza indica*. Linnaeus cites "Vaill. act. 358. *Conyza indica*." This must be an erroneous page reference. A search at Houghton Library, Harvard University, disclosed a series of papers by Vaillant, Sébastien. Établissement de nouveaux caractères de trois familles ou classes de plantes, etc., torn from Mem. Acad. Roy. Sci. Paris, consisting of the pages: 143-191. 1718, 277-318. 1719 and 277-339, 1720. I found the only reference to *Conyza indica* on page 300 of the section published in 1719. To correct the record, the citation would appear to be Mem. Acad. Roy. Sci. 1719:300. This, of course, is largely academic with our Linnean starting date for nomenclature, but it may help someone who attempts to follow the same course.

*V. anthelmintica* is widespread in India from the lower slopes of the Himalayas to the southern end and Ceylon and from Pakistan in the west to Burma in the east.

*Selected Collections*: PAKISTAN: Azad Kashmir. Nawal Nadi. 3,500 feet. *A. Rashid, E. Nasir & R. R. Stewart* 1064. Sept. 11, 1953. (RAW). Punjab. Rawalpindi Distr. Saidpur. 1,900 feet. *R. R. Stewart* 13670. Sept. 1951. (RAW). NEPAL: Ila, Bheri River. 6,000 feet. *O. Polunin, W. R.*

*Sykes & L. H. J. Williams* 3250. Sept. 7, 1952. (BM). INDIA: Punjab Biari, Kulu, Kangra. 3,500 feet. *W. Koelz* 7469. Nov. 15, 1933. (NY). Azad Kashmir. Poonch, Kotli. *A. Rashid* 26987. Sept. 18, 1954. (BM). Punjab. Pampur, Kulu. 4,500 feet. *W. Koelz* 3150. Nov. 10, 1931. (NY). Dehra Dun. 2,200 feet. *U. Singh* 432. Sept. 21, 1928. (NY). Bihar. Chota Nagpur, Sirguja. 1,500–2,000 feet. *J. J. Wood* 277. Dec. 2, 1890. (NH). Karwar, Lejwad. *L. J. Sedgwick & T. R. D. Bell* 6724. Oct., 1919. (K). Rajauri Prov. Puch via Kotli to Islamabad. 2,000–4,000 feet. *Schlagintweit* 12557. Nov. 10–15, 1856. (BM). Chittagong Hill Tracts. Fenoa Hill, 29 mi. from Chittagong. *B. Khan* 45. Oct., 1886. (CAL). Ganpur. Orissa, Sundargarh. 800 feet. *H. F. Mooney* 1593. Oct. 29, 1940. (K). Bombay Presid. Near Padkhumb. *A. P. Young* s. n. Jan., 1879. (BM). Kangra, Dharmsala. 5,000 feet. *G. A. Gammie* 18760. Sept. 27, 1896. (K). Madras. Marmigudi. 3,000 feet *J. S. Gamble* 18470. Nov., 1886. (BM). Madras. Coimbatore. *Anonymous*. (NY). Madura Distr. Periyakolam riverside. *A. G. Bourne* s. n. Jan. 2, 1899. (K). CEYLON: Kandy. *A. Moon* 102. Feb. 4, 1819. (BM). BURMA: S. S. S. Thamakhan. *A. Khalil* s. n. 1896. (BR).

9. *Vernonia petitiana* A. Rich. Tent. Fl. Abyss. 1:373. 1847. (figs. 22 and 23.)

Type Coll: *Petit* s. n. Yedjou. (Apparently region around Amba Samber—see Salt map of 1814.) (P!).

*V. filigera* Oliv. & Hiern in Oliver. Fl. Trop. Africa 3:288. 1877.

Type Coll: *Schimper* 1530 (?) (K). The Kew specimen marked as type is obviously authentic material of this species (see notes on sheet), but it does not bear a label listing either of the localities cited.

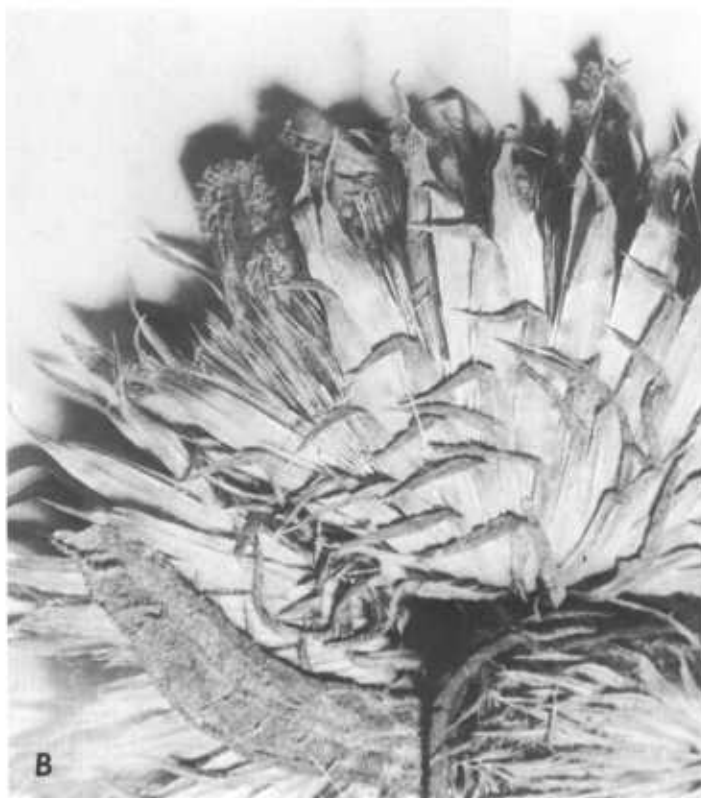
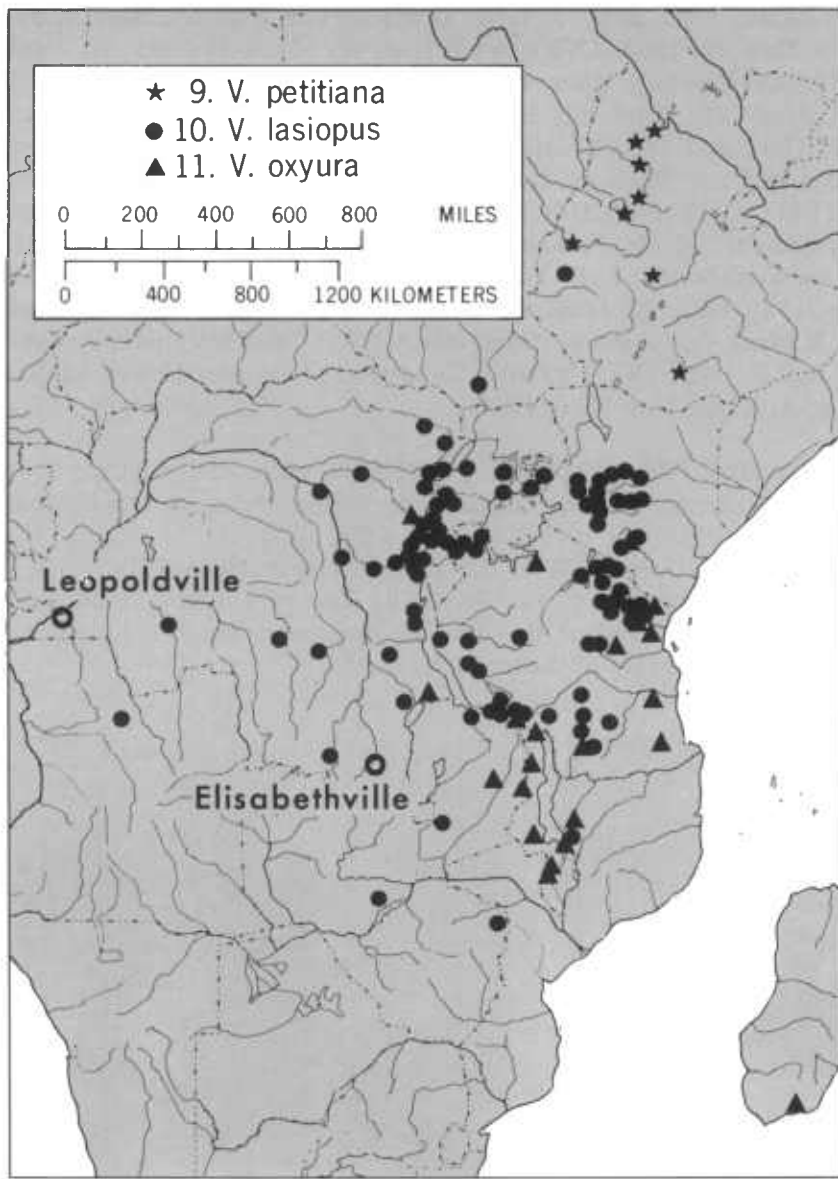


Figure 22.—Type collection of *V. petitiana* A. Rich. A, Habit; and B, detail of head (P).



PN-2043

Figure 23.—Distribution of *V. pettitiana*, *V. lasiopus*, and *V. oxyura*.

Shrub (perhaps more nearly herbaceous than woody?) to 1.5 m. tall. Leaves to 19.5 cm. long, 7.0 cm. wide, ovate to ovate-lanceolate; margin irregularly apiculate dentate; blade glabrous, scattered glandular or scattered pilose above, generally floccose or arachnose, densely glandular beneath; apex acute, base usually decurrent-cuneate, rarely acute; petiole 0.4 to 2.5 cm. long, puberulent, pubescent or floccose. Heads terminal, usually crowded, corymbosely (cymosely?) arranged, to 1.5 cm. high, 2.0 cm. in diameter; phyllaries to 1.5 cm. long, herbaceous tips often attenuate, spreading or reflexed, sometimes merely lanceolate, outer phyllaries pubescent to often arachnosely pubescent; flowers to 1.2 cm. long, generally tube twice as long as urceolate top, often glandular at top of tube; achenes to 0.4 cm. long, usually medium brown, glabrous, highly glandular, rarely dark brown, moderately pilose and densely glandular; pappus to 0.8 cm. long, flattened.

*V. petitiana* seems to be restricted to Ethiopia (see fig. 23). Richards' description and the type specimen (Mus. Paris) belong with several collections with less crowded heads and somewhat pilose achenes which look suspiciously like introgression from *V. abyssinica*. I have no proof for this. The material formerly identified as *V. filigera* forms the bulk of this species. While the more extreme of these might be worthy of distinction in some way, the presently known range of variation and the lack of geographical separation argues against this at the present time.

*Selected Collections:* ETHIOPIA: Eritrea. Asmara. Filfil. 700 m. *A. Fiori* 1735. Mar. 31, 1909. (FI). Carnescin, Valle Gerbabit. 1,000–1,300 m. *A. Pappi* 137. Apr. 6, 1924. (FI). Amhara. Dembia, Gondar. *G. Chiovenda* 2169. Oct. 1, 1909. (FI). Lago Tana, presso il villaggio de Bachianà (Tucùr Dinghia-Gondar). *R. Pichi-Sermolli* 2447. Jan. 24, 1937. (FI). Amhara. Dembia, valle Sciuta sopra Asoso. *G. Chiovenda* 2563. Oct. 17, 1909. (FI). Scioa. Addis Ababa. *H. F. Mooney* 6337. Nov. 16, 1954. (FI, K). Neghelli. *P. G. Piovano* 131. Oct. 27, 1937. (FI).

10. *Vernonia lasiopus* O. Hoffm. in Engl. Pflanzenw. Ost-Afrika. 403. 1895. (Figs. 24 and 25. See also figs. 7B, and 23.)

Lectotype Coll: *Volkens* 444. Marangu. 1,550 m. June, 1893. (BR, K).

*V. iodocalyx* O. Hoffm. Loc. cit.

Lectotype Coll: *Holst* 4327. Usambara. (K).

*V. massaiensis* S. Moore. J. Linn. Soc. Bot. 35:320. 1902.

Type Coll: *Elliot* 6780. Masai. 7,000 feet. (Photo—BM!).

*V. kaessneri* S. Moore. J. Bot. 40:340. 1902.

Type Coll: *Kaessner* 635. Brit. E. Africa, Simba River. April, 1902. (K!).

*V. ruwenzoriensis* S. Moore. J. Linn. Soc. Bot. 35:321. 1905.

Type Coll: *Elliot* 7673. Ruwenzori, Kivate. 6–8,000 feet. May. (BM, K!).

*V. braunii* Muschler. Bot. Jahrb. Syst. 46:73. 1911.

Type Coll: *Braun* 1979. Tanganyika Terr., Amani. Aug., 1908. (EA, K).

*V. albo-violacea* De Wild. Feddes Repert. 13:205. 1911. (non Muschler). *Nom. illeg.* (later homonym).

Lectotype Coll: *Bequaert* 492. Shinsenda. June, 1912. (BR!).

*V. brownii* S. Moore. J. Bot. 54:252. 1916.

Type Coll: *Brown* 2656. Uganda. 100 miles N. W. of Kampala on the Umbendi Road. June, 1915. (K!).

*V. dумicola* S. Moore. J. Bot. 54:252. 1916.

Type Coll: *Dümmer* 84. Uganda: Karirema. 4,000 feet. Aug., 1913. (Photo BM!).

*V. ringoetti* De Wild. Contrib. Fl. Katanga. 228. 1921. (*Nom. nov.* for *V. albo-violacea* De Wild.).

*V. mokaensis* Milbr. Wiss. Ergeb. Deutsch Zentral. Afrika-Exped. 1910–11. 2:195. 1922.

Lectotype Coll: *Milbraed* 7077. Fernando Poo. 1,200–1,800 m. (Photo HBG!).

*V. saltuarii* S. Moore. J. Linn. Soc. Bot. 47:264. 1925–27.

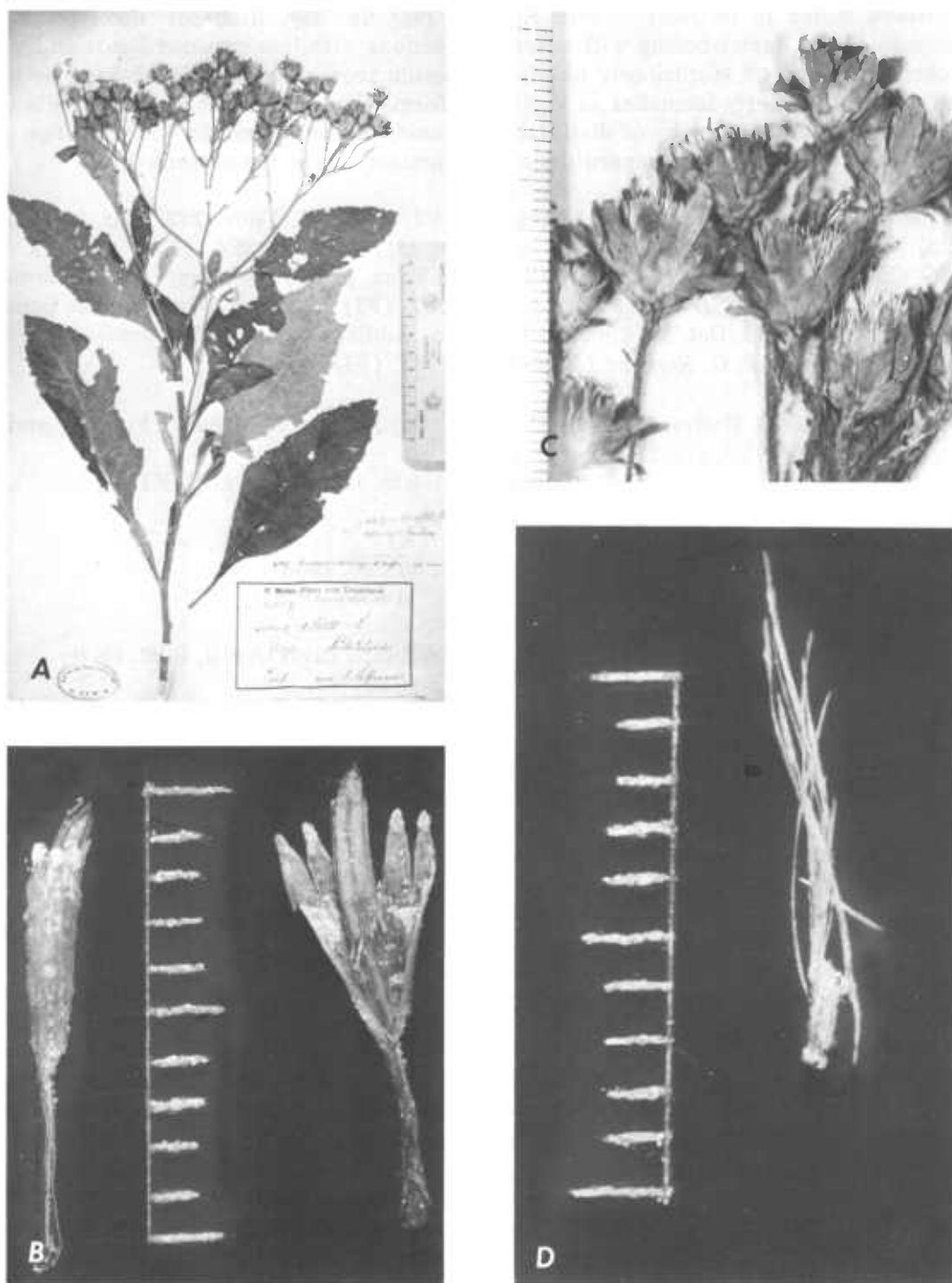
Type Coll: *Swynnerton* 827. Tanganyika Terr. Madolema. June, 1921. (BM!).

*V. tuberculata* Hutch. & Burt. Rev. Zool. Bot. Africaines. 23:39. 1932.

Type Coll: *de Witte* 463. (Not seen); 500. Congo. Kasiki. June, 1931. (K) (Syntype).

Shrubs to 2.4 m. tall, rarely to 4.0 m. tall. Stems seldom glabrate to generally densely puberulent or pubescent; leaves to 25 cm. long, 9.5 cm. wide, usually about 10 cm. by 2.5 cm., ovate to ovate-lanceolate to lanceolate; margin usually apiculate dentate; blade pilose along the veins to generally moderately pilose, rarely with scattered glands above, pilose along the veins to scattered pilose to often densely lanate, glandular beneath; apex acute, base sometimes decurrent and sessile, sometimes cuneate, often acute; petiole, when present, to 3.0 cm. long, usually 0.5 to 1.5 cm. long,

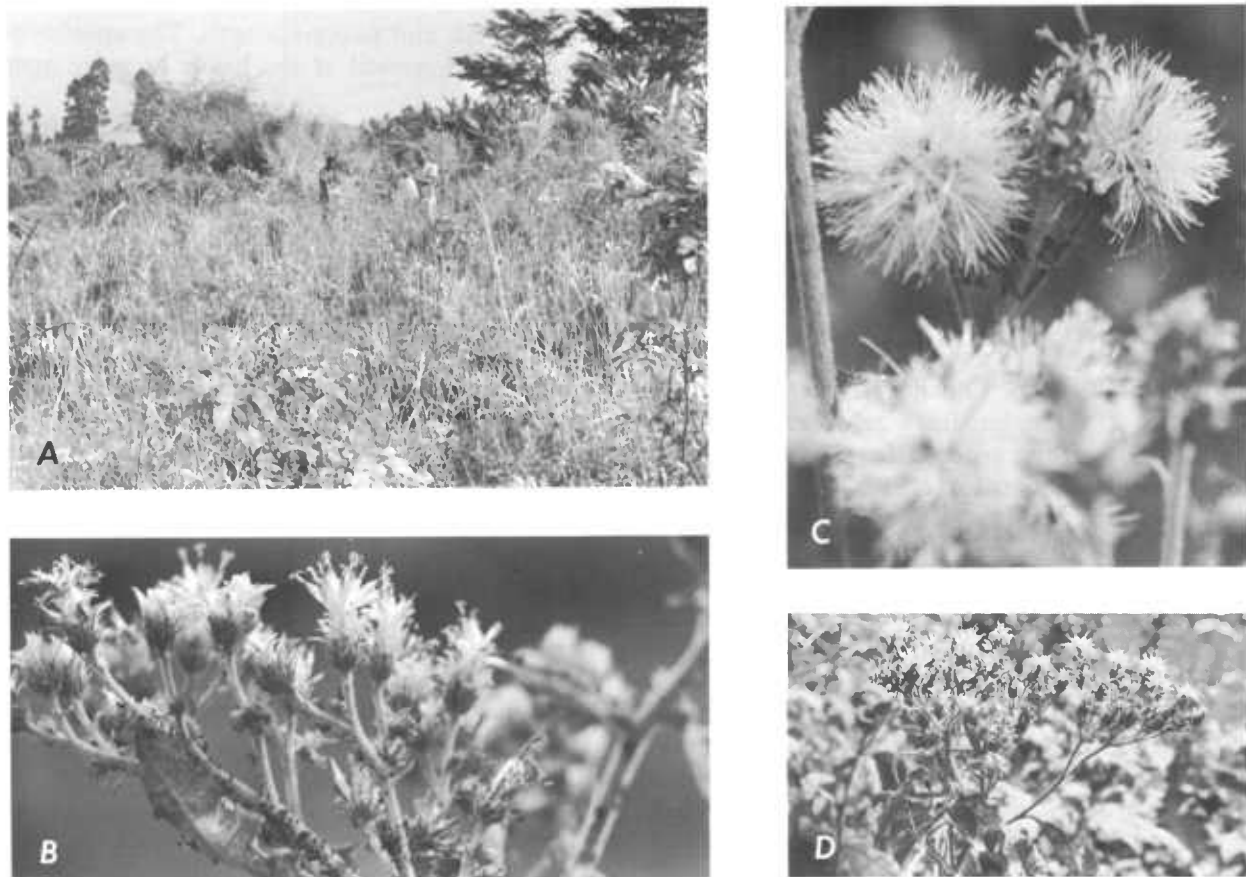




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Figure 24.—Lectotype collection, *V. iodocalyx* O. Hoffm. = *V. lasipous* O. Hoffm. A, Habit; B, flowers, unopened and dissected (expanded in water); C, detail of heads; and D, achene (immature). (K). Scales in millimeters.





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Figure 25.—A, Plants of *V. lasiopus*, scattered through the grass and shrubs in open pasture near Fort Portal, Uganda; B, flowering heads of a plant at Fort Portal (Smith, Wood & Perdue 4612); C, mature heads, and D, flowering heads of plants near the Tombs of Karambi, south of Fort Portal (Smith 4624).

densely pubescent. Heads terminal, generally crowded, corymbosely or paniculately arranged, sometimes so crowded as to form a ball; heads to 1.5 cm. high, to 1.5 cm. in diameter; phyllaries to 1.4 cm. long, coriaceous base usually exposed, herbaceous tip frequently small, ovate to lanceolate, occasionally larger and conspicuous, sometimes moderately puberulent without, white to rose, rose color sometimes persistent in dried specimens; tips sometimes reflexed; flowers to 1.4 cm. long, tube from  $\frac{1}{2}$  to  $\frac{2}{3}$  the length of the flower, white to mauve or purple; achenes to 0.4 cm. long (one collection to 0.7 cm. long), often plump, medium to dark brown, (costae occasionally lighter), rarely glabrous to usually scattered to moderately pilose, often glandular, callus discreet; pappus to 0.9 cm. long, generally only slightly variable in length, narrowly flattened.

*V. lasiopus* appears to be generally found in wet or well-watered habitats across the equatorial portion of Africa and into Zambia and Mozambique on the east. The foliage is widely variable and often undulate on the plants which I have seen in the field.

The specimens which have well-developed phyllary tips are often found at higher elevations. These can be readily confused with specimens of *V. bracteosa* with small heads, but the latter species

is consistently larger in head size, flower length, achene length and pappus length. The specimens of *V. lasiopus* are usually readily recognized whether the arrangement of the heads be more open or densely crowded into a ball.

Confusion between *V. lasiopus* and *V. hymenolepis* is more difficult to define as the heads of the species may be the same size and have similar large, white phyllary tips. Generally, though, the coriaceous phyllary bases are exposed, achenes are sparsely to moderately pubescent and glandular and the pappus is more persistent in *V. lasiopus*. I have found *V. hymenolepis* more frequently in disturbed habitats, but they both are found in similar undisturbed habitats. Because they also occupy similar ranges and may be found in close proximity, I suspect that there may be some gene exchange between them which would account for the many intermediate specimens which are difficult to assign to a species.

In Zambia, D. B. Fanshawe notes, "Shrub with erect-spreading branches and loose corymbose crown, to 2" diameter. Bark grey, smooth with coarse brown lenticels, slash pale green, thick, soft, sappy. Flowering recorded for September, October and fruiting for October and November, but could be much more extensive (I have only seen the plant twice). Locally frequent on dambo margins and stream sides, occasional in montane forest. Apparently confined to the eastern district on both sides of the Luangwa Valley from Abercorn southwards."

*V. lasiopus* is reported to be used as a remedy for a number of ills. In Kenya, the leaves are used in making soap, the branches are used to strengthen hut walls, the juice of the leaves is used as a medicine for goats, and the ashes of the plant are used as medicine (Napier). In Tanzania, a tonic made from the plant is reported to be used in pregnancies (Tanner); the leaves and roots are used to treat stomach pains (Braun and Carmichael) or as a purgative (Koritschorner). A decoction of the whole plant is given for epilepsy, the root is given to aid birth (Bally), and the plant is even used as medicine for cows (de Wulf). In both the Congo and Ruanda-Urundi, extract from the leaves is used as an anthelmintic remedy (Becquet and Gille), and in Ruanda-Urundi the stem bark is used to make sores suppurate (Elkens).

*V. lasiopus* has been generally collected in the uplands of eastern Africa from Ethiopia to Rhodesia and Mozambique and westward in the Republic of the Congo and Angola (see fig. 23, p. 38).

*Selected Collections:* ETHIOPIA: Mt. Tulu Wallel. 8,000 feet. *F. Piffard* 57. Mar. 26, 1958. (K). SUDAN: Lado, Yei River. *F. Sillitoe* 196. Nov. 10, 1919. (K). KENYA: Endebess. 6,400 feet. *M. V. Webster* 8899. (K). Cherangani. 6,400 feet. *M. V. Webster* 8898. (EA). Rift Valley near Eldama Ravine. 700 feet. *P. H. Irwin* 288. June 30, 1956. (EA). Nieri. *R. E. & C. E. Fries* 150. Dec. 19, 1921. (BR, MO). Mau Forest. 8,000 feet. *Q. C. Ivens* 1003. July, 1957. (EA). Nairobi. Thika Road House. 6,500 feet. *B. Verdcourt* 414. Jan. 14, 1951. (EA, MO, PRE). Nairobi. 5,450 feet. *R. A. Dummer* 2030. Feb. 1915. (BM). Chyulu Hills center. 5,500 feet. *P. R. O. Bally* 1030. June 11, 1938. (EA). TANZANIA: West Usambaras. Lushoto to Megamba. 2,000–2,300 m. June 3, 1926. *A. Peter* V251. (EA, K). Arusha Distr. Embagai. *G. W. St. Clair-Thompson* 1235. Feb. 5, 1932. (EA, K). West Lake Prov. Muganza, Bushubi, Ngara. 4,500 feet. *R. E. S. Tanner* 4555. Dec. 1, 1959. (K). Kilimanjaro Distr. Lyamungo. *P. J. Greenway* 3019. Aug. 13, 1932. (EA). Between Bahati and Galappo in Endanok Ravine. 5,000 feet. *J. R. Welch* 109. Aug. 26, 1951. (EA). Eastern Usambaras. Mt. Bambole, Amani. 3,200 feet. *B. Verdcourt* 297. July 28, 1950. (BR, EA, MO, PRE). Western Prov. Kigoma Distr. Kasangazi. Mahali Mts. *C. D. Mgaza* 154. July 16, 1958. (K). Mahenge Distr. Issongo. 900 m. *H. J. Schlieben* 2181. May 5, 1932. (K, PRE). Songea Distr. Matengo Hills, Miyau. 1,620 m. *E. Milne-Redhead & P. Taylor* 10252. May 19, 1956. (EA, K, SRGH). UGANDA: Mubende Distr. Road from Bukumi to Madudu. 4,200 feet. *Lind* 2142. (EA). Mt. Elgon, Butandiga. 7,000 feet. *R. A. Dummer* 3677. (K). Entebbe region. 3,842 feet. *T. D. Maitland* 456. (K). Western Prov. Mubuku valley ridges. 4,500–5,000 feet. *C. E. Smith, Jr.* 4608. Jan. 16, 1967. (BM, EA, FI, K, US). Along Kasese-Mbarara road about 40 mi. from Mbarara. *C. E. Smith, Jr. & D. Wood* 4627. Jan. 20,

1967. (BM, EA, FI, K, US). Kachwekano Farm, Kigezi. 6,700 feet. *J. W. Purseglove* 2776. Apr., 1949. (EA, K). ZAMBIA: Abercorn Distr. Kwimbe. *H. M. Richards* 9619. May 8, 1957. (K). Serenje. *D. B. Fanshawe* 6732. Sept. 27, 1961. (K). Malawi. Mt. Mlanje, Malosa Valley. *E. J. Newman & T. C. Whitmore* 565. Aug. 24, 1956. (SRGH). RHODESIA: Inyanga. Trias Hill. *F. Eyles* 5199. Dec., 1919. (SRGH). MOZAMBIQUE: Niassa Prov. Maniamba Div. Malulo. Tessi Mt. *Pedro e Pedrogão* 4056. May 29, 1948. (EA). RUANDA: Ngoma. Lake Kivu, 20 km. S. of Kibuye. *Ritland* 316. (EA). Biumba. Mutara, environs de Mimuli. 1,400 m. *G. Troupin* 5199. Dec. 14, 1957. (K). Kigali. 1,500 m. *A. Becquet* 379. Feb., 1933. (BR). Terr. Astrida. Entre Astrida et la Riv. Kamahembe, environ Gisagara. 1,750 m. *T. Bazarusanga* 40. Jan. 16, 1957. (K). BURUNDI: Kisozi. 1,800 m. *J. B. H. Lejeune* 174. 1934. (BR, MO). Malagarasi, Keifo Nello. *Michel & Reed* 954. Dec. 12, 1951. (BR). REPUBLIC OF CONGO: Bogoro. *Bequaert* 4952. July 9, 1914. (BR). Mayolo. Beni. *Bequaert* 3493. Apr. 9, 1914. (BR). Lake Kivu. Entre Kiotshe et Bobandana. *D. Van der Ben* 201. Mar. 10, 1953. (BR). Remera Mission, 30 km. from Kigali road to Usumbura. *R. Germain* 1195. Jan. 11, 1942. (BR). Lualu. *P. Quarré* 2762. Nov., 1931. (BR, K). Lukonzolwa-Moero. *P. Quarré* 3309. July, 1933. (BR). Kando. *G. F. de Witte* 112. Apr. 4, 1931. (BR, K). Kanda-Kanda. *Luxen* 336. 1934. (BR, K). Ivumu, Mulungu. *F. L. Hendrickx* 3423. Oct., 1945. (BR, EA). Mutombo-Mukulu. *P. Quarré* 2520. Nov., 1931. (BR, K, MO). ANGOLA: Malange region, Kela, River Lui. *Herb. Serv. Agri. Ang.* 9577. Dec. 27, 1930. (K).

**11.** *Vernonia oxyura* O. Hoffm. in. Engl. Pflanzenw. Ost-Afrika. C: 403. 1895. (Fig. 26. See also fig. 23.)

Lectotype Coll: *Buchanan* 41. Nyassaland. 1891. (BM!).

*V. polyura* O. Hoffm. Bot. Jahrb. Syst. 30:422. 1901.

Type Coll: *Goetze* 866. Langenburg. Elev. 500 m. (BR).

*V. cirrifera* S. Moore. J. Linn. Soc. Bot. 35:320. 1902.

Type Coll: *Buchanan* 370. Nyassaland. (Photo—BM!).

*V. longipetiolata* Muschler. Bot. Jahrb. Syst. 46:74. 1911.

Type Coll: *Kassner* 2746. Congo, Kundelungu. Apr., 1908. (K).

*V. seyrigii* Humbert. Notul. Syst. (Paris). 13:324. 1949.

Lectotype Coll: *Decary* 8577. Madagascar: Ambovombe. Mar., 1931. (K).

Tree to 10 m. tall. Branchlets moderately to densely puberulent, rarely lenticellate; leaves to 20 cm. long, 8.5 cm. wide, ovate; margin often undulate, rarely apiculate; blade scattered to moderately pilose above, scattered to moderately pilose and glandular below; apex obtuse to acute, base acute; petioles to 4.0 cm., generally less, densely puberulent. Heads in terminal, open to generally crowded, corymbose aggregations; heads to 1.5 cm. high, 1.5 cm. in diameter, phyllaries to 1.3 cm. long, lanceolate acute to abruptly attenuate, outer generally pilose without and frequently ciliate; flowers to 1.2 cm. long, tube about equal to the limb or slightly longer, white, pink, mauve or purple; achenes to 0.45 cm. long, medium brown or, rarely, yellow, glabrous, glandular; callus distinct; pappus to 0.9 cm. long, narrowly flattened or nearly filiform, generally rufous-tawny.

*V. oxyura* is readily distinguished from most species of this group by its arboreal form. It is also distinguished by the glabrous achenes which are rare in the section *Stengelia*.

Fanshawe notes that, in Zambia, this species is "Semi-deciduous shrub or small tree to 7" diameter. Bark pale brown, reticulately cracked, flaky, flakes 1.5 cm. diameter. Slash green, thin, soft, sappy. Flowering April, May, June. Fruiting May, June. Rare on granite kopjes."

In Tanzania, the root is used for influenza (Koritschoner) and a root decoction is given for stomach ache and gonorrhea (Tanner). Malawi natives are also reported to use the leaves as medicine and Robyns reports that in the Congo the species is used for wounds.

*V. oxyura* is largely confined to eastern Africa below the equator and it is rarely found westward

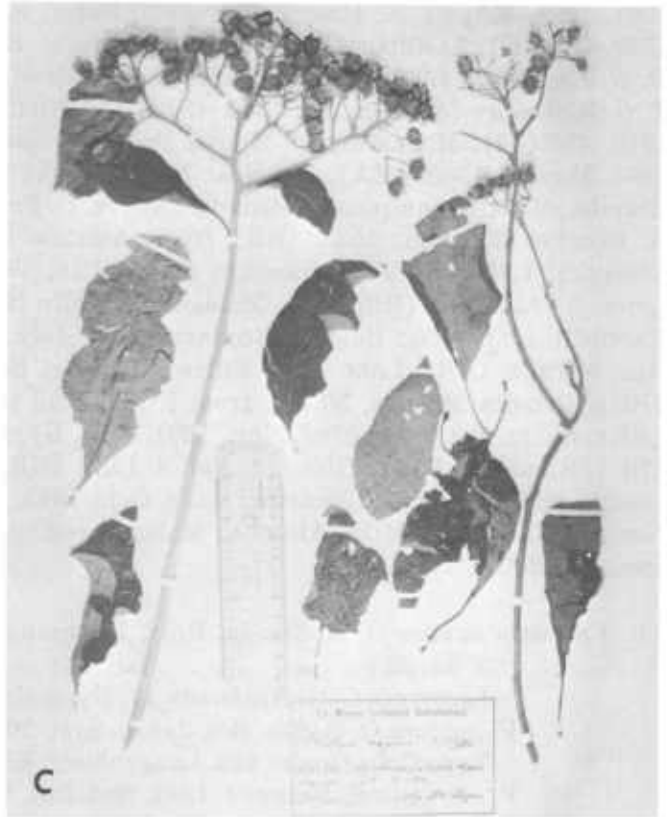
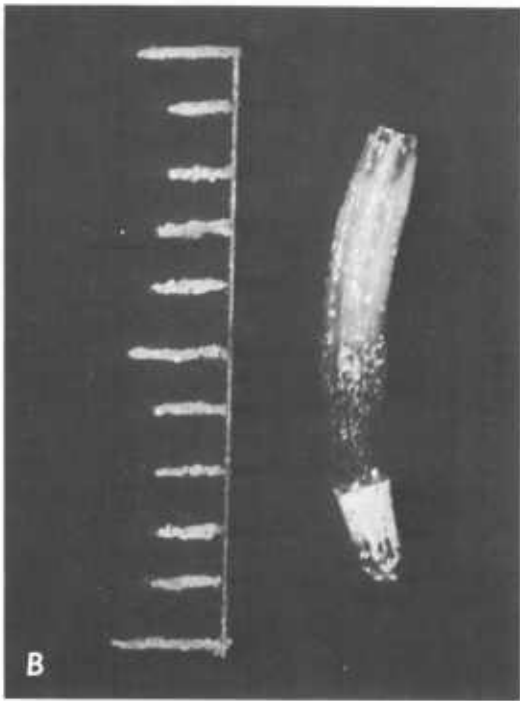
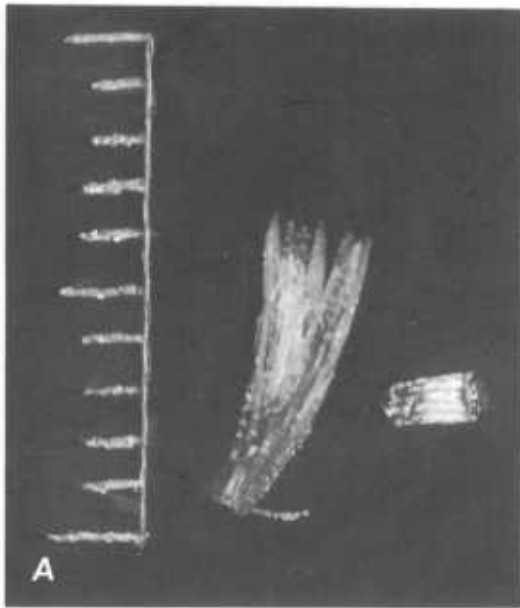


Figure 26.—Lectotype collection of *V. oxyura* O. Hoffm. A, Dissected flower and B, unopened flower (expanded in water); C, habit; and D, detail of heads. (BM). Scales in millimeters.

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in the Congo (see fig. 23, p. 38). I did not borrow specimens of *Vernonia* from Madagascar, except types whose descriptions seemed to fit *Vernonia* section *Stengelia*, and I cannot tell how common the species is on the island. It would not appear to be abundant anywhere in its range.

*Selected Collections:* KENYA: Lumi River Forest. Taveta. *H. M. Gardner* 2965. (K). TANZANIA: Moshi Distr. Mashame. 1,500 m. *M. Mücke* 221. Aug. 28, 1909. (K). Usambara. Maschana. *C. Holst* 3556. July, 1893. (BM, K). Tanga Distr. Pangani, Madanga, Pombwe. *R. E. S. Tanner* 2952. July 4, 1956. (BR). Eastern Prov. Morogoro Distr. Mtibwa Forest Reserve. *S. R. Semsei* 907. Aug., 1952. (EA, K). Kyimbila Distr. N. of Lake Nyassa. *A. Stolz* K7. (BM, BR, K, MO, PRE). Tunduru Distr. 11 km. E. of Songea Distr. boundary. 840 m. *E. Milne-Redhead & P. Taylor* 10710. June 7, 1956. (BR, EA, SRGH). Songea Distr. Kwamponjore Valley about 9.5 km. S.W. of Songea. 1,000 m. *E. Milne-Redhead & P. Taylor* 9829. Apr. 26, 1956. (BR, EA, K, SRGH). ZAMBIA: Eastern Prov. Fort Jameson Distr., Fort Jameson to Lundazi, mi. 30. *F. White* 2476. Apr. 26, 1952. (BR, K, MO). MALAWI: Langenburg. *W. Goetze* 864. (K). North of Bua River, Nyansi Hills. *I. B. P. Evans & J. Erens* 616. June 2, 1938. (PRE). Kasungu Hill. 1,100 m. *L. J. Brass* 17452. Aug. 28, 1946. (BR, MO, NY, SRGH, US). Zomba Distr. 23 mi. N. of Zomba. *L. C. Leach & Brinton* 9888. May 2, 1960. (SRGH). Mlanje Distr. Mlanje Mt. *J. D. Chapman* 355. Apr. 15, 1957. (K, PRE). Likubula Gorge. 840 m. *L. J. Brass* 16374. June 20, 1946. (BM, BR, K, MO, NY, PRE, SRGH, US). MOZAMBIQUE: Nyassa. Massaneulo. 1,100 m. *A. Gomes e Sousa* 1397. Apr., 1955. (K). REPUBLIC OF CONGO: Kivu Prov. Walikale Terr. Near Mutongo, 52 km. N.W. of Masisi, 1,100–1,200 m. *G. Troupin* 3006. Jan. 22, 1957. (K). Between Shiebele and Kitabi, road from Tweto to Baudouinville. 1,100 m. *W. Robyns* 2063. Apr. 21, 1926. (BR, G).

12. *Vernonia guineensis* Benth. in Hook. f. & Benth. Niger Fl. 427. 1849. (Figs. 27, 28, and 29. See also fig. 31, B.)

Type Coll: *Don* 70. Sierra Leone. (Photo—BM!).

*V. firma* Oliv. & Hiern in Oliv. Fl. Trop. Africa 3:290. 1877.

Type Coll: *Schweinfurth* 3153. Linduku. May, 1870. (BM!, K).

*V. ulophylla* O. Hoffm. Bol. Soc. Brot. ser. 1. 13:13. 1896.

Lectotype Coll: *Welwitsch* 3279. Angola. (K).

*V. cardiolepis* O. Hoffm. Op. cit. 12.

Type Coll: *Welwitsch* 3280 (cited 2380). Angola. (K).

*V. temnolepis* O. Hoffm. Op. cit. 11.

Lectotype Coll: *Welwitsch* 3273. Angola: Huila. Inter Nene et Humpata. Apr., 1860. (Photo—BM).

*V. proluxa* S. Moore. J. Linn. Soc. Bot. 35:322. 1905.

Type Coll: *Elliot* 8383. Urundi hills. Sept. (K!).

*V. rotundisquama* S. Moore. J. Linn. Soc. Bot. 37:312. 1906.

Type Coll: *Gossweiler* 1228. Angola. Malange. (K!).

*V. chevalieri* O. Hoffm. Bull. Soc. Bot. France 55:Mem. 8b:39. 1908.

Type Coll: *Chevalier* 5505. Haut Oubangui. Entre lo Tomi et la Kémo. Sept., 1908. (BR).

*V. hierniana* S. Moore. J. Bot. 52:335. 1914.

Type Coll: *Welwitsch* 3278. Angola: Pungo Andongo. (K!).

*V. incompta* S. Moore. J. Bot. 56:210. 1918.

Type Coll: *Kassner* 2261. Rhodesia. Katuba Stream. Dec., 1907. (K!).

*V. guineensis* var. *cameroonica* Adams. J. W. African Sci. Assoc. 6:154. 1960.

Type Coll: *Latilo & Daramola* FHI34467. Cameroons. Yashsaka Distr. Apr., 1955. (BR).

Perennial herb from a woody root crown; stems to 1.5 m. tall, usually about 1 m. Leaves sessile, to 12 cm. long, 4.5 cm. wide, lanceolate, rarely ovate-lanceolate; margin blunt apiculate-dentate; blade generally glabrous, scattered glandular, rarely scurfy, above, raised reticulate, densely lanate

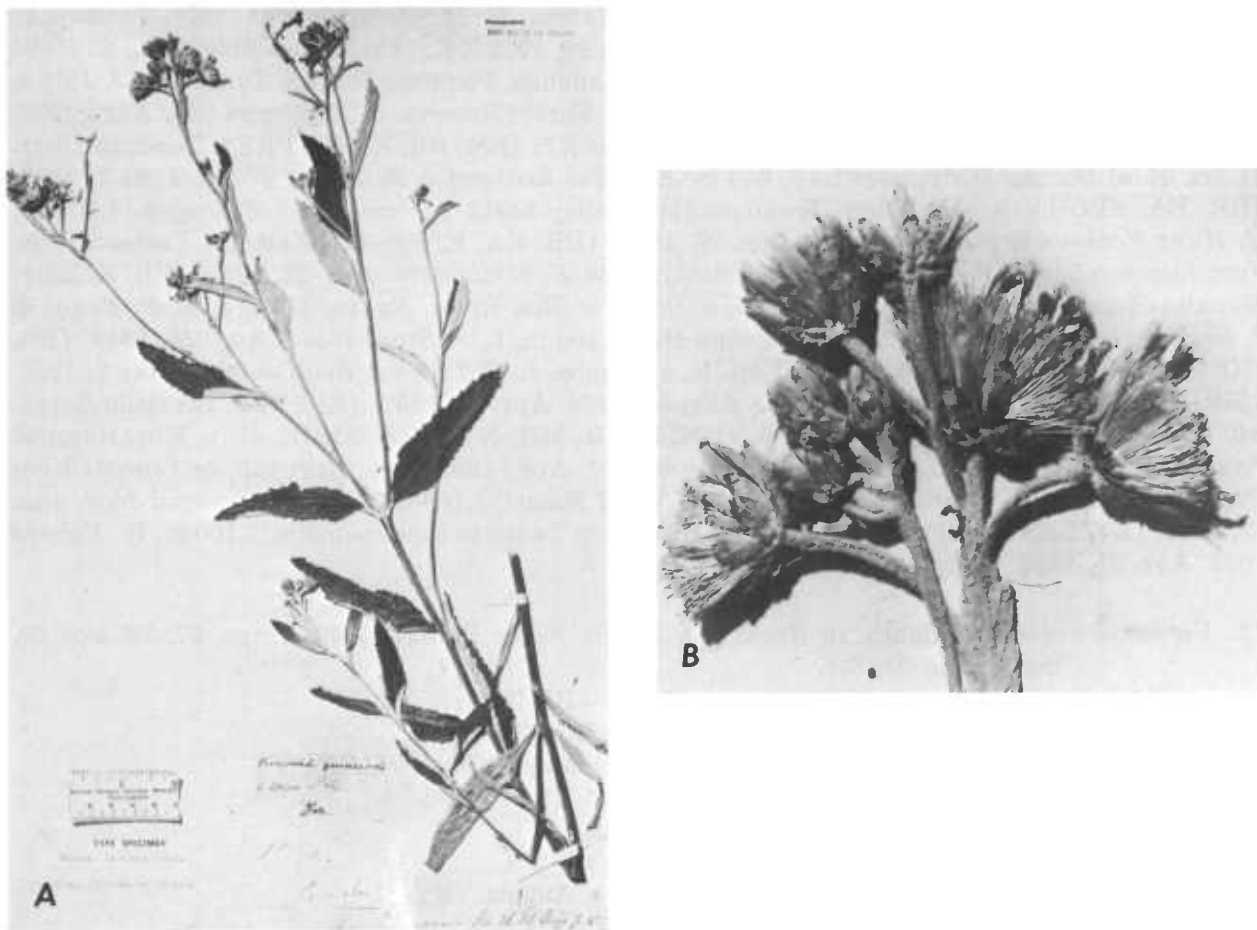


Figure 27.—Type collection of *V. guineensis* Benth. in Hook f. & Benth. A, Habit, and B, detail of heads.  
(Photos, BM.)

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and glandular beneath. Heads terminal, borne in an open panicle arrangement; heads to 1.5 cm. tall, 2.0 cm. in diameter, phyllaries to 1.5 cm. long, tips white to rose; flowers to 1.5 cm. long, tube twice as long as the limb or more than twice as long, white to mauve or lilac, rarely purple; achenes to 0.4 cm. long, usually less, medium brown to, rarely, dark brown, glandular, pubescent; pappus to 1.0 cm. long, usually less, flattened, apex obtuse.

*V. guineensis* is a variable species which has been given numerous names on the basis of minor morphological differences. When sorted by leaf shape, the narrow-leaved forms have been collected primarily along the eastern side of the range of the species in eastern Congo, Mozambique, Malawi, Zambia and Tanzania. Broad-leaved plants have been collected primarily in the Congo, but a few come from Sierra Leone and Togo. The intermediate leaf forms are widely distributed throughout the range of the species and overlap both extremes.

Fanshawe, in Zambia, furnishes the following note: "Subshrub, unbranched or with a few erect-spreading branches. Bark grey-black, smooth, slash green, thin, soft, sappy. Flowering January-April. Fruiting February-May. Locally frequent in miombo woodland, occasional on granite kopjes. Distributed throughout the high rainfall belt."

Although *V. guineensis* had once been reported as poisonous (Homblé), Congo natives used a decoction of the boiled roots for hernia (Lecompte) and the leaves as a purgative (Dewulf). In Sierra Leone, the plant is used as a wash for crawcraw or paralysis (Elliot). In this area, the raw roots are also eaten as an aphrodisiac (Deighton). An infusion of the plant is used to treat "garli," a cattle disease, in Ghana (Williams).

*V. guineensis* ranges from western to eastern Africa in mid-continent from about 15° N. to 15° S. at medium elevations. (See fig. 29, p. 48). It is a species of open deciduous woods and savannas.

*Selected Collections:* GUINEA: Diaguma. *Maclaud* 169. Jan. 12, 1898. (P). Conakry, Boffa. *G. Roberty* 17506. Sept. 17, 1955. (G). Near Beyla. *H. J. Félix* 1546. Feb., 1937. (K, P). SIERRA LEONE: Near Mussaia. *F. C. Deighton* 5388. Apr. 2, 1951. (K). Northern Prov. Mambolo. *F. C. Deighton* 979. Jan. 5, 1928. (BM). Near Magbile (Maforki). *H. D. Gordon* 893. May 26, 1953. (K). Near Buyabuya, Scarcies River. *G. F. S. Elliot* 4842. Feb. 13. (BM). Binkolo. 570 feet. *N. W. Thomas* 1884. Aug. 25, 1914. (K). IVORY COAST: Baoulé. *H. Pobequin* 169. Oct., 1895. (P). 30 km. N. of Bouaké. 300 m. *A. J. M. Leeuwenberg* 2073. Nov. 20, 1958. (K, PRE). Kokoumbo. *G. Roberty* 13996. Feb. 24, 1951. (G). GHANA: Tamale. *J. K. Morton* 8778. Mar. 27, 1953. (K). Between Ejura



Figure 28.—A, Plants of *V. guineensis*, nearly hidden in the grasses and herbs. B, Flowering heads, conspicuous because of their white phyllary tips. (Smith & Fanshawe 4662.) (See also fig. 7, A, p. 9.)



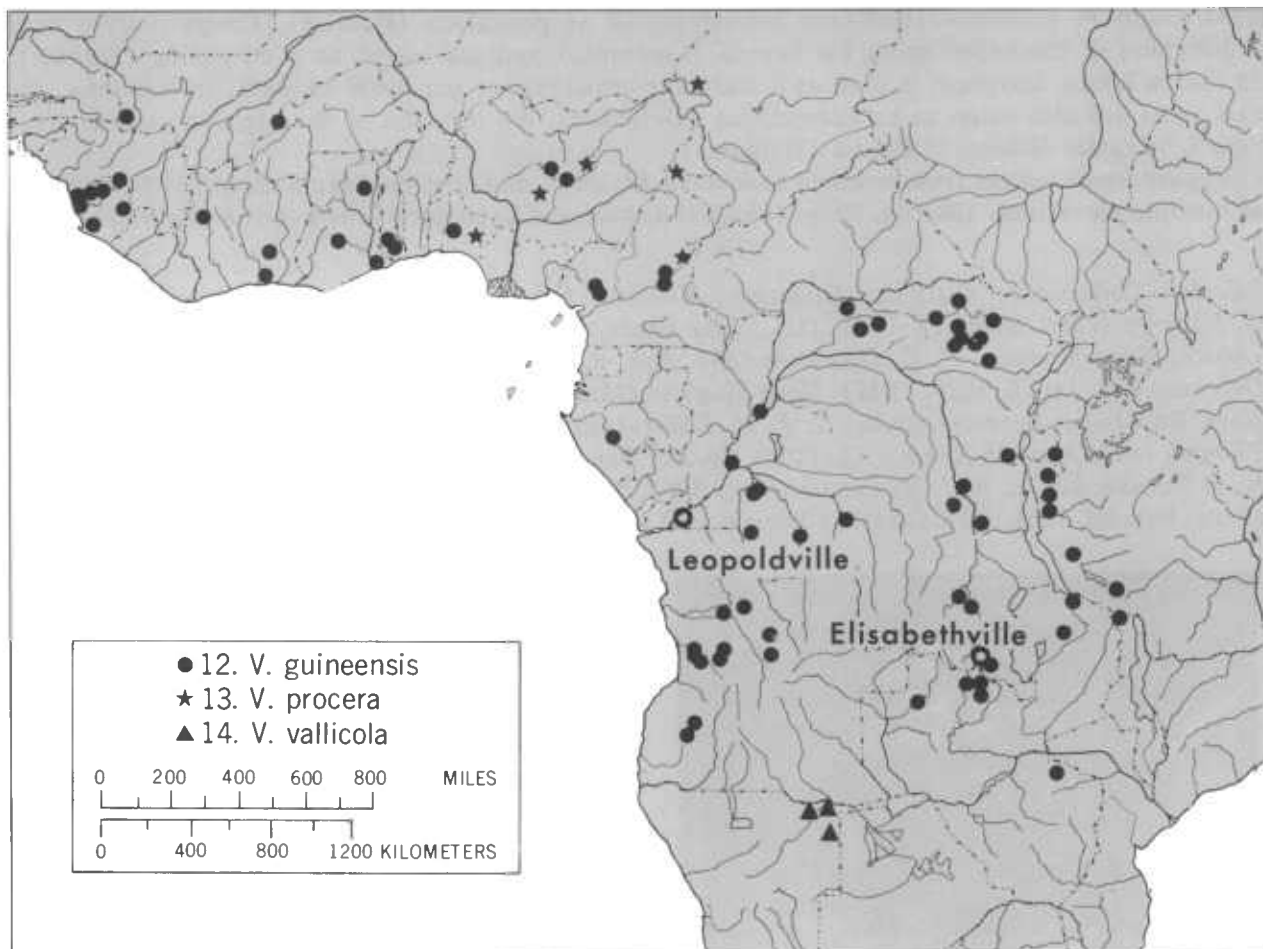


Figure 29.—Distribution of *V. guineensis*, *V. procera*, and *V. vallicola*.

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and Kintambo. 500 feet. *P. R. O. Bally* 175. Apr. 27, 1947. (EA). Afram Plains. *W. Johnson* 715. Mar. 15, 1900. (K). Togo: Kpando. *J. M. Robertson* 117. Apr. 24. (BM). Agome. *R. Schlechter* 12964. Mar., 1900. (BM, BR, G). NIGERIA: Zaria Prov. Near Jengre, 37 mi. from Los. 3,000 feet. *D. E. Coombe* 83. Dec. 28, 1954. (K). Naraguta. 4,000 feet. *H. V. Lely* 242. May 30, 1921. (K). Oyo Prov. Oyo Distr. 9 mi. E. of Igboho. *R. W. J. Keay* FHI22508. Feb. 29, 1948. (K). CAMEROON: Kongola, Mbussa. 800–900 m. *J. Milbraed* 9063. 1914. (BM, K). Bamenda. 5,000 feet. *F. W. H. Migeod* 295. Jan. 14, 1928. (BM). Bamenda Div. Near Bafut-Ngemba Forest Reserve above Lake Bambuluwe. 2,110 m. *F. N. Hepper* 2152. Feb. 23, 1958. (K). Sansane, Kongola. 750–800 m. *J. Milbraed* 8973. Apr., 1914. (BM, K). GABON: Mouila. *A. Walker* s. n. Mar., 1938. (P). ANGOLA: Cuanza Norte. Malange, Cainbaxe. 1,000 feet. *J. Gossweiler* 8875. (K). Benguella. Forte P. Amelia, Cubango. *J. Gossweiler* 1940. (K). Kirima, near River Jombo-Luando. *J. Gossweiler* 9503. Feb. 22, 1931. (K). Alto Catumbela. Ganda. 3,500–4,500 feet. *H. G. Faulkner* 148. Feb., 1942. (K). Near Humpata. 6,000 feet. *H. H. W. Pearson* 2096. May 6, 1909. (K). REPUBLIC OF CONGO: Tukpwo. *P. Gerard* 1273. Apr. 17, 1954. (BR). Basape, Rivier Nanzaie, tributaire de Duma. 700 m. *R. Germain* 704. Jan., 1946. (BR, K). Km. 32, Yakoma-Banzville road. *R. Germain* 8550. Apr. 3,



1955. (BR). Near Bambesa, Uele. *Pittery* 252. 1936. (BR). Region Api, near Likwangili. *W. Robyns* 1275. Dec. 30, 1925. (BR). Between Isoro and Mt. Nambungu. Uele. *J. Louis* 1726. Apr. 20, 1936. (BM, BR, K). Yalinga, haut Oubangui. *G. Le Testu* 2495. (P). Kivu Prov. Kalehe Terr. Bukavu-Walikae road. 2,320 m. *J. Petit* 70. Mar. 18, 1960. (EA). Baise Ruzizi. Paysannat Bulamata. *R. Germain* 6565. Mar., 1950. (BR). Wombali. *H. Vanderyst* 2195. Sept., 1913. (BR). Vakpudu (Doruma). *P. A. M. de Graer* 225. Mar., 1934. (BR). Parc Heenen, Lubumbashi. *P. Quarré* 7914. Apr., 1946. (BR). Mayaba, entre Tshobo et Kai Baku. 350 m. *V. Goossens* 1405. Aug., 1919. (BR). Boitsfort, Elisabethville, 1,250 m. *W. Robyns* 1637. Mar. 11, 1926. (BR, K, MO). Kiayaka, Kwango. *R. Devred* 2860. Mar. 10, 1956. (BR, K). RUANDA: Mosso, Nyabitare. *Michel & Reed* 692. Nov. 21, 1951. (BR). TANZANIA: West Lake Prov. Keza, Bushubi, Ngara. 5,000 feet. *R. E. S. Tanner* 5069. July 20, 1960. (K). Buha Distr. 86 mi. from Kibondo on road to Kasulu. 4,500 feet. *B. Verdcourt* 2850. July 15, 1960. (EA). Kigoma Distr. 36 mi. S. of Uvinsa. 5,700 feet. *A. A. Bullock* 3286. Aug. 31, 1956. (K). Ufipa Distr. Kito Mts. 1,800 m. *H. M. Richards* 11867. Dec. 3, 1959. (K). Mbeya. 6,500 feet. *R. M. Davies* 444. Mar. 3, 1932. (EA, K, SRGH). ZAMBIA: Abercorn Distr. Nkali Dambo. *C. E. Smith, Jr. & H. M. Richards* 4672. Feb. 21, 1967. (BM, EA, K, SRGH, US). Kasama Distr. Mi. 46 on Kasama-Abercorn road. *P. J. Greenway* 8359. Aug. 3, 1949. (EA, K, SRGH). Ndola. *D. B. Fanshawe* 683. Jan. 18, 1954. (K). Western Prov. Luano Forest Reserve near Chingola. *C. E. Smith, Jr. & D. B. Fanshawe* 4662. Feb. 12, 1967. (BM, EA, K, ND, SRGH, US). MALAWI: Misuku Hills. 4,000 feet. *E. A. Robinson* 3141. Jan. 10, 1959. (K, SRGH).

13. *Vernonia procera* O. Hoffm. Bull. Soc. Bot. France 55: Mem. 8b:39. 1908. (Fig. 30. See also fig. 29)

Lectotype Coll: *Chevalier* 7899. Chari. Ndelli. Apr., 1903. (K).

*V. guineensis* var. *procera* (O. Hoffm.) Adams. J. W. African Sci. Assoc. 6:154. 1960.

Perennial from root crown. Stems to 1.75 m. tall, glabrate to pubescent or lanate. Leaves sessile to 14.5 cm. long, 5.0 cm. wide, lanceolate to ovate; margin apiculate dentate; blade glabrous to pustulate (1 specimen) above, densely lanate, glandular below; apex obtuse to sub-acute, base acute. Heads terminal, single to few on long peduncles; heads to 2.5 cm. high, 4.0 (?) cm. in diameter; phyllaries to 2.2 cm. long; flowers to 2.2 cm. long, tube 2 to 3 times longer than the limb, white to mauve; achenes to 0.5 cm. long, brown, short pubescent, sides nearly parallel, glandular; pappus to 1.5 cm. long.

Although this species was recently reduced to a variety of *V. guineensis*, it is as morphologically distinct as many of the other species of section *Stengelina*. Furthermore, it exhibits a coherent geographical distribution within a small area rather than appearing sporadically throughout the range of *V. guineensis* (see fig. 29, p. ). For these reasons, I prefer to maintain it. It is distinguished from *V. guineensis* by the consistently larger heads with flowers 2 or more cm. long, achenes with nearly parallel sides and relatively few heads borne on long peduncles.

*Collections Seen*: NIGERIA: Bauchi. *H. V. Lely* 179. Mar., 1929. (K, MO). Bonu Kurmi, 18 mi. N.W. of Abuja. *E. W. Jones* 157. June 10, 1958. (K). Oloke Meji. *E. W. Foster* 280. Aug. 7, 1907. (K). CAMEROON: Koutschya. *H. J. Félix* 3398. May, 1939. (P). Buar. 1,000 m. *J. Milbraed* 9376. May, 1914. (K).

*A. Chevalier* 7899 was selected as the lectotype because it is the only specimen of those originally cited which was available to me. It is a complete specimen whose identity is undoubted.

14. *Vernonia vallicola* S. Moore. J. Bot. 52:95. 1914. (Fig. 31. See also fig. 29).

Type Coll: *Gossweiler* 3481. Angola: Benguela. Valley of Tiengo, Cuito. (K!).

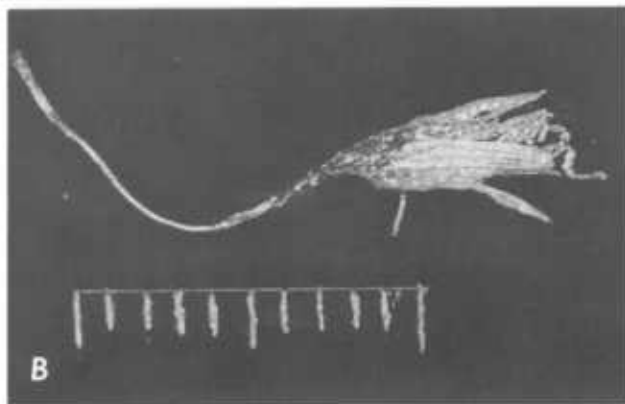
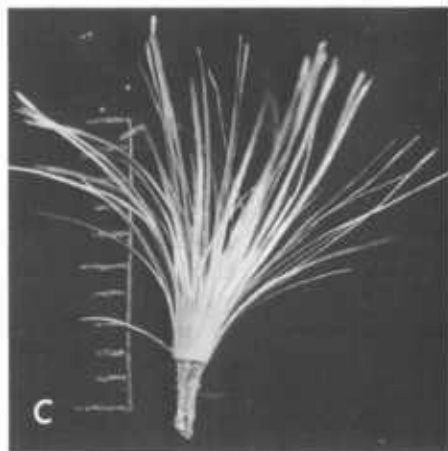
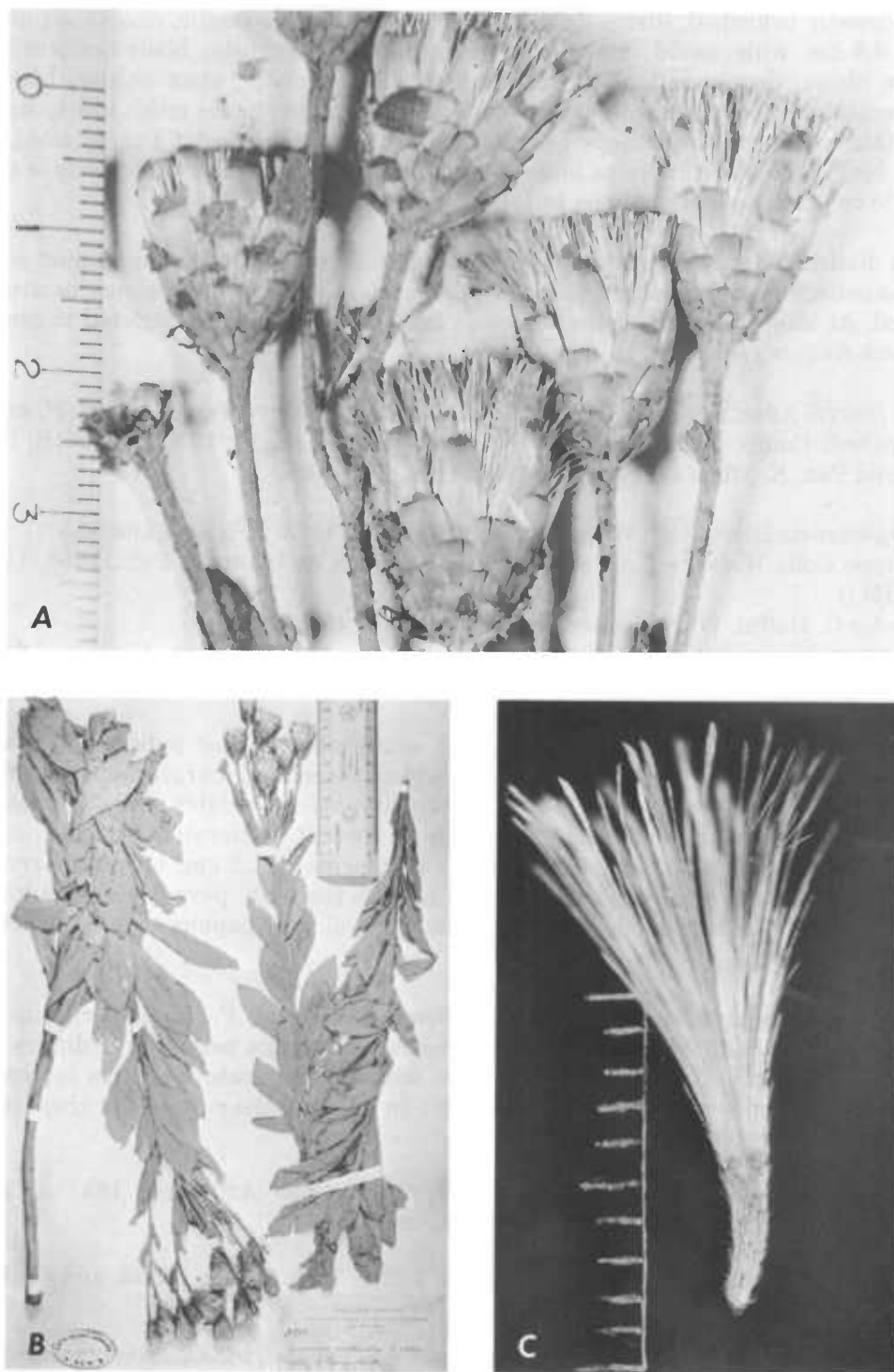


Figure 30.—Lectotype collection of *V. procera* O. Hoffm. A, Habit; B, dissected flower; C, achene; and D, unopened flower (expanded in water). (K). Scales in millimeters.

PN-2050



FN-2051

Figure 31.—Type collection of *V. vallicola* S. Moore. A, Detail of heads; B, habit; and C, achene (K). Scales in millimeters.

Shrub to 1 m., densely branched. Stems light to gray lanate. Leaves sessile, closely set on stems, to 11.0 cm. long, 4.0 cm. wide, ovoid; margin entire to apiculate dentate; blade scattered pilose, slightly reticulate above, deeply reticulate, pilose, glandular beneath; apex obtuse, base acute. Heads borne moderately densely in terminal corymbose arrangement; heads much taller than wide, strict, to 2.5 cm. tall, to 1.5 cm. in diameter; phyllaries to 2.0 cm. long, bract tips petaloid, white; flowers to 2.1 cm. long, tube about twice as long as limb, light purple or mauve; achenes to 0.45 cm. long, densely white or golden pilose; pappus to 1.4 cm. long, flattened, obtuse.

*V. vallicola* is a distinctive species related to *V. guineensis*. It appears to be uncommon as I have seen only the type collection and 2 others. Like *V. guineensis*, the roots of this species are fleshly and spindle-shaped. At least one of the collections was made on deep sand. Restricted to Southwest Africa and adjacent Angola (see fig. 29, p. 48).

*Collections Seen:* SOUTH AFRICA: South West Africa. Okavango Native Terr. 24.5 mi. N. of Tamso on road to Kapupahedi Camp. *B. de Winter & W. Marais* 4745. Feb. 17, 1956. (K, PRE, SRGH). 30 mi. N. of Gautcha Pan. *R. Story* 6431. Feb. 5, 1958. (EA, K, SRGH).

15. *Vernonia benguelensis* Hiern. Cat. Welw. African Pl. 1:536. 1898. (Figs. 32 and 35.)

Lectotype Coll: *Welwitsch* 3276b. Angola. Ad lacum de Ivantola. Feb., 1860. (Photo—BM!).

*V. limosa* O. Hoffm. Warb. Kunene-Sambesi Exped. 400. 1903.

Lectotype Coll: *Baum* 624. Südwest Afrika. Am Longa unterh. Chijija. Jan., 1900. (Photo—BM).

Perennial from a root crown. Stems to 0.75 m. tall, scattered pilose or puberulent, glandular, densely leafy; leaves sessile, to 7.0 cm. long, 2.0 cm. wide, lanceolate; margin apiculate dentate; blade few pilose and glandular above and below, secondary veins variably wide (appearing to spread at intervals); apex and base acute. Heads single to several, moderately crowded, cymosely arranged; heads to 1.5 cm. high, 1.5 cm. in diameter; phyllaries to 1.2 cm. long, tips red-purple (fide Faulkner); flowers to 1.7 cm. long, tube twice as long as the limb, purple; achenes immature in all specimens seen, light brown, moderately pubescent, glandular; pappus to 1.0 cm. long, flat, obtuse.

Although I have only photographs of the types, *V. benguelensis* and *V. limosa* certainly are the same taxon. I am not so sure that one of the cited specimens belongs here, but it differs only in bearing a single head which is insufficient grounds on which to separate a species in the group. One of the specimens has roots with tuberous swellings: In general, the sum of the characteristics indicate that the species is related to *V. guineensis*.

*Collections Seen:* ANGOLA: Alto Catumbela. Ganda. *H. G. Faulkner* A20. Dec., 1941. (K). *H. G. Faulkner* A402. Nov., 1940. (K). Dondi. *L. S. Tucker* 49. Oct. 2, 1924. (GH).

16. *Vernonia filipendula* Hiern. Cat. Welw. African Pl. 1:536. 1898. (Figs. 33, 34, and 35. See also fig. 8.)

Type Coll: *Welwitsch* 3275. Angola. Catumba. Apr., 1860. (Photo—BM!).

*V. lancibracteata* S. Moore. J. Bot. 46:293. 1908.

Type Coll: *Eyles* 291. Rhodesia. Mazoe. Bernheim Hill and Iron Mask. Mar., 1906. (SRGH).

*V. longepedunculata* De Wild. Feddes Repert. 13:207. 1914.

Type Coll: *Homblé* 881. Congo. Katanga. Plateau de Bianco. Nov., 1912. (BR!).

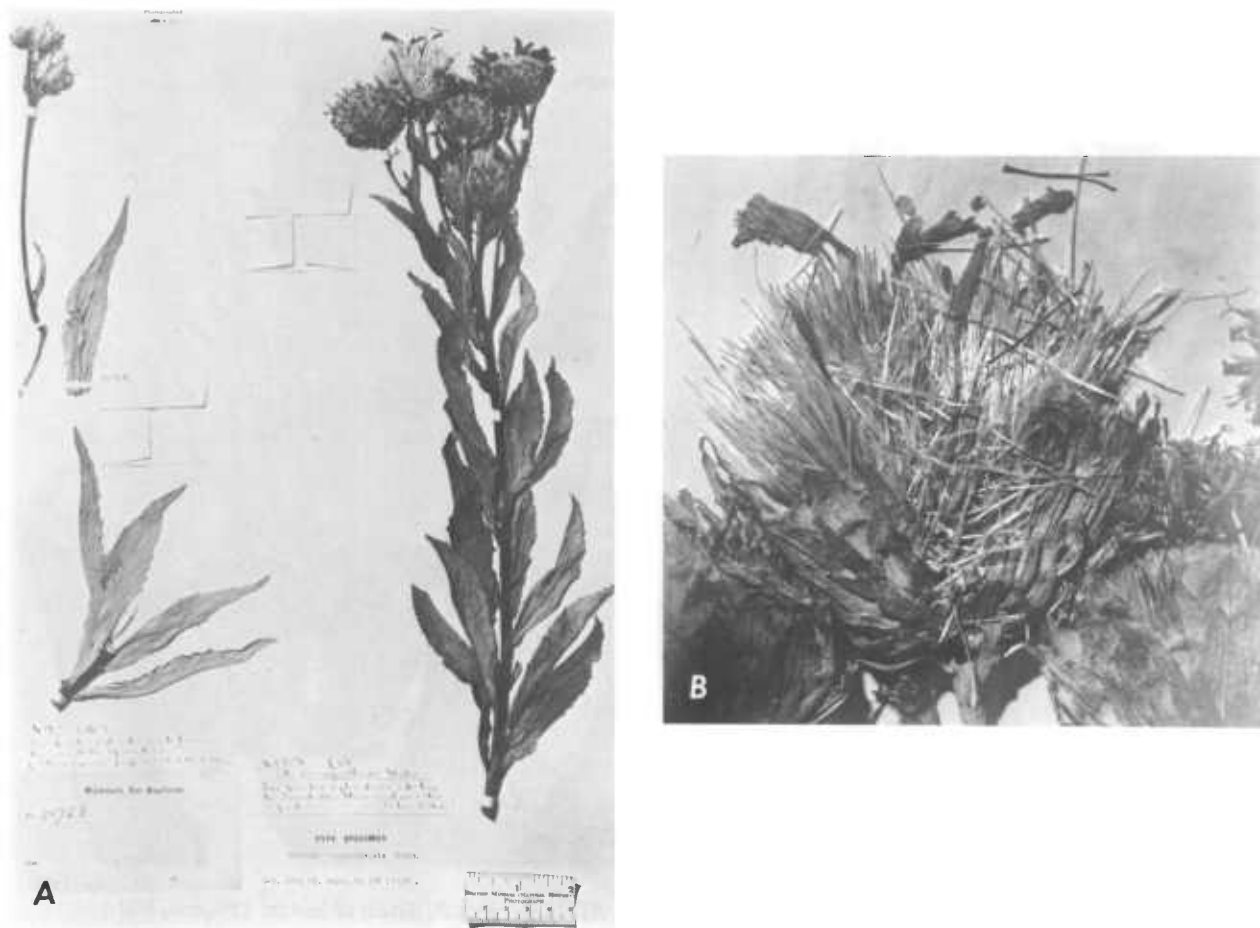


Figure 32.—Lectotype collection of *V. benguelensis* Hiern. A, Habit; and B, detail of heads. (Photos, BM.)

PN-2052

*V. descampsii* De Wild. Bull. Jard. Bot. État. 5:97. 1915.

(*E. descr.*, type collection not seen).

*V. manikensis* De Wild. Op. cit. 99.

(*E. descr.*, type collection not seen).

*V. pleiotaxoides* Hutch. & Burt. Rev. Zool. Bot. Africaines. 23:38. 1952.

Type Coll: Quarré 2654. Congo. Katanga. Luniemu. Aug., 1931. (PRE).

*V. wittei* Hutch & Burt. Rev. Zool. Bot. Africaines. 23:39. 1932.

Type Coll: de Witte 543. Congo. Kangenge (sic. Kanzenze). Aug., 1931. (K).

Perennial from a root crown, roots tuberous. Stems to 1 m. tall, generally less, usually pubescent to scarcely puberulent, leaves moderately crowded, generally sessile, rarely with petiole to 0.5 cm. long, oblanceolate to lanceolate, to 15 cm. long and 9 cm. wide, but more often to 12 cm. long and 4.0 cm. wide or less; margin apiculate dentate, sometimes irregularly so; blade glabrous to pilose to scabrous above, scattered pilose to densely pubescent, glandular below; apex obtuse or rounded to subacute, base usually cuneate acute. Heads borne singly or at most 3 or 4 together, sometimes long pedunculate, sometimes short pedunculate and somewhat crowded; heads to 2.5 cm. high, 3.5 cm. in diameter; phyllaries to 2.2 cm. long, herbaceous tip often broad, sometimes pubescent



Figure 33.—Type collection of *V. filipendula* Hiern. A, Habit; and B, detail of heads. (Photos, BM.)

PN-2053

without, rose or green; flowers to 2.2 cm. long, tube sometimes three times longer than the limb, white to lilac or purple (blue fide Bullock); achenes to 0.5 cm. long, stout, sides nearly parallel, usually medium brown, short pubescent to pubescent, often glandular, callus discrete, very small; pappus to 1.4 cm. long, flat, tips obtuse.

*V. filipendula* has received several names on the basis of length of peduncles or the size and shape of the leaves, none of which appear to be particularly reliable characters. It appears to be related to *V. guineensis* but is shorter, lacks lanate pubescence on the leaves beneath, and has larger heads and flowers.

*V. filipendula* is restricted to medium and lower elevations across Africa below the equator and above 22° S. latitude (see fig. 35, p. 56).

**Selected Collections:** REPUBLIC OF CONGO: Leopoldville Prov. Bayaka Sud Terr. Sanzi-Mawenga Kwango. *R. Devred* 1670. Mar. 18, 1955. (K). Kipaila. *T. Kassner* 2548. Mar. 2, 1908. (K) Katanga. Kamina. *J. Becquaert* 85. Aug. 2, 1934. (GH, US). Kamina, Haut Lomani. *W. Mullenders* 1785. Dec. 18, 1947. (BR). Katanga. Lunumba. *R. Desenfans* 2209. (BR). Kando. *G. F. de Witte* 89. Apr. 4, 1931. (K). ANGOLA: Dist. Cuanza-Sul. Seles Cucul. 1,000 m. *J. Gossweiler* 9353. Oct., 1930. (K). Libolo. *M. T. Dawe* 317. Jan., 1922. (K). 130 mi. E. of Ching, W. of Cuanza River. Chinguar. *A. G. Curtis* 374. Sept. 25, 1923. (GH). ZAMBIA: Abercorn Distr. Abercorn. *A. A. Bullock* 1018. Sept. 20, 1949. (K). Abercorn Distr. Mpulungu, Abercorn road near Kasama turning, 5,000 feet.

*H. M. Richards* 2011. Oct. 11, 1954. (SRGH). Kawambwa. *D. B. Fanshawe* 3519. Aug. 22, 1957. (K). Mwinilungu Distr. 16 mi. W. of River Katompo. *E. Milne-Redhead* 1102. Sept. 11, 1930. (K). Luano Forest Reserve near Chingola. *C. E. Smith, Jr. & D. B. Fanshawe* 4664. Feb. 12, 1967. (SRGH, US). Kitwe. *D. B. Fanshawe* 10017. Apr. 10, 1967. (ND, US, S). 6 mi. N.W. of Ndola. *C. J. Doloway* 84092. Mar. 27, 1958. (SRGH). RHODESIA: Urungwe Distr. Zuoipani. *R. Goodier & T. B. Phipps* 260. Mar. 5, 1968. (SRGH). Marandellas Distr. Shortlands Farm. *J. M. Rattray* 603. Mar. 1, 1933. (SRGH). Salisbury. *H. G. Flanagan* 3042. May 1, 1906. (PRE). Miami. *H. Wild* 1824. Mar. 4, 1947. (SRGH). MALAWI: Dzalanyama Forest Reserve, near Chiungiza, 1,550 m. *N. K. B.*



PN-2054

Figure 34.—A plant of *V. filipendula* in Luano Forest Reserve near Chingola, Zambia. (Smith & Fanshawe 4660.)

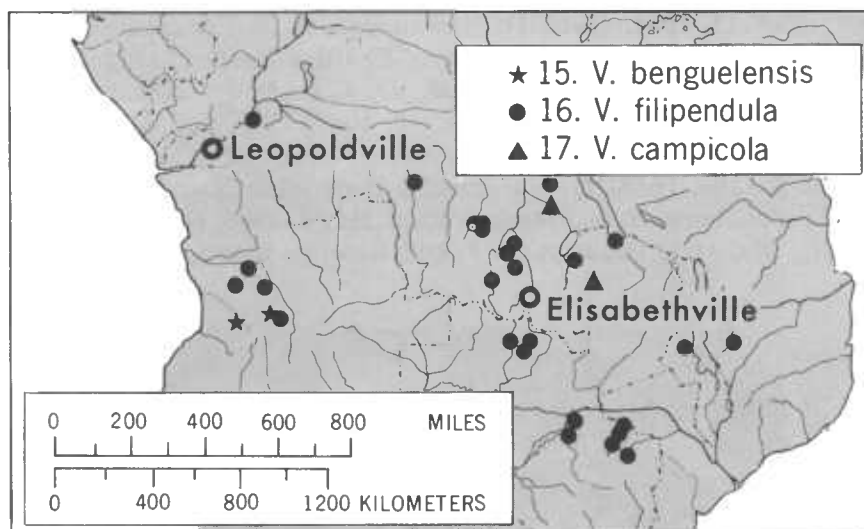


Figure 35.—Distribution of *V. benguelensis*, *V. filipendula*, and *V. campicola*.

*Robson 1519*. (SRGH). Southern Prov. Ncheu Distr. Lower Kirk Range, Chipusiri. 1,460 m. A. W. Exell, F. A. Mendonça & H. Wild 954. Mar. 17, 1955. (SRGH). MOZAMBIQUE: Niassa. Vila Cabral. Pedro e Pedrogão 3708. May 20, 1948. (EA).

17. *Vernonia campicola* S. Moore. J. Bot. 52:97. 1914. (Fig. 36). See also fig. 35.

Type Coll: *Kassner 2845a*. Congo. Lufongo. May, 1908. (Photo—BM!).

*V. retifolia* S. Moore. J. Linn. Soc. Bot. 47:264. 1925–27.

Type Coll: *Jelf 44*. Rhodesia. Luwingu. May, 1922. (Photo.—BM!).

*V. venosa* S. Moore. J. Linn. Soc. Bot. 47:265. 1925–27.

Type Coll: *Kassner 2545*. Congo. Kipaila. Mar., 1908. (Photos.—BM!, HBG).

Of this species, I have only the photographs of type collections as cited and a single immature achene of *V. venosa* which was sent to me by the Hamburg Herbarium. I am, therefore, preparing no description nor do I see any value in repeating previously published descriptions. I have no doubt that all of the specimens belong to a single species which is distinguishable from *V. sclerophylla* by the lanceolate foliage; the flower, which is clearly composed of a tube twice as long as the limb; the limb which has short, triangular lobes; and by the foliage closely investing the fewer crowded heads. The flower color note ("yellow") on the label for Jelf No. 44 may be in error as I know of no other species in this complex with yellow flowers. If the flowers are, indeed, yellow, *V. campicola* would not appear to belong to section *Stengelia*, but this I cannot credit as it otherwise appears to belong here.

18. *Vernonia nigritana* Oliv. & Hiern in Oliv. Fl. Trop. Africa. 3:288. 1877. (Fig. 38, See also fig. 37.)

Type Coll: *Barter s. n.* Nupe (K!).

Perennial from a root crown. Stems glabrate to sparingly pubescent; leaves ovate to ovate-lanceolate, to 15.5 cm. long, 5.5 cm. wide; margin scarcely apiculate to apiculate dentate; blade harshly scabrous above, rarely scattered pilose, sometimes glandular below; apex acute to obtuse, base acute, sessile or petiole to 0.7 cm. long. Heads few, in a close or crowded panicle, to 3.0 cm.



high, 3.0 cm. in diameter; phyllaries to 4.0 cm. long, lanceolate, pubescent to scabrous, generally dark red within, yellowish green without, apex rounded, sometimes radiating or reflexed; flowers to 1.4 cm. long, tube enlarging graduating into limb, lobes long, lanceolate, purple?; achenes to

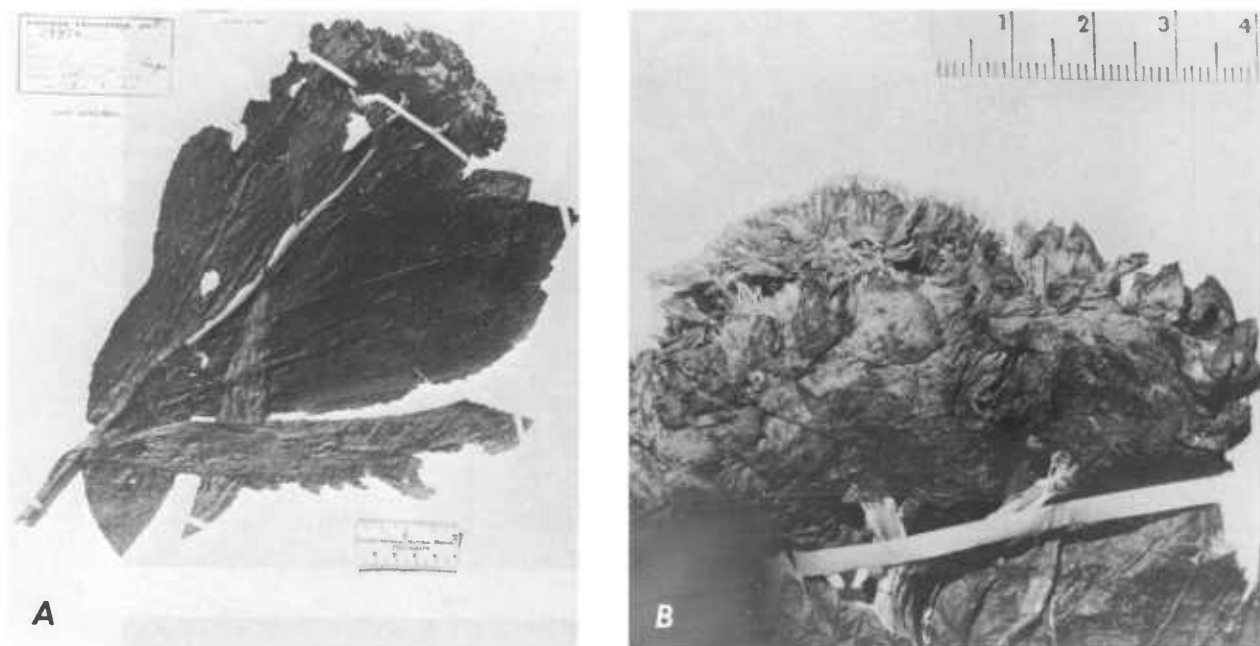


Figure 36.—Type collection of *V. campicola* S. Moore. A, Habit; and B, detail of heads. (Photos, BM.)

PN-2056

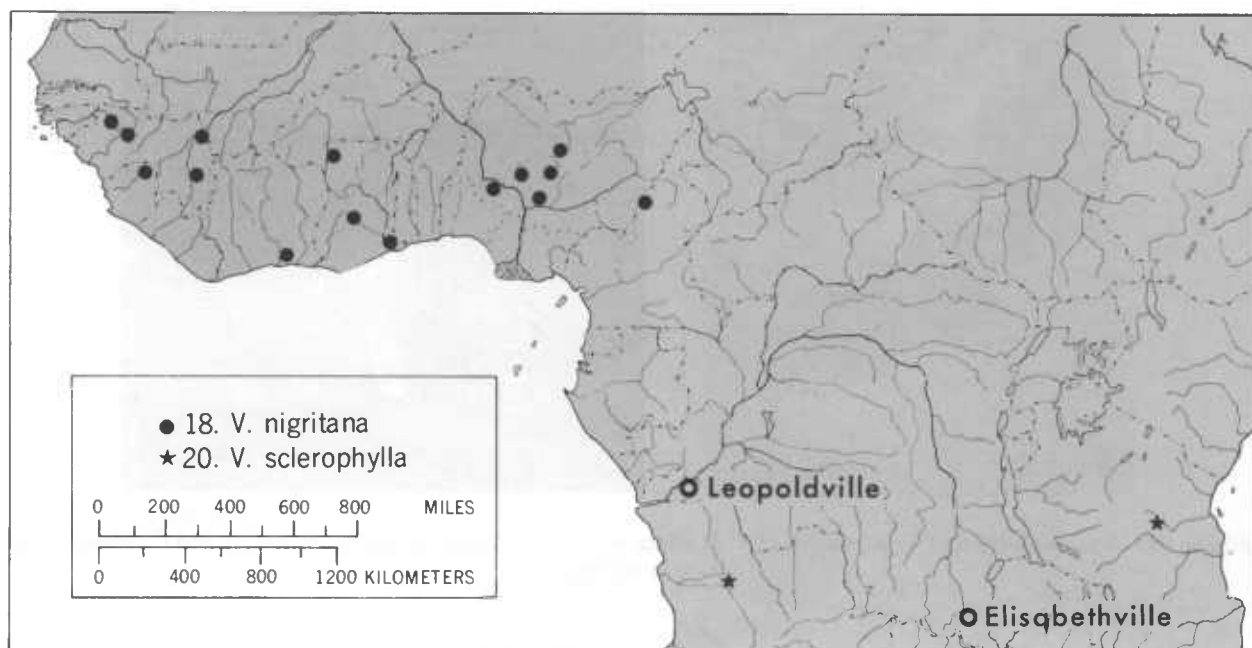
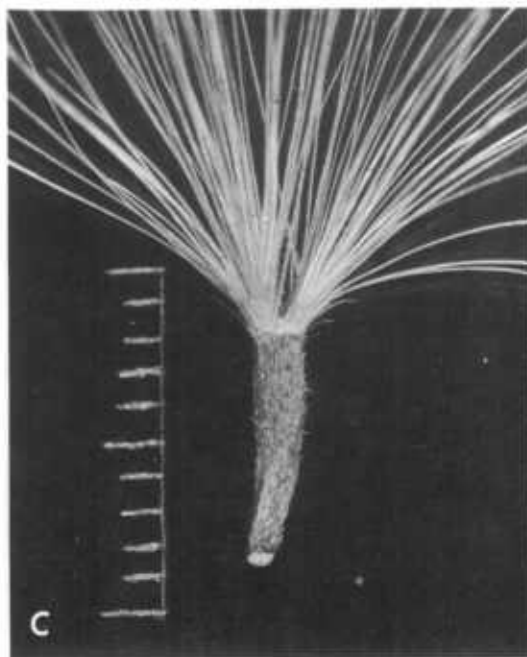


Figure 37.—Distribution of *V. nigritana* and *V. sclerophylla*.

PN-2057



PN-2058

Figure 38.—Type collection of *V. nigritana* Oliv. & Hiern in Oliv. *A*, Detail of heads; *B*, habit; and *C*, achene. (K). Scales in millimeters.

0.9 cm. long, sometimes curved near narrow base, dark brown, moderately pubescent to pilose, callus small, discreet; pappus to 1.4 cm. long, filiform.

*V. nigrimana* is very distinct from other species of section *Stengelina*. Although the morphology of the flowers and achenes clearly places this species with the rosette-leaved group, the heads are borne in panicles on a leafy stem. Tubercles on the underside of the leaves are surrounded at the base by a rosette of specialized cells which, from the top, look much like a rose window in a Gothic church. I have not been able to investigate these tubercles in detail, but they appear to have large lumens and thin walls and may be secretory in function. Mineral deposits are common on the underside of leaves of the species.

In Sierra Leone, milk calabashes are washed with a decoction of the leaves or roots to curdle milk (Deighton).

*V. nigrimana* is restricted to the western portion of Africa below the Sahara west of 15° E. longitude (see fig. 37, p. 57).

*Collections Seen:* GAMBIA: Abeokuta. *Irving s. n.* (K). PORTUGUESE GUINEA: Pitche, Pansor. *Espírito Santo 3430*. Sept. 3, 1955. (K). GUINEA: Fouta-Djallon. *Macclaud 272*. (K). Near Siguiri. *H. J. Félix 500*. Nov., 1935. (P). Near Kissidougou. *H. J. Félix 2083*. July, 1937. (P). SIERRA LEONE: Musaia. *F. C. Deighton 4470*. Dec. 19, 1946. (K). IVORY COAST: Cercle de Baoulé Nord. Entre Bouaké et Langouassou. *A. Chevalier 22147*. July 21, 1909. (K). Baoulé, Toumodi. *H. Pobequin 179*. Oct., 1896. (P). GHANA: Near Babili Mts. *K. O. Darko 1051*. (K). 14.6 mi. N. of Chiraa on Sunjani-Wenchi road. *R. R. Innes 312*. Sept. 27, 1956. (K). Bame Pass. Eastern Prov. *J. K. Morton 9316*. Oct. 25, 1953. (K). NIGERIA: Bauchi Prov. Lame Distr. Dababe. 3,000 feet. *G. V. Summerhayes 27*. Aug. 19, 1954. (K). Jemaa Div. Dogon Kurmi near Jagindi. 520 m. *F. N. Hepper 1033*. Oct. 16, 1957. (K). Minna Div. Near Minna. *R. D. Meikle 1480*. Dec. 3, 1949. (K). Ilorin Prov. Ilorin Distr. Share Forest Reserve *E. Ujor FHI31613*. Jan. 16, 1952. (K). CAMEROON: Adamawa Prov. Jamtari on Jamtari-Karamti road. *M. G. Latilo & B. O. Daramola FHI28930*. (K).

**19. *Vernonia sciaphila* S. Moore. J. Bot. 56:208. 1918. (Figs. 39 and 40.)**

Type Coll: *Kassner 2106*. Rhodesia. Sangolo stream. Dec., 1907. (Photos—BM!, HBG).

Perennial from a root crown. Stems to 1.5 m. tall, densely pubescent, moderately leafy. Leaves sessile, to 12.0 cm. long, 2.5 cm. wide, lanceolate; margin nearly entire; blade moderately pilose above, raised reticulate, densely pilose, glandular below. Heads not crowded, few, corymbosely arranged; heads to 2.0 cm. high, 2.0 cm. in diameter; phyllaries to 1.8 cm. long, generally pubescent without, particularly toward the tip, green, apex sometimes apiculate; flowers lilac, to 1.3 cm. long, limb sometimes longer than the tube, texture thin, lobes of limb long, lanceolate; achenes to 0.8 cm. long, thin, glabrous, yellowish, occasionally glandular, callus confluent with the costae; pappus filiform, to 0.9 cm. long, sometimes with spatulate tips.

*V. sciaphila* is readily recognizable from the photographs of sheets of the type collection at British Museum and Hamburg and from the achene kindly sent to me by Walther from Hamburg. This may well be the taxon described by De Wildeman and Muschler as *V. luembensis* of which I have seen no authentic specimens. However, their description says that *V. luembensis* is a shrub with strong branches while all of the plants I have seen of *V. sciaphila* are typically annual shoots rising from a perennial root crown which branch only near the summit to bear several heads.

In Zambia, Fanshawe notes, "A multistemmed subshrub with erect branches. Bark grey-black, smooth, velvety, slash green thin, soft, sappy. Flowering, January, February. Fruiting, February,



PN-2059

Figure 39.—Type collection of *V. sciaphila* S. Moore.  
A, Habit, and B, detail of heads. (Photos, BM.)



PN-2060

Figure 40.—A, *V. sciaphila* is abundant in relatively undisturbed *Brachystegia* woodland near Abercorn, Zambia. (Smith & Richards 4665). B, Note the longer stems beneath the heads of these plants near Kitwe, Zambia (Smith & Fanshawe 4660).

March. Locally common in miombo woodland. Abercorn, Mporokoso, Kawamba, Luwingu, Fort Roseberry, Samyfa, Copperbelt. Which means that it almost certainly occurs in the Congo pedicle."

The glabrous achenes of this species are distinctive, but the flowers are indistinguishable from those of the rosette-leaved species.

Because I did not specify that I wished to see this species, I did not see sufficient specimens to delimit the geographical range of the species. I know it only from Zambia as follows: Western Prov. Between Kitwe and Ndola. *C. E. Smith, Jr. & D. B. Fanshawe 4660*. Feb. 11, 1967. (BM, EA, K, SRGH, US). Northern Prov. Near Abercorn on road to Ndingi Pans. *C. E. Smith, Jr. & H. M. Richards 4665*. Feb. 17, 1967. (BM, EA, K, SRGH, US).

**20. *V. sclerophylla* O. Hoffm. Bol. Soc. Brot. 13:13. 1896. (Fig. 41. See also fig. 57.)**

Lectotype Coll: *Welwitsch 3277*. Angola. Pungo Andongo. (K).

*V. lafukensis* S. Moore. J. Bot. 52:94. 1914.

Lectotype Coll: *Kassner 2846a*. Congo. Lufongo. May, 1908. (Photo—BM!).

Perennial from root crown. Stems to 1.2 m. tall, puberulent or glabrate; leaves crowded, to 6.5 cm. long, 3.5 cm. wide, sessile; margin sharply apiculate dentate; blade glabrate to scabrous above, few to moderately pilose, glandular beneath; apex sub-acute to obtuse, apiculate; base subacute to obtuse. Heads numerous, crowded, cymosely arranged; heads to 1.5 cm. high, 1.5 cm. in diameter; phyllaries to 1.5 cm. long, herbaceous tip with prominent midrib which may extend into an apiculum, lower often pilose; upper small leaves often subtending heads; flowers to 1.2 cm. long, tube enlarging gradually into limb so that they are not clearly distinct, lobes of limb lanceolate, thin, blue or light purple; achenes immature, to 0.3 cm. long, medium brown, densely pilose, callus small; pappus narrowly flattened, acute, nearly plumose.

*V. sclerophylla*, from the numerous crowded heads, is clearly distinct from the last species. However, it remains to be proven that the two cited Tanzanian specimens are truly conspecific with the type of *V. sclerophylla*. The latter has broader herbaceous phyllary tips than the Tanzanian specimens. All have the accentuated midrib on the phyllaries which is unusual in this group of *Vernonia* species. For what it is worth, the foliage is essentially the same on all specimens. On the other hand, if these specimens do not belong here, I have no other place to put them.

The flowers of this species clearly show its close relationship with the rosette-leaved species which follow. In general aspect, it is also reminiscent of *V. buchingeri*, but it differs from the latter species in many ways, not the least of which are the numbers and disposition of the heads.

I have seen so few collections of *V. sclerophylla* that I have no knowledge of the true geographic range of the species. It apparently spans the African continent south of the equator (see fig. 37, p. 57).

*Collections Seen: TANZANIA: Without locality. H. G. Faulkner 1219. (K). Usambaras. Sangarawe. P. J. Greenway 829. Sept. 18, 1928. (K).*

**21. *Vernonia gerberiformis* Oliv. & Hiern in Oliv. Fl. Trop. Africa. 3:285. 1877. (Figs. 42, 43, and 44.)**

Type Coll: *Schweinfurth 2688*. Bei. Addai. Nov., 1869. (K!).

*V. macrocyanus* O. Hoffm. Bol. Soc. Brot. 13:20. 1896.

Type Coll: *Welwitsch 3883*. Angola. Huila. Prope Catumba et versus Ohay. Jan., 1860. (Photo. BM).

*V. macrocyanus* var. *ambacensis* Hiern. Cat. Welw. Pl. 1:532. 1898.

Type Coll: *Welwitsch 3882*. (K!).

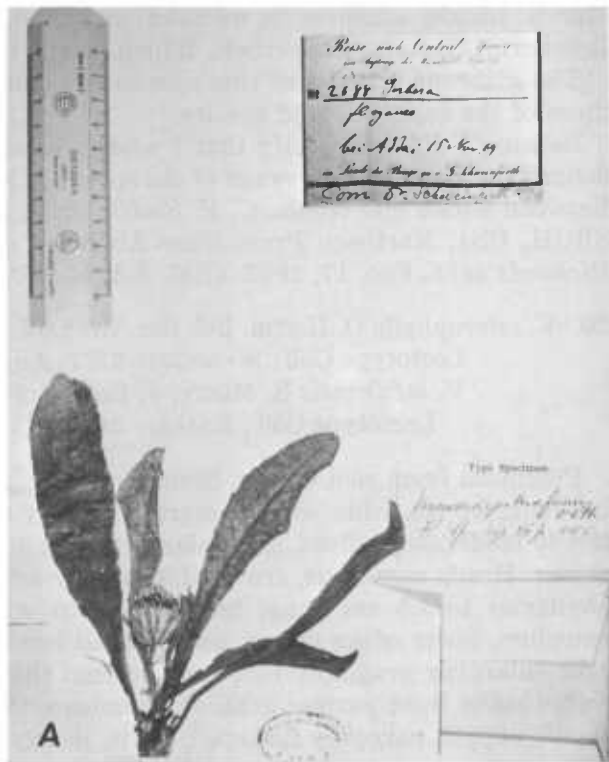
*V. primulina* O. Hoffm. Kunene-Sambesi Expedit. 402. 1903.

Type Coll: *Baum 134*. Am Chitanda unterh. Gondkapse. 1,100 m. Sept., 1892. (K, (Photo. BM)).



PN-2061

Figure 41.—Type collection of *V. sclerophylla* O. Hoffm. A, Detail of heads; and B, habit. (K). Scales in millimeters.



PN-2062

Figure 42.—Type collection of *V. gerberiformis* Oliv. & Hiern in Oliv. A, Habit (inset, label); and B, detail of head. (K). Scales in millimeters.

*V. nandensis* S. Moore. J. Linn. Soc. Bot. 35:323. 1905.

Type Coll: *Elliot 7032*. Nandi. 7,000 feet. (Photo—BM!).

*V. gossweileri* S. Moore. J. Linn. Soc. Bot. 37:312. 1906.

Type Coll: *Gossweiler 1167*. Angola. Malange in Parinari and U'Gambo groves. (Photo—P).

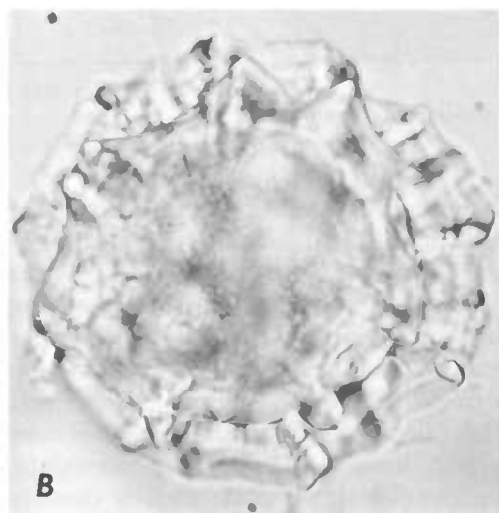
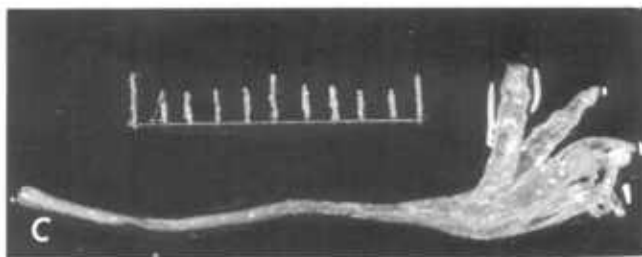
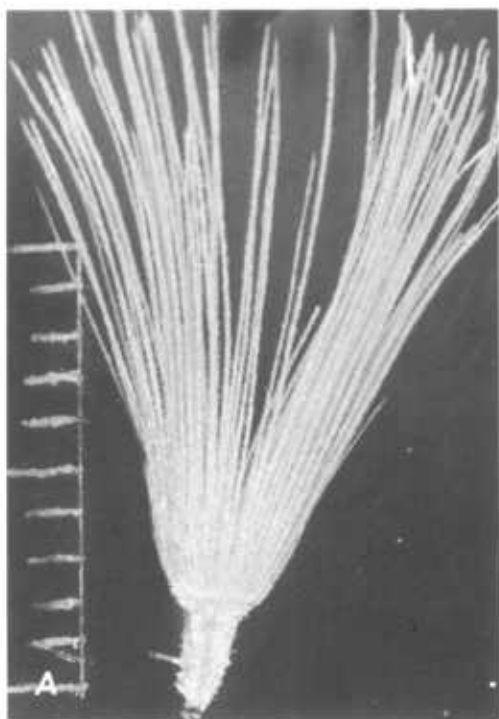
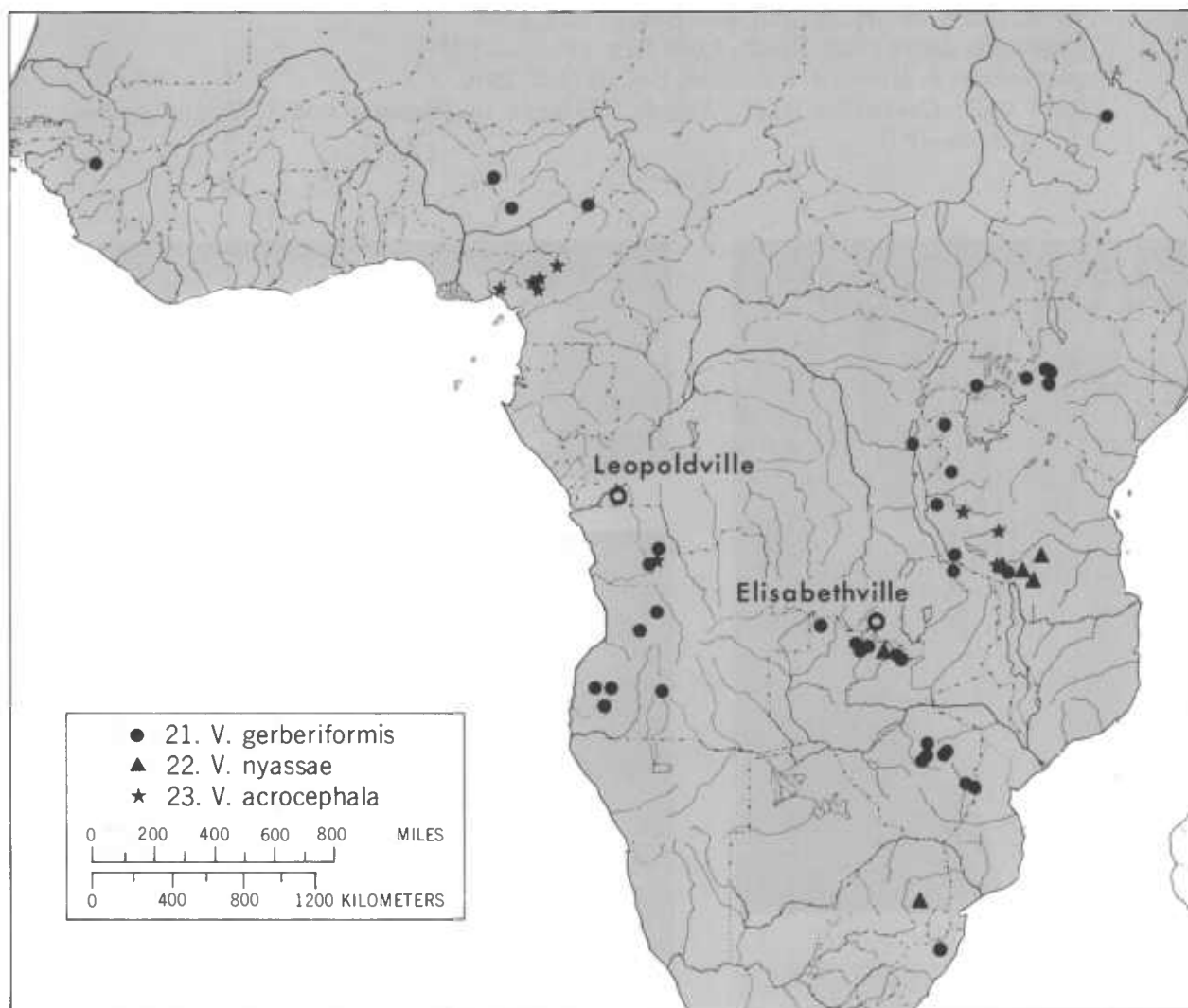


Figure 43.—Type collection of *V. gerberiformis*. A, Achene; B, pollen grain (average diameter  $66.3\mu$ ); C, unopened flower; and D, dissected flower (expanded in water). (K). Scales in millimeters.





PN-2064

Figure 44.—Distribution of *V. acrocephala*, *V. gerberiformis*, and *V. nyassae*.

Usually rosettes from a perennial root crown, becoming caulescent in the northwestern part of its geographical range, flowers generally borne singly on an elongated scape. Stems and scapes to 0.6 m. tall, glabrous to usually densely pubescent or lanate, rarely with a dense lanate mass at the apex of the root crown; leaves sessile, spatulate, to 23 cm. long, 6.0 cm. wide, margin sometimes undulate, rarely entire, usually apiculate, sometimes dentate; blade glabrous to rarely scabrid to scattered pilose above, glabrous to moderately pilose, occasionally glandular below. Heads generally borne singly, to 2.5 cm. high, 3.0 cm. in diameter; phyllaries to 2.3 cm. long, lanceolate, sometimes pubescent without and ciliate, usually green, sometimes reddish; flowers to 2.7 cm. long, with tube equal to twice as long as limb, tube widening gradually into limb, limb thin, lobes long lanceolate, purple or violet to frequently blue; achenes to 0.6 cm. long, generally stramineous, usually densely pubescent or pilose, rarely glandular, callus, discreet; pappus to 1.9 cm. long, narrowly flattened, nearly plumose.



*V. gerberiformis* is a very variable species. Much of this may be due to ecological conditions and a certain amount can certainly be attributed to the specimens available which are almost all collected before the plant is mature. I suspect that some of the variability may have a genetic base; I know of no chromosome counts for this species, but the wide variation is reminiscent of species of plants in which the chromosome number varies.

The pollen grains of this species are distinctive. The surface reticulation is winglike giving the grains a much different appearance from the pollen grains of other species in the complex. It is this which emphasizes the conspecificity of *V. gerberiformis* and *V. macrocyanus*. The extremes in size are completely bridged by intermediate specimens.

*V. gerberiformis* is widely distributed over much of Africa south of the Sahara with a single collection known from Natal in South Africa (see fig. 44). Because this is a plant of the savannas and plains where it is largely hidden among the grass and other herbs, it is probably more common than the number of available specimens indicates.

*Selected Collections:* GUINEA: Near Labé. *H. J. Félix* 658. Dec., 1935. (P). NIGERIA: Zaria Prov. Anchau Distr. Anchau. *S. C. Onyeagocha FHI7642*. Mar. 6, 1944. (K). Bokkos Plateau. 4,000 feet. *D. E. Coombe* 73. Dec. 27, 1954. (K). CAMEROON: Adamawa Div. Belé District. Belé on Demasa road. 280 m. *F. N. Hepper* 1629. Jan. 1, 1958. (K). ANGOLA: E. of Cuanza River. *A. G. Curtis* 331. Sept. 23, 1923. (GH). Sierra de Chella near Huila. 1,850 m. *H. Humbert* 16711. Aug., 1937. (P). Near the Coculovu River between Huila and Chibia. *H. H. W. Pearson* 2237. May 12, 1909. (K). Mossamedas. *Berthelot s. n.* (P). Galangus Mission, Nova Lisboa. *H. G. Faulkner* A170. Aug., 1942. (K). KENYA: Trans Nzoia Plain. 5,900 feet. *D. R. Tweedie* 356. Feb., 1937. (K). Kitale. *A. Bogdan* 3721. Apr. 18, 1953. (K). UGANDA: Mulanda Hill, Bulemezi. *T. D. Maitland* 95. June 24, 1915. (K). Entebbe. 3,900 feet. *P. Chandler* 1159. June, 1934. (K). REPUBLIC OF CONGO: Ruzizi Plain, Luwingu. *R. Germain* 5905. Jan. 30, 1950. (K). TANZANIA: West Lake Prov. Mumwendo, Bugifi, Ngara. 4,500 feet. *R. E. S. Tanner* 5235. Aug. 12, 1960. (K). Kakama Distr. Nyamgalika-Magende. *A. A. Bullock* 3185A. Aug. 21, 1950. (K). Mpanda Distr. Mugombasi, about 65 mi. S. of Kigoma. 3,000 feet. *R. M. Harley* 9477. Aug. 31, 1959. (K). Ufipa Distr. Malonje. 8,000 feet. *A. A. Bullock* 1886. Nov. 21, 1949. (K). Kiyimbila Distr. N. of Lake Nyassa. *A. Stolz* 1001. (K). ZAMBIA: Abercorn. Nkali Dambo. *H. M. Richards* 13181. Sept. 1, 1960. (SRGH). Muwosi Stream 42 mi. S. of Mwinilunga on Kabompo road. *J. P. Loveridge* 706. May 31, 1963. (AAH). Lake Ishika. *D. B. Fanshawe* 216. Aug. 9, 1953. (K). Solwezi Distr. Head of Mbulungo Dambo, W. of Mutanda Bridge. *E. Milne-Redhead* 720. July 17, 1930. (K). Solwezi. *E. Milne-Redhead* 1195. Sept. 24, 1930. (K). Ndola. *D. B. Fanshawe* 10194. Oct. 6, 1967. (ND, US). RHODESIA: Salisbury Distr. Hunyani Landing. *F. C. Greatrex s. n.* Sept. 10, 1946. (SRGH). 3 km. along Norton road from Salisbury-Beatrice road. 1,800 m. *R. Rutherford-Smith* 20. Aug. 30, 1960. (K, SRGH). Marandellas Distr. 4,500 feet. *R. M. Davies* 2259. Nov., 1956. (SRGH). Hartley Distr. Lake Mcllwane. *J. A. Whelan* 1427. Sept. 14, 1957. (SRGH). Melssetter Distr. N. W. of Musapa Mt. 6,700 feet. *N. C. Chase* 6702. Sept. 6, 1957. (K, SRGH). Mutsarara Farm. *A. O. Crook* M190. Oct. 5, 1950. (SRGH). Chimanimani Mts. 5,000 feet. *H. Wild* 2964. July 9, 1949. (K, SRGH). SOUTH AFRICA: Natal. Zululand. *J. M. Wood* 7463. Dec. 20, 1898. (K).

22. *Vernonia nyassae* Oliv. Hooker's Icon. Pl. 36, t. 1349. 1881. (Fig. 45. See also fig. 44.)

Type Coll: *Thomson s. n.* Higher plateau north of Lake Nyassa. (K!).

Small rosettes from a perennial root crown, sometimes with a lanate tuft at the top from which the leaves arise. Leaves ovate-lanceolate or lanceolate to, usually, spatulate, to 9.0 cm. long, 1.5 cm. wide, generally smaller; margin entire; blade glabrous to moderately pilose, glandular above, glabrous to moderately pilose, glandular beneath; apex obtuse to acute, base cuneate. Scape to

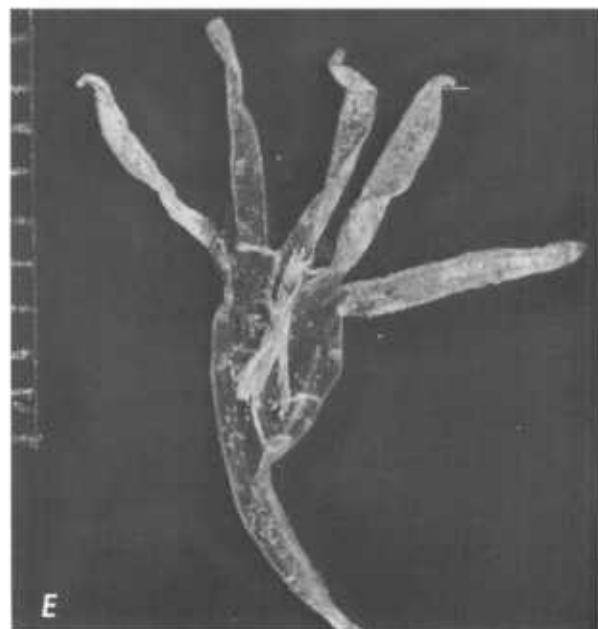
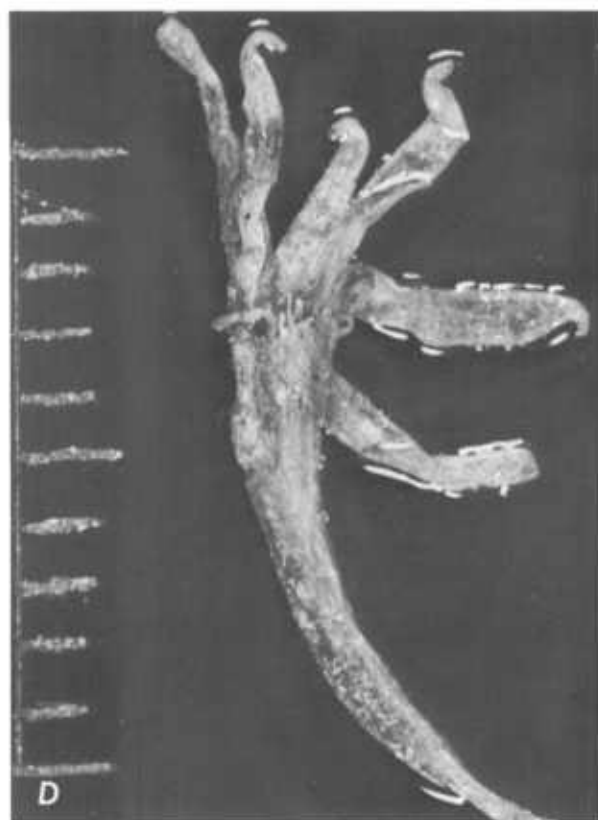
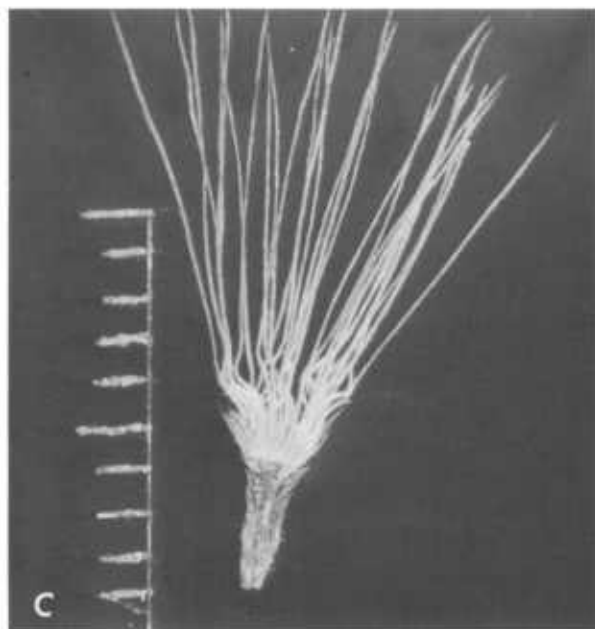
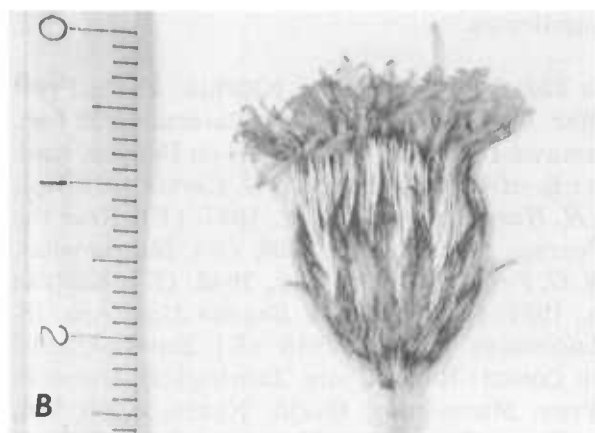


Figure 45.—Type collection of *V. nyassae* Oliv. A, Habit; B, detail of head; C, achene; D, unopened flower, and E, dissected flower (expanded in water). (K). Scales in millimeters.

0.15 m. tall, scattered pilose to pilose or pubescent, usually densely pilose just beneath the head, sometimes with a bract midway on the scape; heads single, to 1.5 cm. high, 2.0 cm. in diameter; phyllaries to 1.5 cm. long, lanceolate, often 3-nerved, glabrate to pilose without, generally reddish, tip often attenuate acute; flowers to 1.4 cm. long, tube broadening gradually into the limb, lobes thin, long, lanceolate, sometimes scattered pilose without, violet or purple; achenes (immature) to 0.35 cm. long, light to dark brown, moderately pilose, callus discreet; pappus to 1.1 cm. long, filiform, sometimes moderately plumose.

*V. nyassae* is easily separated from *V. gerberiformis* by its small size, entire leaves and generally by its overall pilosity. Contrary to the general pattern in this group, *V. nyassae* does not seem to be highly variable although one of the specimens cited is remarkably glabrous throughout. I cannot tell whether the foliage of many of the specimens has reached its full size. All of them were collected before the heads were fully mature.

*V. nyassae* has been collected largely on the highlands immediately north of Lake Nyassa although one collection is known from Zambia to the west and another collection, which is apparently this species, comes from far south in Transvaal, South Africa (see fig. 44, p. 64).

*Specimens Seen:* TANZANIA: Sao Hill. 6,200 feet. *A. M. Watermeyer* 32. Feb., 1959. (K). Mbeya Distr. Slopes of Mbeya Mt. 9,000 feet. *B. D. Burt* 6334. Sept. 25, 1936. (K). Southern Highlands Prov. Njombe Distr. Elton Plateau. 8,500 feet. *R. L. Willan* 172. Oct. 6, 1954. (K). Near Njombe. 2,100 m. *H. M. Richards* 7874. Jan. 17, 1957. (K). ZAMBIA: Highlands, Ndola. *C. F. E. Allen* 363. Oct., 1906. (SRGH). SOUTH AFRICA: Transvaal. 12½ mi. E. of Lydenburg on the road to Sabie. 7,000 feet. *L. E. Codd & B. de Winter* 3291. Nov. 12, 1947. (K).

23. *Vernonia acrocephala* Klatt. Ann. Naturhist. Hofmus. 7:100. 1892. (Fig. 46. See also figs. 4, A, and 44.)

Type Coll: *Mechow* 278. Angola. Malange. Oct., 1879. (Drawing & fragments—GH).

*V. extranea* S. Moore. J. Linn. Soc. Bot. 47:263. 1902.

Type Coll: *Kassner* 2707. Congo. Kundelungu Mt. Apr. 1908. (K!).

Rosettes from perennial root crown with densely pilose apex from which the leaves and scapes arise. Leaves (mostly immature) ovate to lanceolate or spatulate, to 14.5 cm. long, 9.0 cm. wide; margin entire; blade scattered pilose to pilose on veins only above, scattered pilose, often glandular beneath; apex rounded to acute, base generally cuneate. Scapes to 0.2 m. tall, moderately to densely pubescent, more pubescent just beneath head, sometimes with small bracts midway; heads single, to 2.0 cm. high, 2.0 cm. in diameter; phyllaries broad, generally acute, to 1.8 cm. long by 0.9 cm. wide, often reddish, sometimes veined, often pubescent without; flowers to 1.1 cm. long, rose? or mauve, tube widening gradually into limb, limb with long, thin, lanceolate lobes; achenes to 0.4 cm. long, glabrous to moderately pubescent, light brown, perhaps nearly square in cross section when mature; pappus to 0.9 cm. long, narrowly flattened, scarcely plumose, apex acute.

*V. acrocephala* is usually represented by immature specimens. Apparently the foliage is much larger than that of the last species when it is mature. It is also clearly separated by the broad phyllaries.

*V. acrocephala* has been collected on opposite sides of the African continent in Cameroon, where it is apparently most abundant, and in Tanzania (see fig. 44, p. 64). Inasmuch as the type collection was made in Angola, it is probably more widely distributed and abundant than the recorded collections indicate, but, due to its habit and habitat, it is apparently difficult to find.

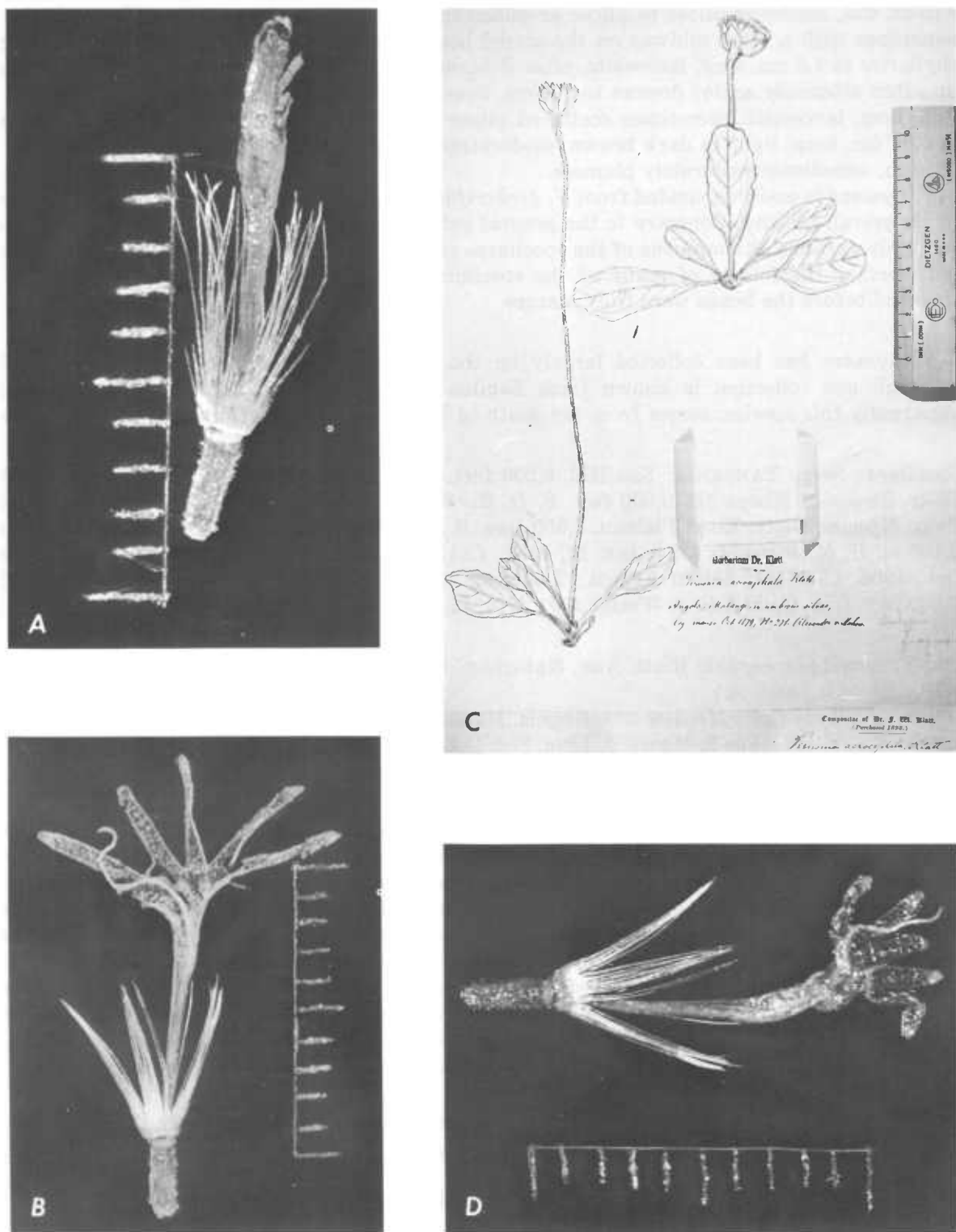


Figure 46.—Type collection of *V. acrocephala* Klatt. A, Achene; B, flower dissected; C, habit; and D, flower unopened (expanded in water). (GH). Scales in millimeters.

*Collections Seen:* CAMEROON: Mt. Gotel. *H. J. Félix* 3338. Mar., 1939. (P). Bamenda Div. Bafut-Ngemba Forest Reserve. 2,210 m. *F. N. Hepper* 2181. Feb. 25, 1958. (BR, K). Bamenda Sta. 5,000 feet. *T. D. Maitland* 1549 bis. June, 1931. (K). Bamenda. 5,000 feet. *T. D. Maitland* 1417. (K). 12 mi. E. of Bamenda. 5,200 feet. *C. F. A. Onochie* FHI34867. Mar. 20, 1955. (K). Njon, Tibali. *G. Tessman* 2726. Sept. 6, 1914. (K). TANZANIA: Unyika. *W. Goetze* 1450. (BR, G). Ufipa. Sum-bawanga. 7,100 feet. *H. M. Richards* 3441. Nov. 27, 1954. (K).

**24.** *Vernonia praemorsa* Muschler. Bot. Jahrb. Syst. 46:68. 1911. (Figs. 47 and 48. See also fig. 4, B.)

Type Coll: *Stolz* 104. Nyassa hochland, Station Kyimbila, Namulapi. Nov., 1907. (GH, K).

*V. castellana* S. Moore. J. Bot. 52:95. 1914.

Type Coll: *Gossweiler* 2883. Angola: Benguela. Forte dom Affonso, R. Cului. (K!).

*V. kuluina* S. Moore. J. Bot. 56:209. 1918.

Type Coll: *Gossweiler* 2904. Angola: Benguela. (K!).

Rosettes from a perennial root crown, apex often with a felty tomentum from which the leaves and scapes arise. Leaves ovate to lanceolate, to 24.0 cm. long, 10.0 cm. wide; margin undulate to apiculate dentate; blade moderately pilose to scattered scabrid above, sparsely to moderately pilose, generally glandular beneath; apex obtuse, rounded or subacute; base cuneate, often extending down petiole, petiole 1.5 to 5.0 cm. long. Scape sparsely pubescent to pubescent, often bracteolate midway, bearing many closely crowded heads; heads to 1.0 cm. high, 1.0 cm. in diameter; phyllaries to 0.9 cm. long, lower often pilose without, green or usually reddish; flowers to 1.0 cm. long, tube gradually broadening into limb, lobes thin, frequently pilose on the tip without, mauve or purple; only immature achenes seen, to 0.3 cm. long, medium brown, moderately pubescent, callus discreet?; pappus to 0.7 cm. long, filiform, scarcely plumose.

*V. praemorsa* is readily distinguished by the numerous crowded heads on the long scapes. In eastern Africa, it is apparently locally common, but, like many of the rosette species, is only found when it is conspicuously in flower. None of the herbarium specimens bear mature achenes.

Fanshawe's note for Zambia is, "Flowering December, January, February. Fruiting January, February, March. Occasional in miombo woodland, dambo margins and plains. Distribution in Zambia, Isoka, Abercorn, Copperbelt. This type of distribution usually means throughout the high rainfall belt, but, owing to its rarity, it has not been collected in the intermediate districts."

*V. praemorsa* is found in Angola in the west and in Tanzania. Zambia and Malawi in the east (see fig. 48, p. 71). It will probably eventually be found in intervening stations when the mid-continent has been more thoroughly collected.

*Collections Seen:* TANZANIA: Iringa Prov. Msima Stock Farm. *H. E. Emson* 247. 1932. (EA). Sao Hill. 6,500 feet. *P. J. Greenway* 6409. Nov. 5, 1941. (EA). Ruhudje, Lupembe. 1,600 m. *H. J. Schlieben* 1222. Sept. 25, 1931. (GH, K). ZAMBIA: Abercorn Distr. Nkali Dambo. *H. M. Richards* 3922. Jan. 5, 1955. (K). Ndingi Pans. 1,500 m. *H. M. Richards* 11993. Dec. 19, 1959. (K). MALAWI: Rumpi Distr. Nyika Plateau. 2,400 m. *H. M. Richards* 10486. Jan. 5, 1959. (K).

**25.** *Vernonia subaphylla* Baker. Kew Bull. 1895:290. (Non Muschler). (Figs. 49 and 50. See also fig. 48.)

Type Coll: *Carson* 10. Kalangwizi, Moero. 1894. (K!).

*V. armerioides* O. Hoffm. Bot. Jahrb. Syst. 24:462.

Type Coll: *Pogge* 1315. (Not seen.)

*V. agricola* S. Moore. J. Bot. 56:208. 1918.

Type Coll: *Kassner* 2136. Rhodesia. Lukanda River. Dec., 1907. (K!).

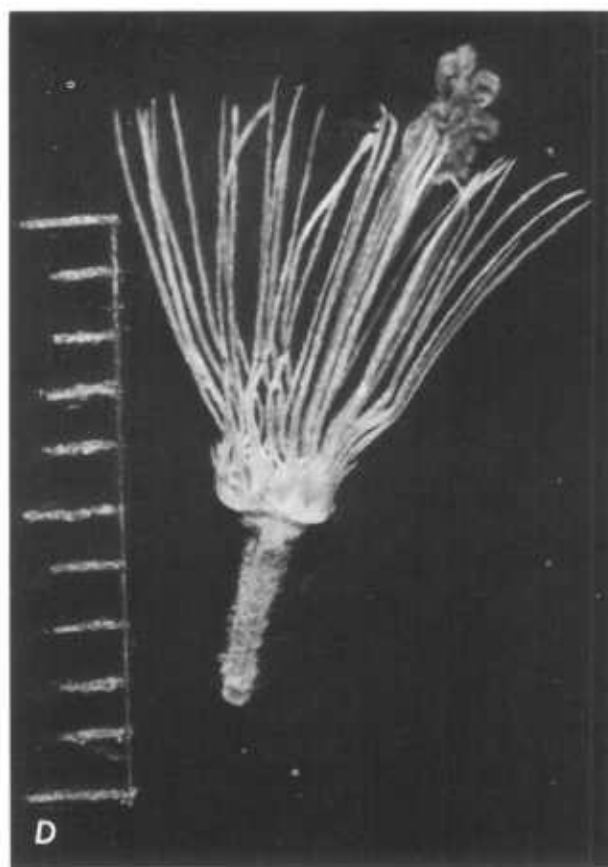
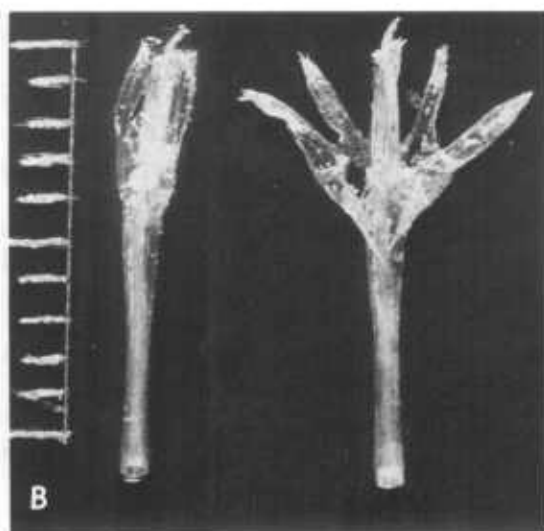
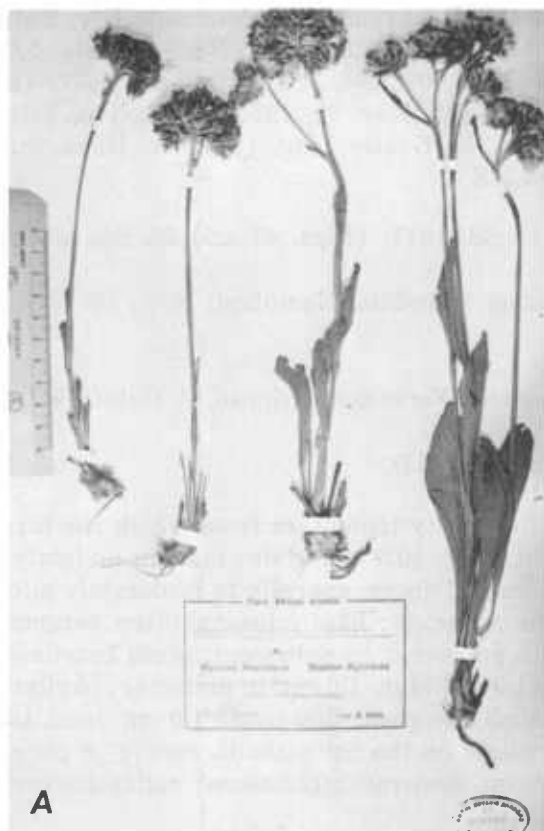
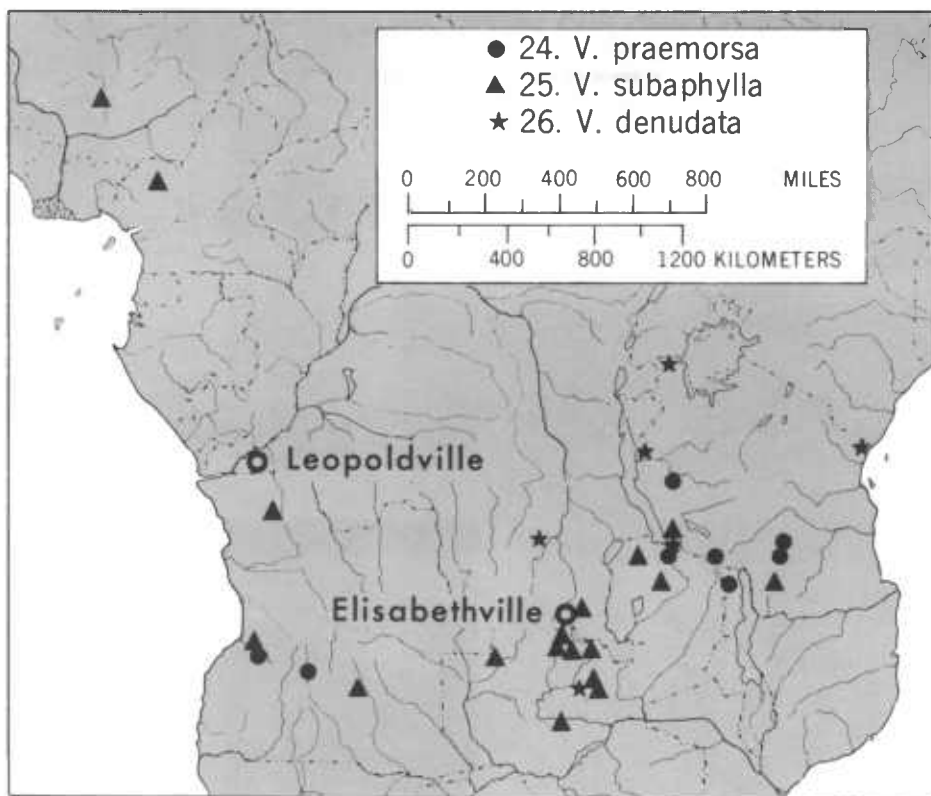


Figure 47.—Type collection of *V. praemorsa* Muschler. *A*, Habit; *B*, flower unopened and dissected (expanded in water); *C*, detail of heads; and *D*, achene (immature). (K). Scales in millimeters.



PN-2068

Figure 48.—Distribution of *V. denudata*, *V. praemorsa*, and *V. subaphylla*.

Rosette from a perennial root crown, apex frequently with dense tan tomentum from which the leaves and scrapes emerge. Leaves lanceolate to, rarely, obovate, to 19.0 cm. long, 5.0 cm. wide; margin entire to barely apiculate to apiculate dentate; blade often nitid, glabrous to usually few pilose, rarely moderately pilose above, scattered to densely pilose or hirsute, glandular beneath; petiole to 2.2 cm. long. Scape to 0.8 m. tall, heads rarely single, usually several, in an open panicle; heads to 1.3 cm. high, 1.5 cm. in diameter; phyllaries to 1.2 cm. long, outer sometimes pubescent or lepidote, tips rounded, scarious, usually purple or reddish; flowers to 1.1 cm. long, tube enlarging gradually into limb, lobes long, lanceolate, thin, white to pink, mauve, or usually, purple; achenes to 0.45 cm. long, yellow to tan or medium brown, ridged-angled at maturity, glabrous to moderately pilose, rarely glandular, callus light to medium yellow, discreet, small; pappus to 0.7 cm. long, filiform.

*V. subaphylla* is largely distinguished by the scarious purple or reddish phyllary tips. It is similar in habit and aspect to *V. praecox*, but the latter species has much more narrow phyllaries with narrowed tips which can rarely be interpreted as scarious. No other species in the rosette-leaved group is liable to be confused with *V. subaphylla*.

*V. subaphylla* is distributed across southern Africa from Angola to Tanzania with an extension northward into Cameroon and Nigeria where it apparently is less common (see fig. 48).

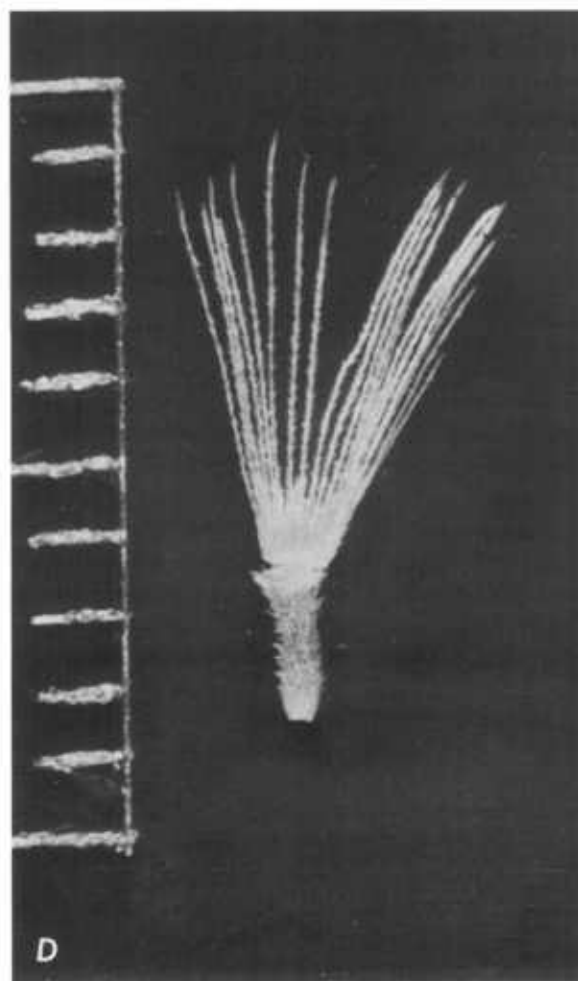
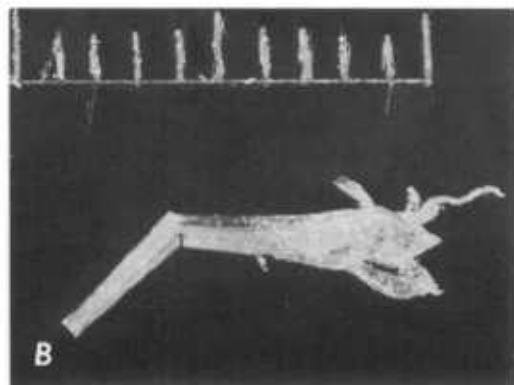
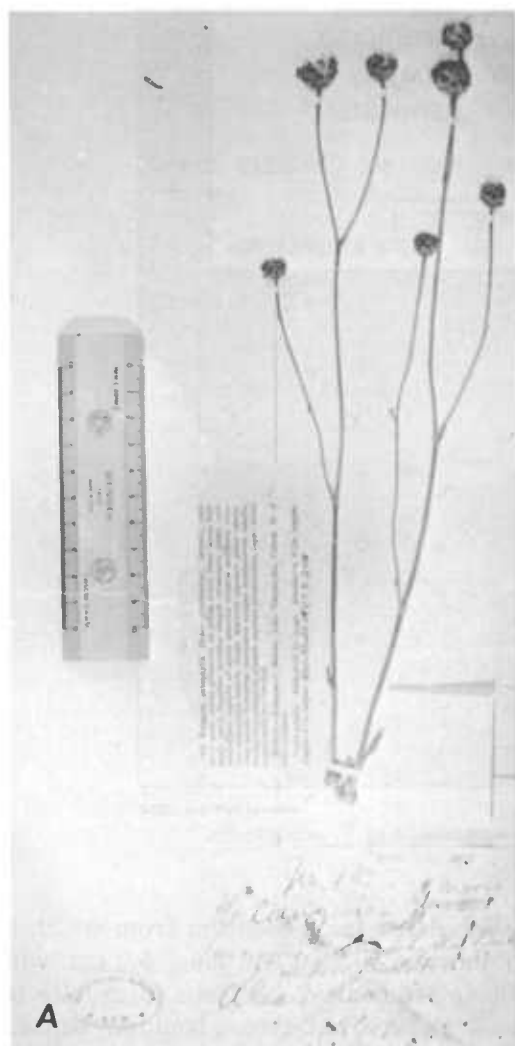


Figure 49.—Type collection of *V. subaphylla* Baker. A, Habit; B, flower (expanded in water); C, detail of heads; and D, achene (immature). (K). Scales in millimeters.





FN-2070

Figure 50.—A, Plants of *V. subaphylla* are barely seen in the surrounding grass and herbs at the base of a tree in Ndola Forest Reserve near Ndola, Zambia. The shiny leaves belong to the *Vernonia* plant. B, Heads in flower are very inconspicuous, but the pappus of mature achenes is easily seen.

*Collections Seen:* NIGERIA: Von. Bauchi Plateau. 3,000–4,500 feet. *J. D. Young* 139. Jan., 1922. (K). CAMEROON: Nkambe Div. 23 mi. W. of Nkambe. 3,500 feet. *F. N. Hepper* 2827. Feb. 11, 1958. (K). REPUBLIC OF CONGO: Elisabethville. *F. A. Rogers* 163. Oct. 22, 1911. (K). Tshinsenda. *F. A. Rogers* 204. Oct. 18, 1911. (K). ANGOLA: Camaquenhe, Dundo. *J. Gossweiler* 14021. Apr. 2, 1948. (K). Benguella. *J. Gossweiler* 2921. (K). Longa near Minnesera. 1,200 m. *H. Baum* 659. Jan. 11, 1900. (K). TANZANIA: Songea Distr. 1.5 km. S. of Gumbiro. 780 m. *E. Milne-Redhead & P. Taylor* 8416. Jan. 24, 1956. (EA, K, SRGH). ZAMBIA: Mporokoso Distr. 16 mi. from Mporokoso, Kasama-Mporokoso road. 1,200 m. *H. M. Richards* 12074. Jan. 6, 1960. (K). Kasama Distr. Mungwi. *E. A. Robinson* 4149. Dec. 4, 1960. (EA, K, SRGH). Western Prov. Between Ndola and Kitwe. *C. E. Smith, Jr. & D. B. Fanshawe* 4661. Feb. 11, 1967. (EA, SRGH, US). Chingola. *D. B. Fanshawe* 2667. Dec. 19, 1955. (K). 15 mi. S. E. of Mufulira. 1,300 m. *E. A. Robinson* 3304. Jan. 26, 1960. (K). Solwezi Distr. Chingolo to Solwezi. *P. J. Greenway & J. P. M. Brenan* 8127. Sept. 29, 1947. (EA,

SRGH). Mwinilunga Distr. 10 mi. W. of Lunga, 40 mi. S. of Boma. *E. Milne-Redhead* 909. Aug. 15, 1930. (K). 25 mi. S. E. of Choma. 4,200 feet. *E. A. Robinson* 1775. Dec. 17, 1956. (K, SRGH).

26. *Vernonia denudata* Hutch. & Burt. Rev. Zool. Bot. Africaines 23:37. 1932. (Fig. 51. See also fig. 48.)

Type Coll: *de Witte* 588. Congo. Kangenge. Aug., 1931. (K).

Rosette from a perennial root crown, apex densely tan, woolly. Leaves produced after inflorescence mature, broadly spatulate, to 32.0 cm. long, 13 cm. wide (only one herbarium specimen with leaves seen); margin irregularly apiculate dentate; blade scattered pilose glandular above, moderately pilose, glandular beneath; apex rounded, base cuneate acute. Inflorescences often several from single root crown, open panicate, heads on long peduncles. Scares sparingly pubescent, scantily bracteolate; heads to 1.5 cm. high, 1.5 cm. in diameter; phyllaries to 1.3 cm. long, lanceolate, usually sparingly pubescent without, somewhat glandular, sometimes ciliate, generally with reddish margin; flowers to 1.0 cm. long, white to deep mauve or purple, tube broadening gradually from base into limb; achenes to 0.4 cm. long, yellow to, usually, medium brown, slim, moderately to densely pilose, callus papillose, discreet; pappus to 1.0 cm. long, filiform, scarcely plumose, clear white.

*V. denudata* can be confused with no other species in section *Stengelia*, because of the distinctive form of the inflorescences. In detail, the flowers are not unlike those of other rosette-leaved species, many of which also have a dense tomentum at the apex of the root crown. Other species in this group also produce the inflorescences before the leaves appear and, in all of these species, usually only the flowering plants are collected.

Although the type collection of *V. denudata* was made in the Congo, all subsequent collections have come from Tanzania and Zambia in eastern Africa (see fig. 48, p. 71).

*Collections Seen:* TANZANIA: Kigoma Distr. Near Ulemba. 900 m. *H. M. Richards* 11713. Nov. 4, 1959. (K). Ufipa. Sumbawanga-Nkunde. 7,000 feet. *A. A. Bullock* 1951. Nov. 28, 1949. (FI, K). Utahya. *H. S. Mahinde* 215. Aug. 4, 1958. (EA). ZAMBIA: Abercorn Distr. Kalambo Falls road. 1,500 m. *H. M. Richards* 6502, 11426. Sept. 15, 1956 & Sept. 4, 1959. (K, SRGH). Abercorn. 5,500 feet. *D. Kafuli* 14. Sept. 28, 1955. (SRGH). Western Prov. Mwinilunga Distr. 8 mi. W. of Kakome. *A. Angus* 567. Sept. 28, 1952. (K).

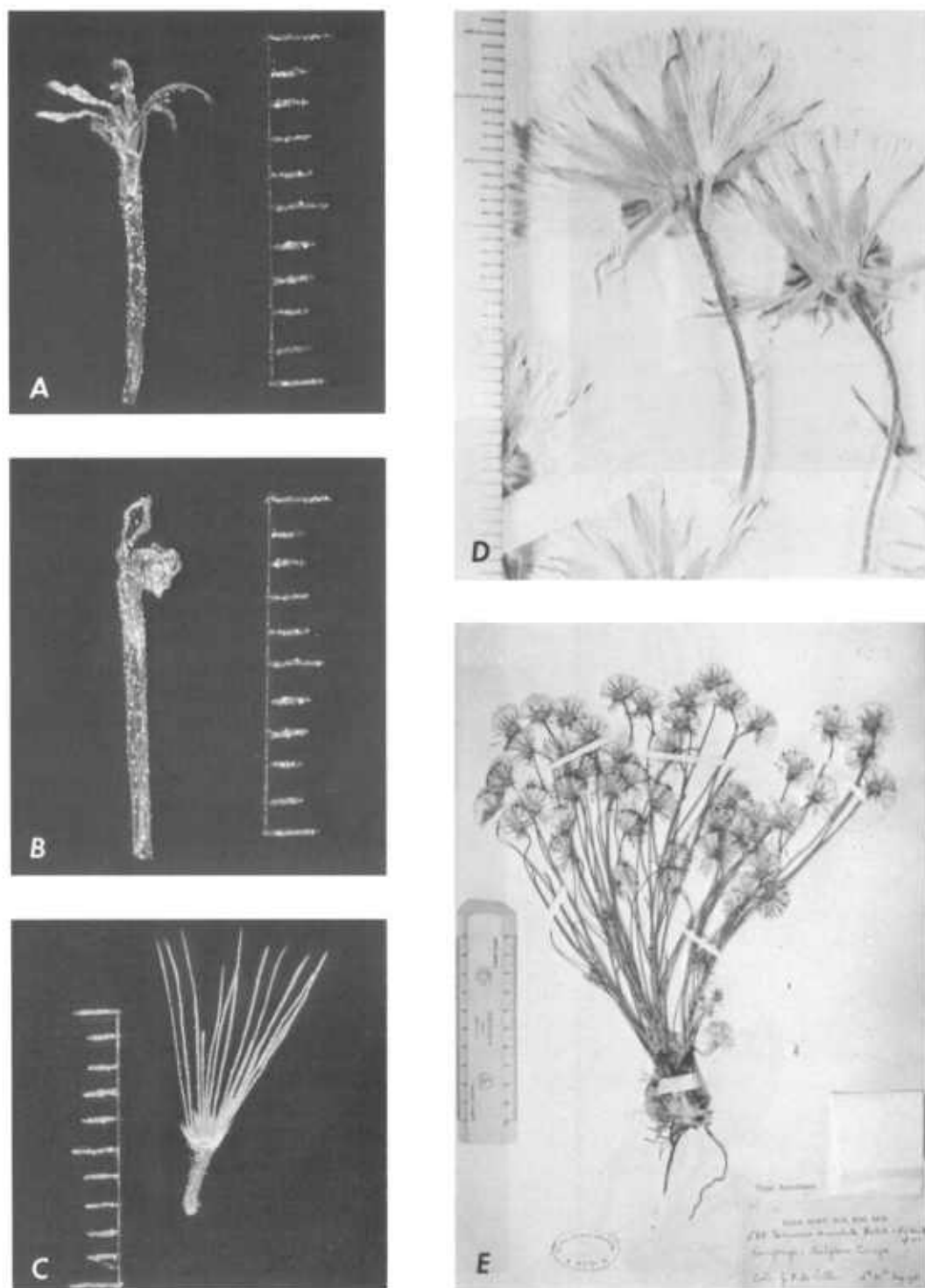
27. *Vernonia praecox* Welw. ex O. Hoffm. Bol. Soc. Brot. 13:16. 1896. (Figs. 52 and 53.)

Type Coll: *Welwitsch* 3330. Angola. (K).

*V. divulgata* S. Moore. J. Bot. 58:44. 1920.

Lectotype Coll: *Vanderyst* 3658. Congo. Gamboni. (Photo—BM!)

Rosette from a perennial root crown with tan, densely lanate apex. Leaves produced after inflorescence is mature, spatulate?, to 24.0 cm. long, 10.0 cm. wide, (only mature leaves seen were ragged); margin apiculate or apiculate dentate; blade glabrous or with a few hairs along the midrib, shiny above, scattered pubescent beneath; apex rounded; base cuneate acute; petiole to 4.0 cm. long?. Inflorescence an open panicle on a tall single scape; heads short pedunculate, to 1.0 cm. high, 1.2 cm. in diameter; phyllaries to 0.9 cm. long, lanceolate, occasionally scarious tipped, sometimes reddish, barely pubescent without; flowers to 0.8 cm. long, mauve, glandular without, thin, lobes moderately long; achenes (immature) to 0.3 cm. long, yellow to medium brown, moderately pubescent to moderately pilose, callus distinct, small; pappus to 0.6 cm. long, filiform.



PN-2071

Figure 51.—Type collection of *V. denudata* Hutch. & Burtt. *A*, Dissected flower, and *B*, unopened flower (expanded in water); *C*, achene (immature); *D*, detail of heads; and *E*, habit. (K). Scales in millimeters.

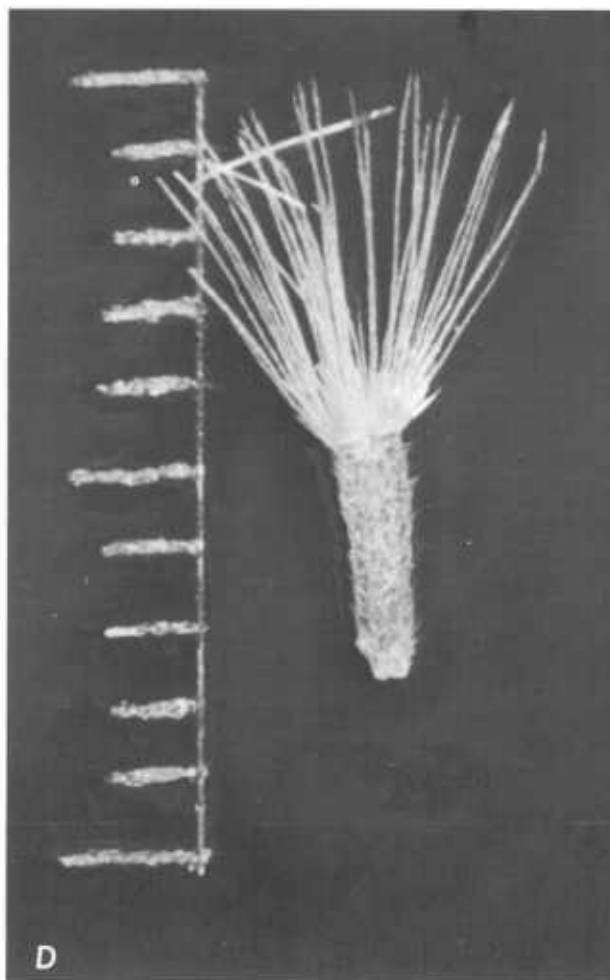
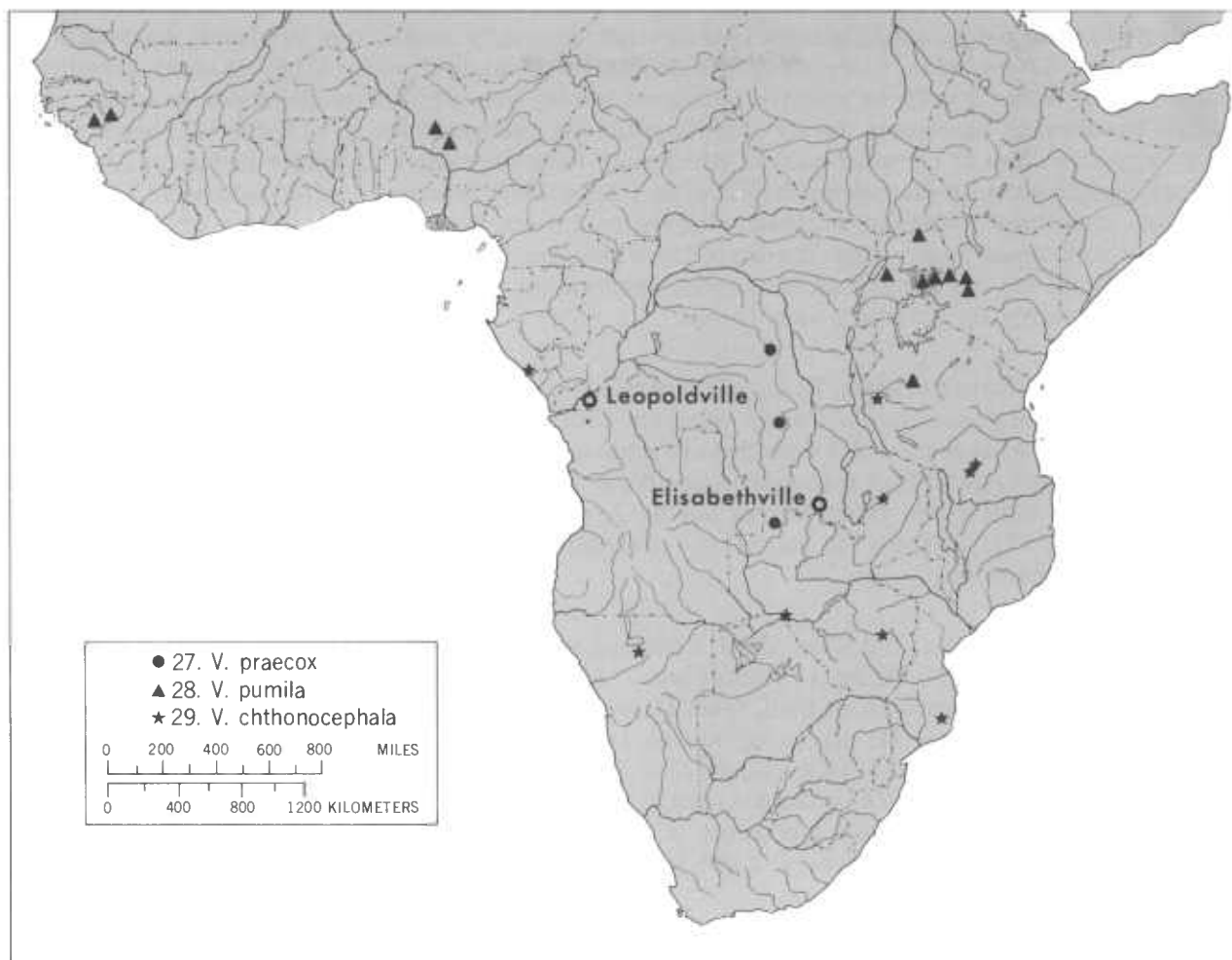


Figure 52.—Type collection of *V. praecox* Welw. ex O. Hoffm. A, Flowers (expanded in water). Note that they are about the same diameter from the base to the lobes. B, Habit; C, detail of heads; and D, achene. (K). Scales in millimeters.



PN-2073

Figure 53.—Distribution of *V. chthonocephala*, *V. praecox*, and *V. pumila*.

*V. praecox* is readily distinguished from the last species by the smaller heads borne on much shorter peduncles, giving the inflorescence a much different appearance. Foliage may be similar, but perhaps is usually shiny and leathery in this species. As before, all of the collections are in flower with no mature achenes and only one specimen has rather worn foliage.

*V. praecox* is known only from Angola, Republic of the Congo and Zambia (see fig. 53).

*Collections Seen:* ZAMBIA: Mwinilungu Distr. 10 mi. W. of River Lunga. *E. Milne-Redhead* 904. Aug. 13, 1930. (K). REPUBLIC OF CONGO: Lukeni River near Mutombo-Mukulu. *P. Quarré* 2533. July, 1931. (K). Lualu. *P. Quarré* 2812. Nov., 1931. (K).

28. *Vernonia pumila* Kotschy & Peyr. Pl. Tinn. 37. t. 17a. 1867. (See fig. 53.)

Type Coll: *Heuglin s. n.* Prés de Bongo. Dec. 1863. (Type not seen.)

Perennial from a root crown; flowers and stems with leaves appearing at different times. Foliage-bearing stems to 0.4 m. tall, glabrous to pubescent, generally moderately so; leaves lanceolate, to 14.5 cm. long, 5.0 cm. wide; margin barely apiculate to apiculate dentate; blade glabrous, sometimes glandular, or veins scurfy or slightly pubescent above, densely lanate, glandular beneath; apex obtuse to subacute, base acute, rarely slightly petiolate. Inflorescences to 11.5 cm. tall, heads single or several in a close or crowded panicle which may have very short or longer peduncles; heads to 2.0 cm. high, 3.0 cm. in diameter; phyllaries to 1.4 cm. long, lanceolate, often pubescent on the tip without, sometimes glandular without; flowers to 1.6 cm. long, reddish purple or purple, tube usually 2 to 3 times longer than the limb, lobes sometimes with glandular tips without; achenes (immature) to 0.3 cm. long, medium brown, moderately to densely pilose, glandular; pappus to 1.1 cm. long, narrowly flattened, apex obtuse.

In many of its characteristics, *V. pumila* is similar to *V. guineensis*. The separate appearance of the flowering and foliar shoots clearly separate these species. Although *V. pumila* is obviously related to the other species which bear flowers separately from the leaves, in this species, the leaves are borne on an elongate shoot rather than in a basal rosette.

*V. pumila* is distributed from Guinea across Africa to Kenya generally north of the equator (see fig. 53, p. 77). Sparsity of collections probably fails to provide a complete picture of the geographic distribution.

*Collections Seen:* GUINEA: Boké, Guildé. *J. Chillou s. n.* Jan. 9, 1924. (P). Cercle de Boké. *J. Chillou s. n.* June, 1924. (BR, K). NIGERIA: Kontagora. *J. M. Dalziel 190.* Jan. 20, 1906. (K). Niger Prov. Minna Fuel Forest Reserve about 5 mi. from Minna on the Zungeru road. *R. W. J. Keay FHI37325.* Jan. 2, 1958. (K). KENYA: Mt. Elgon, 6,000 feet. *D. R. Tweedie 124.* 1934. (K). Trans Nzoia Plains. *D. R. Tweedie 357.* Feb., 1937. (K). Nandi. *G. F. S. Elliot 7037.* (BM, K). UGANDA: Mt. Debasien, Karamoja, 5,000 feet. *A. S. Thomas 2207.* Jan. 8, 1937. (K). Senu Teso, 3,600 feet. *P. Chandler 21.* Nov., 1931. (K). Hoima, Unyote, 3,000 feet. *A. G. Bagshawe 947.* Mar. 3, 1906. (BM). TANZANIA: Ugalla River, 120 mi. S.W. of Tabora, 3,800 feet. *P. R. O. Bally 7496.* Sept. 28, 1949. (K).

29. *Vernonia chthonocephala* O. Hoffm. Bol. Soc. Brot. 13:17. 1896. (Fig. 54. See also fig. 53.)

Lectotype Coll: *Welwitsch 3886.* Angola. (K).

*V. perparva* S. Moore. J. Linn. Soc. Bot. 35:324. 1905.

Type Coll: *Elliot 8123.* Karagwe, 4,000–5,000 feet. Sept. (K!).

Rosette from blanched perennial root crown, apex densely tan, woolly, flowers and leaves produced at different times. Leaves to 50.0 cm. long, 8.0 cm. wide, lanceolate to spatulate; margins undulate; blade scattered scabrous to scattered pilose above, pilose on the veins or moderately pilose or hirsute, sometimes glandular beneath; apex subacute to usually obtuse, base cuneate; petiole probably seldom longer than about 3.0 cm., pubescent. Scapes produced one to several from each root crown, each bearing a single head, to 4.0 cm. tall; heads to 1.5 cm. high, 2.0 cm. in diameter; phyllaries to 1.5 cm. long, lanceolate, glabrous to usually pubescent or pilose sometimes ciliate, without, usually reddish, sometimes glandular; flowers to 1.4 cm. long, tube expanding gradually into limb, lobes long, thin, pale purple to purple; achenes to 0.4 cm. long, yellow to light brown, few pilose to usually densely pilose, glandular; pappus to 0.9 cm. long, filiform.

*V. chthonocephala* is unlike any other species in this group. The very short, single-flowered scapes are unusual. Because the plant is usually collected only in flower, very few collections of leaves are available.

The few collections available of *V. chthonocephala* indicate that it is widely distributed from

Cameroon to Sudan in the north to Angola and Malawi in the south (see fig. 53, p. 77). As with most species of this group of the plains and savannas, the collector must almost step on the plant before he sees it. Thus, the species is probably more uniformly distributed and more common than the following specimens indicate.

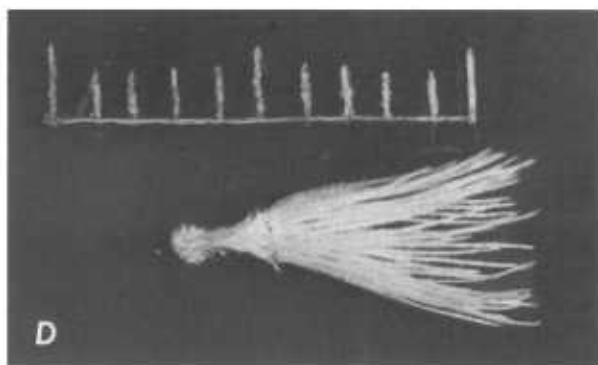
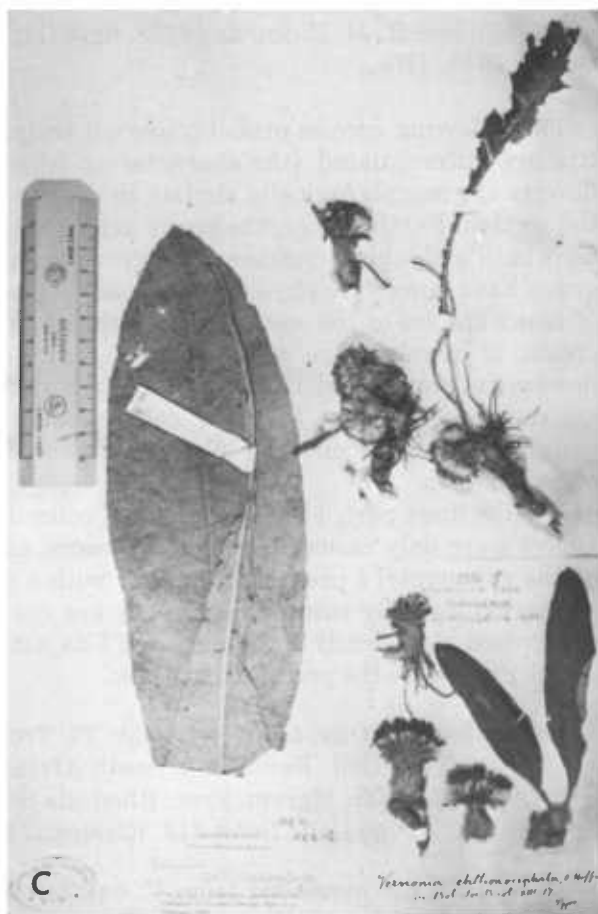
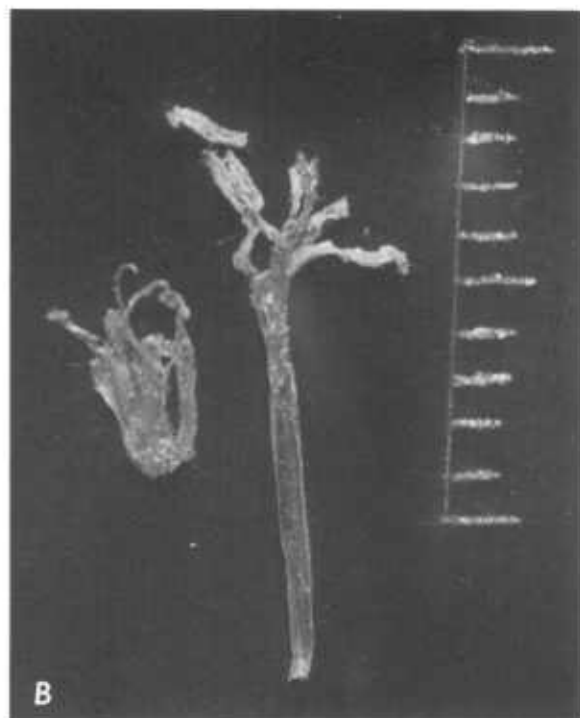
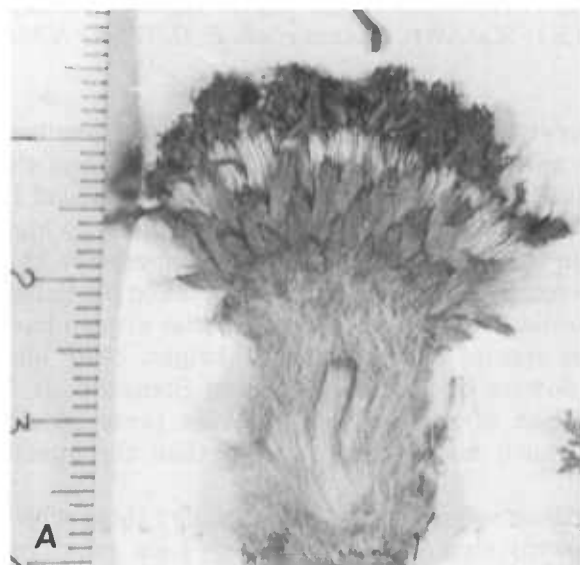


Figure 54.—Type collection of *V. chthonocephala* O. Hoffm. *A*, Detail of head; *B*, flower (expanded in water); *C*, habit, and *D*, achene (immature). (K). Scales in millimeters.



*Collections Seen:* CAMEROON: Adamawa Div. Mambila Distr. Karara. 1,500 m. *F. N. Hepper* 1775. Jan. 25, 1958. (K). REPUBLIC OF CONGO: Kangenge. *G. F. de Witte* 556. Aug. 12-15, 1931. (K). ANGOLA. Malange Distr. *J. Gossweiler* 1152. (K). Capacca, Membassoco Cubae. 3,500 feet. *H. G. Faulkner* 109. July-Aug., 1941. (K). SUDAN: Equatoria Prov. Kagelu Sta. *J. G. Myers* 8321. Jan. 26, 1938. (K). KENYA: Trans Nzoia. 6,200 feet. *P. H. Kioni* 246. Mar. 27, 1956. (EA). Hoey's Bridge. 6,000 feet. *Mainwaring* K25. 1936. (K). ZAMBIA: Abercorn Distr. Top of Kambole escarpment. 1,500 m. *H. M. Richards* 13222. Sept. 11, 1960. (K). MALAWI: Nzama road. *P. O. Wiehe* N264. Oct. 7, 1949. (K).

The following species probably are not truly members of section *Stengelia*. However, the phyllary tips are differentiated (the character on which most species are included in the section) and the flowers are morphologically similar to the rosette-leaved species which have long been included in the section. Furthermore, the epoxy acid constituent of the achene oil of *V. afromontana* is as high as it is in undoubted members of section *Stengelia*. On the other hand, many of the species in this group have lanceolate phyllaries with acute green tips totally unlike the enlarged petaloid phyllaries of many species of the section. Often, the pappus is sordid, whereas stengelioid species always have cream, or rarely, pure white pappus. Many of these species have startlingly bright, clear blue flowers in contrast to the purple, mauve, or white flowers of species of section *Stengelia*. It is entirely possible that the blue color is only a function of cell sap pH, because these species photograph mauve on color film, an indication that much more red is present than the human eye sees.

For the most part, I have insufficient collections of these species to treat them fully: those which I have were only casually included in loans, except for my own collections. Where I am convinced of the synonymy, I present it, usually with a note about the impression I have of the relationship of morphologically similar taxa. They are not keyed out, because I am not at all sure that I have recognized biologically valid units and I do not wish to give the impression that I have studied them as fully as I have the preceding species.

*Vernonia bainesii* Oliv. & Hiern in Oliv. Fl. Trop. Africa 3:272. 1877.

Type Coll: *Baines* s. n. South African gold fields. (Type not seen.)

*V. wildii* Merxm. Proc. Rhodesia Sci. Assoc. 43:72. 1951.

Type Coll: *Dehn* 248. Rhodesia. Marandellas. (M!).

*V. wildii* is distinguished from *V. bainesii* only by the width of the foliage, a distinction which I cannot accept as significant. The flowers of this species are morphologically indistinguishable from those of the rosette-leaved members of section *Stengelia*. Otherwise, this species is not a good morphological fit with stengelioid species.

*Collections Seen:* ZAMBIA: Northern Prov. Kwimbe School. *C. E. Smith, Jr. & H. M. Richards* 4671. Feb. 21, 1967. (EA, K, SRGH, US). RHODESIA: Inyanga Distr. Mare Dam. *O. West* 7266. Apr. 25, 1966. (SRGH, US).

*Vernonia africana* (Sond.) Druce. Bot. Soc. Exch. Club Brit. Isles. 1916: 651. 1917.

Type Coll: *Gueinzus* 339. Port Natal. (Type not seen.)

*Vernonella africana* Sond. Linnaea 23:62. 1850.

*Vernonia vernonella* Harvey. Fl. Cap. 3:53. 1894. *Nom. illeg.* (Superfluous).

*V. africana* is probably allied to *V. bainesii*. All of the collections which I have seen are old. I searched the type locality for living plants, but the area is now devoted to sugarcane fields and the species may have been completely eliminated. It apparently was never very widely distributed.

*Collections Seen*: SOUTH AFRICA: Natal. Grassy flat, Victoria County, 400 feet. *J. M. Wood* 753. May, 1889. (K, US). Natal. *K. Saunders s. n.* May, 1881. (K).

*Vernonia glabra* (Steetz in Peters) Vatke. Oesterr. Bot. Z. 27:194. 1877.

*Linzia glabra* Steetz in Peters. Reise nach Mossambique, etc. 353. 1862-64.

Described with two varieties:

var. *a confertissima* Steetz in Peters. Op. cit. 354.

Type Coll: *Peters*. In Boror und Rios de Sene in Mossambique. (Type not seen.)

var. *β laxa* Steetz in Peters. Loc. cit.

Type Coll: *Peters*. Bei Sena, und andere Exemplare am Ufer des Flusses Zambeze in Mossambique. (Specimens not seen and lectotype not selected).

Vatke did not specify which element he intended as the type of the new combination so we must conclude that he embraced the entire concept described by Steetz including all of the variants illustrated by the cited specimens. Unfortunately, I did not find a duplicate of any of the Peters collections, but a more intensive search may reveal some in the European herbaria.

I have seen a number of collections from eastern Africa, from Ethiopia to Rhodesia, which I would interpret as *V. glabra*. Included are specimens identified as *V. melleri*. However, I do not know the type collections and I cannot be sure of the synonymy. Many of the specimens had blue flowers, others mauve or purple. I do not think that the flower color is a valid distinction.

A number of varieties have been described for or transferred into *V. glabra*. My understanding of this complex is so poor that I make no comment on varieties of *V. glabra* per se. However, it has been my experience in taxonomy of tropical or primarily tropical groups that seldom is a clear understanding achieved of the overall broad species. Recognition of infraspecific taxa is, then, hardly profitable. I doubt that all of the divisions of *V. glabra* will stand under close scrutiny.

*Vernonia pauciflora* (Willd.) Less. Linnaea 4:292. 1829. (Fig. 55.)

*Conyza pauciflora* Willd. Sp. Pl. (ed. 4) 3:1634. 1803.

Type Coll: *Richard s. n.* Senegal. (Photo—B!)

*V. senegalensis* Desf. Cat. Hort. Paris ed. 3. 400. 1829.

Type Coll: Jardin des Plantes Juillet 1828. (P!).

I have seen the type of Desfontaine's species in Paris and I have no doubt that it is synonymous with *V. pauciflora*. However, my choice of correct name is arbitrary, because I do not know whether the Lessing article was published prior to the Catalogue or not.

The eastern African specimens which I have seen are blue-flowered, herbaceous plants which are similar to, but apparently distinguished from *V. glabra* by their large thin foliage.

A further complication is introduced by Lessing's *V. senegalensis* (Linnaea 4:265. 1829) which appears to be a transfer of *Baccharis senegalensis* Pers. (Syn. 2:424. 1806). As the species name is priorable from 1806, *V. senegalensis* Desf. becomes an illegitimate name (later homonym). However, Lessing cites other names in synonymy, including *Eupatorium coloratum* Willd. (Sp. Pl. 3:1768. 1803). Whether we agree with Lessing's decision or not, under the Code, the new combination should have been made with the earliest species name *coloratum*, and *V. senegalensis* (Pers.) Less. is illegitimate. If this is the case, *V. senegalensis* Desf. is now legitimate. Whenever this taxon is critically evaluated, the investigator should attempt to locate the Persoon specimen and any corroborative evidence as the chances are rather good that Persoon's specimen and the plants in the Paris Garden came from the same source.

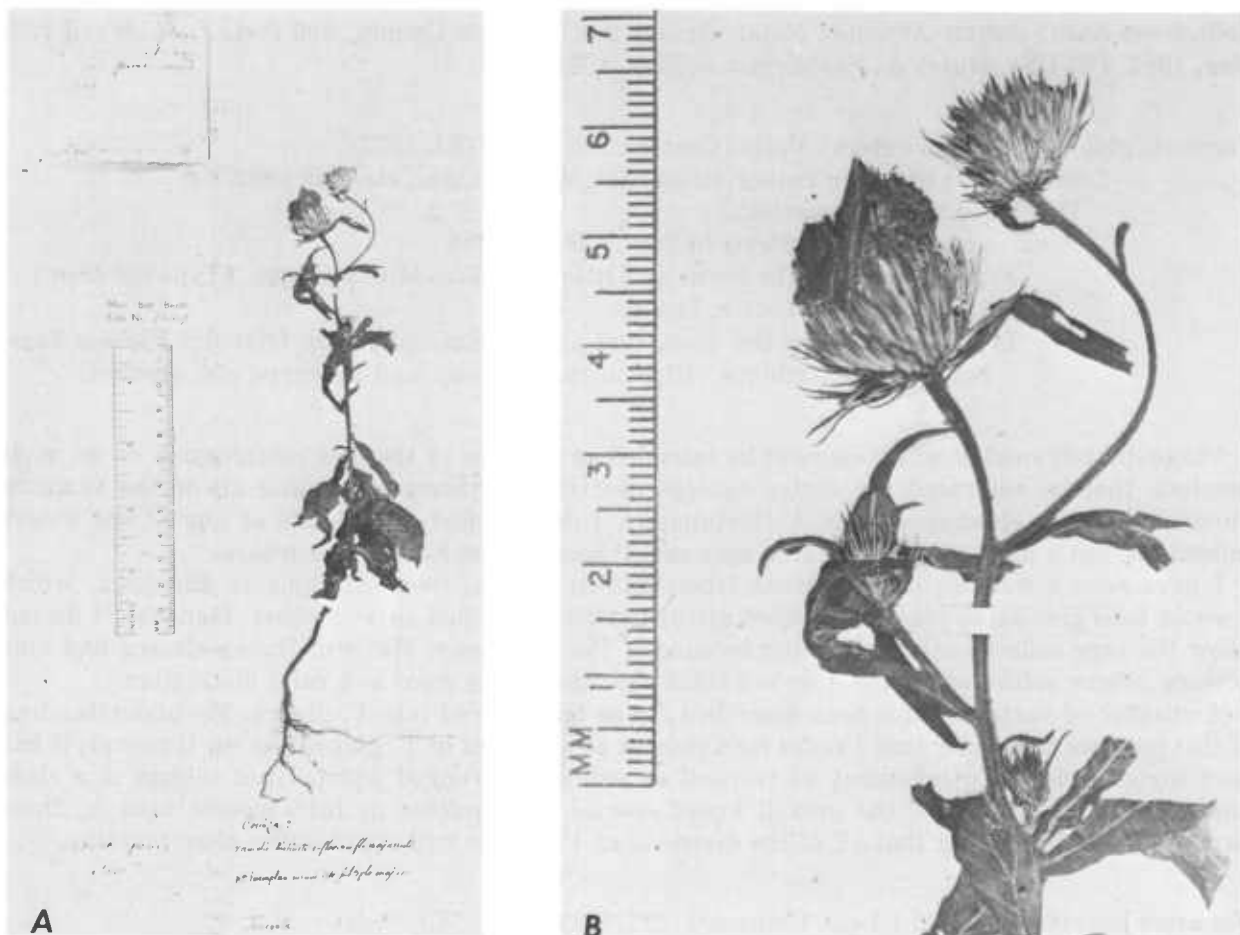


Figure 55.—Type collection of *V. pauciflora* (Willd.) Less. (*Conyza pauciflora* Willd.).  
A, Habit; and B, detail of heads. (Photos, B.)

PN-2075

*Vernonia superba*. O. Hoffm. in Engl. Pflanzenwelt Ost Afrika. 406. 1895. (Fig. 56.)

Type Coll: *Stuhlman 3429*. Bukowa. (Type not seen.)

*V. paludigena* S. Moore. J. Bot. 52:91. 1914.

Type Coll: *Kassner 2832*. Kabinda, Congo. (Type not seen.)

Although I have seen neither type, from the descriptions and from specimens which I have seen which were identified in Europe, I have little hesitation in putting these species together. In the field, *V. superba* is a very handsome plant in flower. Although it is similar to the two preceding species, the heads of this species are usually single and much larger.

*Vernonia afromontana* R. E. Fries. Acta Horti Berg. 9:116. 1928. (Fig. 57.)

Type Coll: *R. E. & I. C. E. Fries 784*. Mt. Kenia. (Type not seen.)

In view of the abundance of this species in Kenya, Uganda, and Tanzania, I can hardly imagine that it went undetected until 1928. However, I have not found an earlier name for it.

*V. afromontana* achenes have a high epoxy acid content in the achene oil. In this regard, it is

very like species of section *Stengelia*. Morphologically, it is rather closely related to *V. glabra*, although it is generally larger over all than that species.

Mature heads of *V. afromontana* plants are inconspicuous because the pappus is sordid and blends well with the surrounding shadows. Open-grown plants are shorter than those that grow in competition with other vegetation. Flowers of *V. afromontana* are often clear, bright or light blue. The plants are called machagene by the people near Meru, Kenya.

As with any study of this nature, this report ends up with several riddles. The most vexing of these is the type specimen of *V. swynnertonii* S. Moore (J. Linn. Soc. Bot. 40:107. 1911) from Kew which consists of a broken scape with a single head and several scraps in the packet. Moore must have had a better specimen to write his rather full description. I have found no other collection to match nor do I feel confident enough to accept Moore's species on the basis of the available specimen. It may belong near *V. subaphylla*.

The following specimens cannot be comfortably placed with any of the species which I am recognizing. *H. Lynes D-164* belongs to the group with a rosette of leaves from a perennial root crown. It is also near *V. subaphylla*, but I lack specimens with intermediate morphological characteristics which would allow me to place the collection here. *P. R. O. Bally 9203* and *J. B. Gillett 14413* from the same region of Ethiopia are the same species and certainly belong with the upright-stemmed species of section *Stengelia*. The Bally collection has been identified as *V. abyssinica* which it isn't. They may represent a new species, but I haven't sufficient collections to warrant a description in a group in which too many species have already been described.

Two collections from Somaliland, *C. N. Collenette 330* and *J. G. B. Newbould 1007*, are certainly a new species, if they are placed in section *Stengelia*. However, I feel that my knowledge of neighboring sections is insufficient and they may well belong with species in another section with which I am unfamiliar.



Figure 56.—A, Plants of *V. superba* are locally abundant near Abercorn, Zambia. B, The clear, bright blue of heads in flower is very noticeable, but the flower color photographs pale mauve on color film. (Smith & Richards 4666).



FN-2077

Figure 57.—A, Mature heads of *V. afromontana*. (Smith & Njeroge 4640.) B, Open-grown plants in Kericho, Kenya. (Smith & Mygogo 4570.) C, Flowering plants of *V. afromontana*, well hidden among surrounding vegetation, near Meru, Kenya. (Smith & Mygogo 4585.) D, Flowers of *V. afromontana*. (Smith and Mygogo 4570.)

In addition, I have many names for species described as belonging to section *Stengelia* for which I have seen no authentic specimens. The descriptions, in spite of the thoroughness of some of those by German authors, are inadequate to place the names in synonymy or in the ranks of recognized

species. The following species were placed in section *Stengelia* by the authors or the descriptions or discussions lead me to believe that they may belong to the section.

*V. anandrioides* S. Moore. I have a specimen of Gossweiler No. 2132, the type collection, but it is a depauperate plant, and I cannot confidently place it with any of the species previously discussed.

<i>V. albo-violacea</i>	<i>V. descampsii</i> De Wild.	<i>V. ledermannii</i> Mattf.	<i>V. pygmaea</i> O. Hoffm.
Muschler	<i>V. drymaria</i> Klatt	* <i>V. luembensis</i> De Wild.	<i>V. quangensis</i> O. Hoffm.
<i>V. argutidens</i> Chiov.	<i>V. goetzei</i> Muschler	& Muschler	<i>V. retusa</i> R. E. Fries
<i>V. bequaertii</i> De Wild.	<i>V. graciliflora</i> De Wild.	<i>V. manikensis</i> De Wild.	<i>V. roseo-violacea</i> De Wild.
<i>V. bojeri</i> Less.	<i>V. hierniana</i> S. Moore	<i>V. napus</i> O. Hoffm.	<i>V. rufuensis</i> Muschler
<i>V. brideliifolia</i> O. Hoffm.	<i>V. hockii</i> De Wild. &	<i>V. neumanniana</i>	<i>V. ruwenzoriensis</i> var.
<i>V. britteniana</i> Hiern	Muschler	O. Hoffm.	<i>glabra</i> S. Moore
<i>V. bukamensis</i> De Wild.	<i>V. kapiensis</i> De Wild.	<i>V. oehlerii</i> Muschler	<i>V. tolypophora</i> Mattf.
<i>V. calvoana</i> var	<i>V. kirungae</i> R. E. Fries	<i>V. otophora</i> Mattf.	<i>V. towaensis</i> De Wild.
<i>mesocephala</i> Adams	<i>V. lasiolepis</i> O. Hoffm.	<i>V. paludigena</i> S. Moore	<i>V. ulugurensis</i> O. Hoffm.
		<i>V. printzioides</i> Muschler	<i>V. verrucata</i> Klatt
		<i>V. punctulata</i> De Wild.	<i>V. yatesii</i> S. Moore

\*See note under *V. sciaphila*, p. 59.

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## Appendix

List of vernacular names for stengelioid *Vernonia* species

<i>Vernacular Name</i>	<i>Tribe or language</i>	<i>Country and locality</i>	<i>Reported by</i>
<i>Vernonia adoensis</i>			
Akavumavuma	Kinyaruanda	Ruanda-Urundi	G. Troupin 4915
Akco	Hlur	Congo, Nioka	-----
Dju-dju	Bilendu	Congo, Nioka	-----
Ilumba Iya shimba	Kisukuma	Tanzania	R. Tanner 1217
Liuluya	Mwera	Tanzania	Semsei 2148
Msohoso	Bende	Tanzania	Semsei 2570
Tsoyo	Chewa	Zambia	F. White 2446
Ukafuma	Kirundi	Congo	Michel & Reed 315
Umuvumo	Kinyaruanda	Ruanda-Urundi	G. Troupin 4915
<i>V. afromontana</i>			
Machegene	Kikuyu	Kenya, Meru	C. E. Smith 4585
Morerangamba	Kikuyu	Kenya, Mt. Kenya	C. E. Smith 4644
<i>V. bracteosa</i>			
Mtokutu	Kihehe	Tanzania, Iringa	Carmichael 393
<i>V. filipendula</i>			
Kasingele	-----	Angola, Libolo	M. Dawe 317
<i>V. guineensis</i>			
Akaniamymya	Kirundi	Congo, Ruyigi	-----
Akanianina	Kirundi	Ruanda-Urundi	Evrard 1769
Funyembe	Ma. (?)	Sierra Leone	-----
Kanyamina	Kirundi	Ruanda-Urundi	Michel & Reed 692
Koberafaira	-----	Sierra Leone	G. F. S. Elliot 4842
Kumbiarona	T. (?)	Sierra Leone	N. W. Thomas 760
Lwishote	Mashi	Congo, Kivu	J. Petit 70
Mombakalu	Azomde	Congo, Bas Ebele	A. Dewulf 184
Nambakalu	Zande	Congo, Tukpwo	Lecompte 26
Nwagoe	Lo. (?)	Sierra Leone	-----
Teti	-----	Congo, Haut Uele	Nannan 521
<i>V. hymenolepis</i>			
Fulucha	-----	Central Africa	Johnson s. n.
Ivumo	Kinyaruanda	Ruanda-Urundi	G. Troupin II 126
Uvumovumo	Kinyaruanda	Ruanda-Urundi	G. Troupin II 126
<i>V. lasiopus</i>			
Gihihahika	Kihunde	Congo, Rutshuru	Spitaels 129
Imbassa	Kichagga	Tanzania, Moshi	G. B. Wallace 948
Ivumavuma	-----	Congo, Tshumba	Tramasure 620
Ivumera	Kinyaruanda	Congo, Rutshuru	Spitaels 129
Ivumo	-----	Congo, Kitana	de Wulf 82
Ivumu	Tshiragaga	Congo ?, Mulungu	Hendryx 33
Kilugutu	-----	Tanzania, Morogoro	E. R. Bruce 43
Mbaaza	Kichag. ?	Tanzania, Kilimanjaro	P. J. Greenway 3019



<i>Vernacular Name</i>	<i>Tribe or language</i>	<i>Country and locality</i>	<i>Reported by</i>
<i>V. lasiopus</i> —Continued			
Mbasa	-----	Tanzania, Tengeru	Carmichael 511
Mbasa	Kimeru	Tanzania, Arusha	R. L. Williams 53
Mbasa	Chaga	Tanzania, Kilimanjaro	P. J. Greenway 3019
Mnyatira	Sukuna	Tanzania, Bomboju	Bally 200
Mshasha	Shambea	Tanzania, Bomboju	Bally 200
Mucatha	Kikuyu	Kenya, Nairobi	E. R. Napier 295
Muchatha	Kikuyu	Kenya, Nairobi	C. W. Leahey 470
Muhasha	Kish	Tanzania, Usambaras	Koritschoner 743
Mululusa	Kihehe	Tanzania, Mufindi	C. G. McGregor 62
Musambanyumu	Kinande	Congo, Beni	Gille 110
Muvatha	Kamba	Kenya, Katumani	Thomas 723
Muvuma	-----	Ruanda-Urundi	O. Elskens 92
Mwitanyonyi	Haya	Tanzania, Arusha	Bintabara 3
Npalagasha	Kisambaa	Tanzania, Lushoto	Mahwilo 9
Omujuma	-----	Uganda, Kashwekana	A. S. Thomas 4204
Pasapasa	Kisafwa	Tanzania, Mbeya	G. Myembe 39
Rinkalikali	Arusha	Tanzania, Arusha	L. Matalu 3139
Sondja sondja	-----	Mozambique, Malulo	P. Pedrogat 4056
Umukurasi	Kitundi	Ruanda-Urundi	-----
Umundu	Limatinzo ?	Tanzania, Arusha	Carmichael 607
Umuturumbuka	Kishubi	Tanzania, Nyakisasa	R. Tanner 5749
Umuvumavuma	-----	Ruanda-Urundi	A. Becquet 379
<i>V. nigriflora</i>			
Kundidi tuna	Yalunka	Sierra Leone	F. C. Deighton 4470
Nonomorandakofin	Mandingo	Sierra Leone	F. C. Deighton 4470
<i>V. oxyura</i>			
Fusa	Chinyanja	Malawi, Likubula Gorge	Brass
Futsa	Nyanja	Mozambique, Massaneulo	Sousa 1397
Mdulua	-----	Tanzania, Makuyuni	Koritschoner 1286
Msangusangu	Kigao	Tanzania, Tunduru	Barter H131/55
Msangusangu	Ayaua	Mozambique, Massaneulo	Sousa 1397
Mteli	Nguru	Tanzania, Mandeni	S. R. Semsei 570
Mtugutu	Nguru	Tanzania, Mtibwa	Semsei 5907
Mululusia	Kibembo	Congo, Shiebale	W. Robyns 2063
Ugua Msugumbili	-----	Tanzania, Pangani	R. Tanner 3190
<i>V. pumila</i>			
Muhindabijumiro	Lunyoro	Uganda, Bunyoro	-----