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## Some new species, varieties and forms of *Monadenium* (Euphorbiaceae)

by

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During 28 years of botanical studies in Tropical East Africa I had the opportunity to make a thorough study of the genus *Monadenium*. I was able to compile sufficient material and information on which to base a revision of this little-known but interesting genus.

An exhaustive and fully illustrated monograph has been ready for the press for some time, but owing to difficulties in finding the necessary funds to cover the cost of the colour plates, without which this work would lose much of its value, publication is held up for the time being.

Several of the new species which are described and illustrated in the monograph have already found their way into Botanical Gardens and private collections in Europe and in America; it seems expedient therefore to publish the descriptions of all new taxa without further delay.

### ***Monadenium arborescens* Bally, spec. nov.**

Affinis *Monadenio coccineo* Pax sed proceritate majore, caule semper solitario, ramis leviter torquatis, foliis et cymis haud aculeatis differt.

Planta arborescens, succulenta, sublignosa, ad 3.80 m. alta, sparse ramosa. *Caulis* solitarius, ad 10 cm. crassus, 5-angularis, leviter torquatus. Rami ascendentes, solitarii aut bini, 30-60 cm. distantes, 40-100 cm. longi, 3.5-4 cm. crassi, haud furcati, 5-angulati, glabri, viride glaucescentes. Cicatrices foliorum 4-7 cm. distantes, transverse reniformes, 10 mm. latae, 5 mm. altae, sub cicatrice tuberculum exiguum spinam brevem ad 2 mm. longam gerens. *Folia* in apice ramorum ex angulis orta, carnosa, obovata, acuta, cordata, 7-9 cm. longa, 5.6-11 mm. lata, margine integra, in basi raris aculeis obsita. Cicatrix cymae rotunda, 7 mm. diam., e latere dextro spinam minutam, solitariam, ad 1.5 mm. longam producens. *Cymae* plures, axillares, in apice ramorum aggregatae, ad 12 cm. altae, 8 cm. diam., ad 7-furcatae. Pedunculus teres, leviter compressus, ad 63 mm. longus, 5-6 mm. crassus, rubicundus. *Cymae* rami gradatim breviores. Prophyllum cyathii glabrum, oblongo-

ovatum, 6 mm. longum, 5 mm. latum, usque ad dimidium bilobatum, apicibus binis rotundatis, leviter bicarinatum, latere anteriore apertum, viride, dorso rubescens. *Cyathium* prophyllum aequans, doliiforme, 6-5 mm. longum, 4 mm. latum, in apice constrictum, margine tenue haud incrassatum, lobos subquadratos, fimbriatos superans. *Capsula* exserta, subglobosa, obtuse 3-lobata, carnosae, 6.5 mm. longa, 7 mm. diam., convolute rugulosa, rubicunda. Semen obtuse 4-angulatum, subtus et infra truncatum, 2.6 mm. longum, 1.6 mm. diam., acute rugosum, atropadix, rugae pallide spadices, carunculus breviter pedicellatus, 0.6 mm. diam.

TROPICAL EAST AFRICA: Tanganyika, Eastern Prov., Kilosa Distr., Malolo, Eastern slopes of the Ruaha Gorge, 7°20'S, 36°04'E., Sept. 11, 1943, *Victor Harris* (*Bally E 236*) E. A. <sup>1</sup>=type, K.

***Monadenium capitatum*** Bally, spec. nov.

Affinis *Monadenio crispo* N.E.Br., sed caule dense papilloso, cymis subsessilibus, in apice caulis dense congregatis distinguitur.

Herba erecta, tenuis, paulum carnosae. *Caulis* solitarius, cylindricus, haud ramosus, ad 60 cm. altus, dense papillosus. *Folia* alterna, spiraliter disposita, 12-16 mm. distantia, oblanceolata, mucronata, breviter pedunculata, ad 6.6 cm. longa, 1.7 cm. lata, glabra. Costa media infra conspicua, nervis lateralibus ascendentibus minus conspicuis. Margo parte superiore integra, parte inferiore sparse dentata. *Dichasia* involucrum unum primarium, duo secundaria producentia. Pedunculi axillares, solitarii, glabri, in apice caulis dense congregati. Bractee cyathii usque ad basim divisae, obovatae, dorsaliter costatae, mucronatae, 4.5 mm. longae, 2.35 mm. latae. *Involucrum* cupuliforme, apice truncato, latere anteriore apertum, margine integro, paulum incrassatum, lobos subquadratos fimbriatos multum superans, 4 mm. longum, 2 mm. latum. *Capsula* pedicellata, exserta, trilobata, glabra, angulis haud alatis, 2.75 mm. longa, 2.5 mm. lata. Styli divisi, 0.75 mm. longi, in apice bilobati, spissati.

TROPICAL EAST AFRICA: Tanganyika, Southern Highland Prov., S.-end of Poroto Mountains, n'r Mt. Rungwe, 14 miles N. of Tukuyu, 9°05'S., 33°27'E. 2000-2200 m. alt., March 6, 1932, *St. Clair-Thompson*, 654 (type, K.).

***Monadenium discoideum*** Bally, spec. nov.

Affinis *Monadenio hirsuto* Bally sed cymis minus furcatis, pedunculis reflexis multo brevioribus, prophyllis rotundioribus dense setuligeris, apice haud incrassatis differt.

Herba carnosae, radice tuberosae. *Caulis* erectus, ad 15 cm. altus cylindricus, setuliger, haud ramosus. *Folia* alterna, ad basim caulis squamosae, sessilia, adpressa, apicem versus caulis breviter petiolata, basi cuneata, apice obtuso vel acuto, ad 42 mm. longa, 14 mm. lata, margine integra, parum undulata. *Cymae* axillares, in caule laxae dispositae, semel furcatae. Pedunculus reflexus, ad 6 mm. longus, 6 mm. crassus, setuligerus; cymae ramis tenuiores, breviores. Prophyllum cyathii nutans, obovato-rotundatum, extra setuligerum, 9-11 mm. longum, 11-18 mm. latum,

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<sup>1</sup> E.A.=East African Herbarium, Nairobi; all specimens cited under this heading are the property of the Museums Trustees of Kenya.

bicarinatum, haud aut obscure sinuatum, involucrium multum superans. *Involucrium* doliiforme, 4-4.5 mm. longum, 3.5-4 mm. diam., apice truncato, paulum incrassatum, crenulatum, latere anteriore usque ad  $\frac{2}{3}$  apertum, parte inferiore sparse setuligerum, parte superiore glabrum, lobos interiores subquadratos, acute dentatos, glabros, superans. Styli divisi, 0.75 mm. longi, setuligeri, apice bilobato, reflexo, haud incrassato.

*Capsula* et *semen* ignotum.

TROPICAL EAST AFRICA: Northern Rhodesia, Mufulira, 12°30'S., 28°10'E. 1300 m. alt., Dec. 12, 1948, *A.W. Cruse 435* (type, K.).

**Monadenium gracile** Bally, spec. nov.

Affinis *Monadenio herbaceo* Pax, sed planta pumila, sparse ramosa, foliis linearibus, bracteis anguste lanceolatis distinguitur.

Herba exilis, sparse ramosa. Radix tuberosa. *Caulis* cylindricus, glaber, erectus, ad 5 cm. altus. *Folia* alterna, linearia, falcata, plicata, in apice caulis amplius congregata, 3-14 mm. longa, 2-3 mm. lata. *Dichasium* solitarium, axillare, pedunculo tenui ad 15 mm. longo. Cyathii bractee divisae, lanceolatae, carnosae, in margine undulatae, membranaceae, albae, in apice reflexae, 6.5 mm. longae, 3 mm. latae, involucrium multum superantes. *Involucrium* cupuliforme, truncatum, latere superiore vix usque medium apertum, margine paulum incrassato, album, 4 mm. longum, 3 mm. diam. Lobi interiores subquadrati, in margine serrati 1 mm. alti, margini involucri inferiores. Bracteolae membranaceae, glabrae, margine fimbriato. *Capsula* longe pedicellata, exserta, reflexa, ovoidea, margine superiore crenata, obscure trilobata, angulis angustissime bialatis. Styli divisi, in apice bilobati, 0.5-0.75 mm. longi.

TROPICAL EAST AFRICA: Tanganyika, Central Prov., Manyoni Distr., Kazikazi, 5°34'S., 34°12'E., 1300 m. alt., Dec. 1, 1931, *B.D. Burt 3529* (type K.).

**Monadenium hirsutum** Bally, spec. nov.

Affinis *Monadenio fwambensi* N.E.Br. sed ramis, foliis, pedunculis setuligeris, cyathii prophylo majore, rotundiore, lobis valde brevioribus differt.

Herba succulenta, erecta. Radix tuberosa. *Caules* solitarii vel pauci, 5-15 cm. alti, cylindrici, haud ramosi, sparse setuligeri; setae reflexae, pellucidae. *Folia* alterna, 0.5-2.3 cm. distantia, lanceolata vel anguste elliptica, apice acuto, basi angustata, subpetiolata, ad 6 cm. longa, 1.5 cm. lata, margine integra, crispata, setis reflexis dense fimbriata, paginae supra et infra setuligerae, costae setas plures gerentes. *Cymae* solitariae, axillares, ad apicem aggregatae, 4-5-furcatae, ad 8 cm. longae, 8 cm. diam. Pedunculus cylindricus, carnosus, 1.5-3 cm. longus, dense setuligerus, cymae rami valde breviores, setuligeres. Prophyllum cyathii involucrium multum excedens, glabrum, membranaceum, acute bicarinatum, in apice bilobatum, breviter sinuatum, 8.5 mm. longum, 10 mm. latum, album, in basi erubescens. Carinae aliquando setas paucas gerentes. *Involucrium* 4 mm. longum, 4 mm. latum, cupuliforme, apice truncato, latere anteriore  $\frac{2}{3}$  apertum, margine incrassatum, integrum, lobos subquadratos, fimbriatos vix superans, albiviride. *Capsula* exserta, reflexa, glabra, 4.3 mm. longa, 4.3 mm. lata, obtuse trilobata, angulis vix carinatis. Styli 2 mm. longi, usque ad dimidium connati, in apice bilobati, incrassati. *Semen*

oblongum, obtuse tetragonum, 3.8 mm. longum, 3 mm. diametro, in basi et apice truncatum, rugulosum, spadix. Carunculus breviter pedicellatus, 0.75 mm. diam.

TROPICAL EAST AFRICA: Northern Rhodesia, 180 miles E. of Lusaka, at Kundabuika (Kundamika) Falls, 15°30'S., 30°03'E. at 1300 m. alt., May 1931, *E.G. Walter 1* (type, K.).

**Monadenium intermedium** Bally, spec. nov.

Affinis *Monadenio crispo* N.E.Br., sed margine cyathii juvenilis haud aperto, foliis late ellipticis distinguitur.

Herba erecta carnosae. Radix tuberosa. *Caulis* ad 35 cm. altus, cylindricus, glaber. *Folia* alterna, ad 8.5 cm. longa, 3.5 cm. lata, elliptica, carnosae, in margine serrulata, in apice acuta, in basi angustata, costa media infra conspicua. *Dichasia* solitaria, axillaria, semel aut bis furcata; pedunculus cylindricus, 2-4 mm. longus, cymae rami 1.5-3 mm. longi. Cyathii bracteae divisae, obliquae, ovatae, acutae, dorsaliter carinatae, 5.5 mm. longae, 4.5 mm. latae, involucrium apice excedentes, virides. *Involucrum* 5 mm. longum, cupuliforme, glabrum, in margine clausum, labro integro, lobos interiores subquadratos, fimbriatos superans. *Capsula* exserta, reflexa, glabra, obscure 3-angulata, 4 mm. longa, 3 mm. lata, angulis bicarinatis. *Styli* 0.3 mm. longi, in basi connati, in apice spissati. *Semina* haud visa.

TROPICAL EAST AFRICA: Tanganyika, Tanga Prov., Eastern Usambaras, Tongwe-Mlinga, 5°7'S., 38°37'E., 660 m. alt., Oct. 7, 1936, *P.J. Greenway 4666* (type, K.).

**Monadenium montanum** Bally, spec. nov., var. **montanum**.

A *Monadenio invenusto* N.E.Br. caulibus pluribus brevioribus, foliis minoribus, involucri solitariis, seminibus minus rugosis differt.

Herba succulenta, radice tuberosa. Caules solitarii aut pauci, plus minusve erecti, ad 10 cm. longi, 4-5 mm. crassi, cylindrici. *Folia* alterna, adscendentia, sessilia, elliptica, 24-44 mm. longa, 6-25 mm. lata, apice acuto, mucronata, basi cuneato, carnosissima, scabrida. *Dichasia* axillaria, solitaria, involucrium unicum producentia. Pedunculus carnosus, ad 20 mm. longus. Prophyllum cyathii 5 mm. longum, bicarinatum, carinis binis divergentibus, usque ad medium dorsaliter sinuatum. *Involucrum* prophyllis longius, doliiforme, apice angustiore, 3.5 mm. diam., margine carnosum integrum. *Capsula* exserta, pedicellata, trilobata, angulis obtusis, haud carinatis, 5 mm. longa, 4.2 mm. lata. *Styli* e basi divisi, 1 mm. longi, in apice bilobati, incrassati. *Semina* obscure tetragona, truncata, in superficie undulata, pallide fusca, carunculata.

TROPICAL EAST AFRICA: Tanganyika, Northern Prov., Masai Distr., western slope of Mt. Longido, 2°40'S., 36°42'E., 1000 m. alt., Apr. 8, 1939, *Bally E 62*, (type E.A.; K.).

Var. **rubellum** Bally, var. nov.

A typo foliis glabris angustioribus, prophyllis cyathii longioribus, involucrium superantibus, pallide roseis differt.

TROPICAL EAST AFRICA: Kenya, Southern Prov. Machakos Distr. Mbwinzau Hill, summit, 2°20'S., 37°55' E, 1520 m alt., *P.E. Glover*, Jan. 20, 1954, (Bally E 390) (type, E.A.; K.).

**Monadenium nervosum** Bally, spec. nov.

Affinis *Monadenio letestuano* Denis, sed paginis inferioribus foliorum prominenter nervosis, seminibus ovoideis, haud angulatis, profunde rugosis differt.

Planta pumila. Radix tuberosa, perennis. *Caulis* solitarius, erectus, cylindricus, haud ramosus, ad 2.5 cm. altus. *Folia* 4-5, in apice caulis dense congregata, divaricata, oblanceolata vel obovata, basi cuneata, apice obtuso, ad 9 cm. longa, 3 cm. lata, pagina superiore aliquando irregulariter rubromaculata, pagina inferiore viridia, costa media et nervis acute prominentibus. *Cymae* solitariae, axillares, involucrum unicum producentes. Pedunculus adscendens, cylindricus, puberulus, ad 38 mm. longus. Cyathii bractae binae, squamosae, carinatae, carnosae, 1.5 mm. longae, 2-2.5 mm. latae, margine superiore obtuso, paucidentato vel apiculato. *Involucrum* lageniforme, 4 mm. longum, 3 mm. diam., parte superiore puniceum, apice truncato, leviter incrassatum, undulatum, latere anteriore usque ad  $\frac{2}{3}$  apertum, bracteas et lobos subquadratos, fimbriatos superans. *Capsula* exserta, obtuse trilobata, glabra, angulis obscure carinatis, 3.5-5 mm. longa, 3-4 mm. diam., styli usque ad dimidium divisi, 1 mm. longi, in apice bilobati, incrassati. Semen ellipsoideum, 2.25 mm. longum, 1.75 mm. diam., in superficie profunde rugosa, atropadix.

TROPICAL EAST AFRICA: Northern Rhodesia, Northern Prov., Lungu Reserve, Mupulungu, 8°47'S, 31°8'E., 760 m. alt., Dec. 16, 1954, *Mrs. H.M. Richards* 3656 (type, K.).

**Monadenium nudicaule** Bally, spec. nov.

Affinis *Monadenio coccineo* Pax sed caulibus brevioribus, teretibus, cymis minus furcatis, carinis capsulae divaricatis, acute dentatis differt.

Planta erecta, glabra, carnosae, radice tuberosa. *Caules* 1.5-5 cm. alti, carnosae, glabri, teretes, sparse ramosi. *Folia*<sup>1</sup> alterna. 12-30 mm. distantia, sessilia, deltoidea, 4 mm. longa, 3 mm. lata, mox decidua. *Cymae* axillares, terminales, 1-3-furcatae, 3-7 involucra gerentes. Pedunculi 25-45 mm. longi, 2.5-3 mm. crassi, ascendentes, bicarinati, virides, in apice purpurascens; rami cymae 2.5-5 mm. longi, bicarinati. Cyathii prophyllum glabrum, 6 mm. longum, 7 mm. latum, bicarinatum, acute bilobatum, usque ad dimidium sinuatum, latere anteriore apertum, alboride, rubromaculatum. *Cyathium* in sinu et latere anteriore prophyllum superans, dolii-forme, latere anteriore usque ad dimidium apertum, 6 mm. longum, 3 mm. diam., apice truncato, leviter constricto, margine incrassato, pallide spadix, lobos subquadratos, breviter dentatos superans. *Capsula* exserta, reflexa, 6 mm. longa, 6 mm. diam., trilobata, glabra, viridis, maculis purpureis irregulariter suffusa; anguli carinis binis divaricatis, dentatis obsiti. *Semen* oblongum, obtuse 4-angulatum, 2 mm. longum, 1 mm. diam., supra et infra truncatum, rugosum, fuscum; carunculus breviter pedicellatus, 0.5 mm. diam.

<sup>1</sup> The few rudimentary, scale-like leaves of this species during its flowering stage strongly suggest—in analogy with the habit of *M. friesii* N.E. Br. and *M. orobanchooides* Bally—that a sterile growth bearing well developed leaves is produced at another stage of its development.



EAST TROPICAL AFRICA: Southern Highlands Prov., Chunya Distr. at Uleia 8°05'S., 32°40'S., 1300 m. alt., Sept. 2, 1942, *Bally E 135* (type E.A.; K.).

**Monadenium orobanchoides** Bally, spec. nov.

Affinis *Monadenio chevalieri* N.E.Br. sed caulibus et pedunculis dense puberulis, cymis in apice congestis differt.

Herba pumila. Radix tuberosa, perennis. *Caules* 1-2, haud ramosi, carnosii, canaliculati, puberuli, ad 5 cm. longi. *Folia* primaria 4-5, in basim rosulata, glabra, herbacea aut leviter carnosae, obovata, in apice obtusa, in basi cuneata, in margine integra, 3.5-6 cm. longa, 1.5-2.5 cm. lata, mox decidua. Folia secundaria, in caulibus florescentibus producta, squamosa, in apice acuta vel rotundata, 4-5.5 mm. longa, 3-5 mm. lata, in basi et apice caulibus dense congregata, in caule 2-13 mm. distantia. *Dichasia* axillaria, in apice valde congregata, cyathium unicum gerentia, breviter pedunculata; pedunculus carnosus, 1-1.5 mm. longus. Cyathii bracteae obovatae, acutae, dorsaliter costatae, 3.5-4 mm. longae, 3 mm. latae, carnosae, margine membranaceo, paucidentato, involucrium haud superantes. *Involucrium* doliiforme, apice truncatum, latere anteriore vix usque ad medium apertum, margine paulo incrassatum, crenatum, 3.5 mm. longum, 2.5-3 mm. diam., lobos interiores, subquadratos, fimbriatos, 0.5 mm. longos superans. Bracteolae paulum fimbriatae, ad 1.5 mm. longae. *Capsula* exserta, reflexa, subglobosa, obtuse trilobata 2.25 mm. lata, angulis angustissime alatis. Styli divisi, spissati, 0.75 mm. longi, in apice bilobati.

TANGANYIKA: Southern Highlands Prov., Iringa Dist., Dabaga, 8°12'S., 36°00'E. 2000 m. alt., Sept. 6, 1932, *Geilinger 1861* type, K.).

**Monadenium petiolatum** Bally, spec. nov.

Affinis *Monadenio crispo* N.E.Br. sed foliis late obovatis, petiolatis differt.

Herba erecta, aliquantum carnosae, glabra. Radix verisimiliter carnosae. *Caulis* erectus, unicus, 17 cm. altus. *Folia* spiraliter disposita, obovata, petiolata, 6-7.5 cm. lata, petiolis 15 cm. longis. Costa media infra conspicua. *Folia* utroque basis latere stipulis spinescentibus minimis praedita. *Dichasia* solitaria, axillaria, in apice aliquantum congregata, semel furcata. Pedunculi cylindrici, carnosii, 3-4 mm. longi, minutissime puberuli. Cyathii bracteae divisae, obliquae, ovatae, mucronatae, 3.5 mm. longae, 3 mm. latae, dorsaliter costatae, involucrium haud superantes. *Involucrium* cupuliforme, truncatum, latere anteriore apertum, in margine irregulariter crenatum, 3.25 mm. altum, 2.25 mm. diam., lobos interiores subquadratos, fimbriatos superans. Bracteolae membranaceae, fimbriatae, glabrae. *Capsula* pedicellata, reflexa. *Semen* oblongum, tetragonum, truncatum, tenuiter rugosum, pallide fuscum, carunculatatum, 2.5 mm. longum, 0.8 mm. diam.

TROPICAL EAST AFRICA: Tanganyika, Central Prov., Manyoni Distr., at Kazikazi, 5°34'S., 34°12'E., 1300 m. alt., May 14, 1932, *B.D. Burt 3710* (type K.).

**Monadenium pseudoracemosum** Bally, spec. nov., var. **pseudoracemosum**.

Affinis *Monadenio fwambensi* N.E.Br. sed foliis in basim rosulatis, caule cymas gerente elongato, foliis quasi squamosis obsito, lobis prophylli brevioribus differt.

Herba pumila, radice tuberosa. *Caulis* solitarius, cylindricus, glaber, 2-4 cm.

altus. *Folia* 3-4, ad basim caulis congregata, leviter carnosa, glabra, obovata, subpetiolata, 4-6 cm. longa, 2-2.8 cm. lata, in basi cuneata, in apice obtusa, in margine crispata, in pagina superiore viridis, pallide nervosa, pagina inferiore uniformiter viridi, costa media subtus prominenti. Folia in parte superiore caulis elongato 4-12 mm. distantia, oblanceolata, sessilia, in apice acuta, 6-20 mm. longa, 2-6 mm. lata, quasi squamosa, margine integra. *Cymae* solitariae, ad axillam foliorum superiorum productae, involucrum unicum gerentes. Pedunculus ad 2 mm. longus, 1.5-2 mm. crassus, ascendens, dorsaliter bicarinatus. Prophyllum cyathii nutans, ad 8.5 mm. longum, ad 9 mm. latum, bicarinatum, usque ad dimidium sinuatum, parte anteriore apertum, involucrum lobis binis superans. *Involucrum* cupuliforme, 5 mm. longum, 4 mm. diam., apice truncato, margine integro, leviter incrassatum, latere anteriore usque ad dimidium apertum, parte superiore puniceum, lobos interiores, subquadratos, fimbriatos superans. *Capsula* exserta, reflexa, subglobosa, 5 mm. longa, 4 mm. diam., obtuse triangulata, glabra. Styli 1.5 mm. longi, usque ad dimidium divisi, bilobati, in apice incrassati. *Semen* ignotum.

TROPICAL EAST AFRICA: Tanganyika: Southern Highlands Prov., Ufipa Distr., Kipili, 7°25'S., 30°35'E., 1130 m. alt., Feb. 1, 1950, *A.A. Bullock* 2374 (type, K.).

**Var. lorifolium** Bally.

A typo foliis angustioribus, longioribus, oblanceolatis, acutis differt. Semen globosum, 2.25 mm. longum, 2.25 mm. diam., verrucosum; carunculus subsessilis.

TROPICAL EAST AFRICA: Northern Rhodesia, Abercorn District, Nmbulu Island, 8°47'S., 31°5'E., 800 m. alt., Apr. 11, 1955, *Mrs. H.M. Richards* 5399 (type, K.).

**Monadenium pudibundum** Bally, spec. nov.

Ut videtur ex affinitate *Monadenii simplicis* Pax, non satis noti.

Planta pusilla. Radix tuberosa, perennis. *Caulis* reductus ad 2-10 mm. longus, 3-4 mm. crassus, cylindricus, squamosus, e collo erectus, subterraneus. *Folia* 4-7, rosulata, prostrata, ante anthesin producta, leviter carnosa, spathulata, 3.2 mm. longa, 1.5 mm. lata, in basi cuneata, in apice emarginata, apiculata, in margine crispata, fimbriata, caduca. Foliis demissis cymae 1-5 ad axillam squamarum subterraneorum productae. Pedunculus 1-2.5 cm. longus, teres, subterraneus, involucrum bracteatum, solitarium gerens. Prophyllum cyathii obliquum, infundibuliforme, latere anteriore apertum, breviter sinuatum, bicarinatum, 8 mm. longum, 4 mm. diam., carnosum, minutissime puberulum, viridoflavum aut album. *Cyathium* dolii-forme, 5 mm. longum, 4 mm. diam., latere anteriore usque ad dimidium apertum, apice truncato, margine fimbriato-crenato, lobos subquadratos, fimbriatos superans. Perianthium trilobatum, lobis 2-3-dentatis. Ovarium exsertum, reflexum, acute triangulatum, in angulis alis crenulatis obsitum. Styli 1 mm. longi, usque ad dimidium divisi, in apice bilobati, incrassati. *Capsula* et *semen* ignotum.

TROPICAL EAST AFRICA: Northern Rhodesia, Mwinilunga Distr., Matonchi Farm, 11°40'S., 24°2'E., Feb. 1938, *E. Milne-Redhead* 3011 (type, K.).



**Monadenium rhizophorum** Bally, spec. nov.

Affinis *Monadenio stapelioidei* Pax sed caulibus tenuioribus teretibus phyllopodiiis haud tuberculatis, haud tessellatis, cymis raro furcatis, radice rhizomatoidea differt.

Planta succulenta, glabra. Radix tenuiter tuberosa, rhizomatoidea. *Caules* erecti, cylindrici, haud ramosi, 4-10 cm. alti, 5-7 mm. crassi, ad apicem rhizomatis producti, 6-12 cm. distantes. Phyllopodia minime elevata in basi caulis haud tessellata. *Folia* ad apicem producta, carnosae, sessilia, 10-36 m. longa, 6-22 mm. lata, obovata, mucronata, viridia, rubromaculata, basi cuneata, margine crispato. Stipulae duae, aculeatae, minutissimae, deciduae. *Cyma* axillaris, involucrem unicum, raro tria ferens. Pedunculus carnosus 5-15 mm. longus, alboviridis, longitudinaliter atroviride striatus et rubromaculatus. Prophyllum cyathii obliquum, latere anteriore usque ad basim apertum, carnosum, bicarinatum, 7 mm. longum, 5 mm. diam., apice angustato, acute bilobatum, alboviride, lineis atroviridibus et maculis rubris obsitum. *Cyathium* cupuliforme, carnosum, flavoviride, 5.2 mm. longum, 5 mm. diam., latere anteriore usque ad  $\frac{2}{3}$  apertum, margine integro, flavum, incrassatum, lobos subquadratos fimbriatos, alborubrescentes multo superans. *Capsula* exserta, reflexa, obtuse trilobata, 5 mm. diam., viridis, rubromaculata, in basi et apice conglobata, angulis bicarinatis. Styli 2 mm. longi,  $\frac{3}{4}$  divisi, in apice breviter bilobati, incrassati. Stigma obtusum, rugosum. *Semen* haud visum.

TROPICAL EAST AFRICA: Kenya, Southern Prov., Machakos Dist., at Athi River. 1°27'S., 37°00'E., March 26, 1940, C.G. MacArthur, (Bally E 117) (E.A. = type, K.).

**Monadonium ritchiei** Bally, spec. nov.

Affinis *Monadenio guentheri* Pax sed spinis tenuioribus, foliis rotundioribus puberulis, cymis saepe asymmetris differt.

Planta succulenta. Radix raphaniformis. *Caules* laxè ramosi, ad 40 cm. longi, cylindrici, carnosi, 1.5-2.5 cm. crassi, tuberculati, phyllopodiiis at 7 mm. elevatis, in basi rhombiformibus, ad 2 cm. longis, 2 cm. latis. Cicatrix folii rotunda, spinosa, in apice tuberculi. Spinae 3-5, divergentes, tenuissimae, 1-2 mm. longae. Cicatrix cymae 4-6 mm. super cicatricem folii, elliptica, 1 mm. lata. *Folia* carnosae, puberula, ovata vel subrotunda, sessilia, ad 27 mm. longa, 20 mm. lata, in margine serrulata, apiculata. Pagina superior fuscoviridis, pagina inferior pallide viridis, costa subtus paulo prominente, haud carinata. *Cymae* solitariae, laxè in apicem productae, duo, raro tria cyathia gerentes. Pedunculus 3-5 mm. longus, carnosus, viridis; rami cymae ad 5 mm. longi. Prophyllum cyathii obliquum, 6-8 mm. longum, bicarinatum, in apice bifidum, dorsaliter breviter incisum, infra apertum, involucrem superans. *Involucrem* carnosum, 6 mm. longum, 5 mm. latum, cupuliforme, truncatum, latere anteriore usque ad  $\frac{1}{2}$  apertum, lobos interiores, subquadratos, fimbriatos superans, in margine integrum, paulo incrassatum, valide rubrum. Pedicellus capsulae reflexus, parte superiore valde incrassatus; lobi perianthii obtuse trilobati. Styli usque ad basim divisi, in apice bilobati, incrassati. *Semen* truncatum, obtuse 4-angulatum, rugosum, carunculatum, 3 mm. longum, 1.75 mm. latum.

TROPICAL EAST AFRICA: Kenya, Northern Frontier Province, Isiolo, 0°21'N., 37°45'E., 1300 m. alt., Sept. 1939, A.T.A. Ritchie (Bally E 81), (E.A. = type, K.).

**Monadenium stellatum** Bally, spec. nov.; *Euphorbia ellenbeckii* Chiov. (non Pax) in: Le Collez. bot. Stefanini e Paoli: 185. 1916; *Monadenium guentheri* Chiov. (non Pax), Flora Somala 1: 298. 1929.

Affinis *Monadenio reflexo* Chiov., sed habitu scandenti, tuberculis canaliculatis, fasciculis spinosis coronatis differt.

Planta suffruticosa, subscandens, succulenta, sparse ramosa, omni parte glabra, spinosa, ad 2.10 m. alta. *Caulis* cylindricus, glaber, canaliculatus, undique tuberculatus, ad 5 cm. crassus, ramis paucis 1-3 cm. crassis, ascendentibus, teretibus. Phyllopodia obscure rhomboidea, aut oblonge hexagona, canaliculata, in parte superiore tuberculum conicum, valde tenuum, 4-28 mm. longum gerentia. Cicatrix folii in apice tuberculi, ab utroque latere cicatricis duo fasciculos spinarum gerens. *Folia* carnosa, mox decidua, cuneata, acuminata, margine apicem versus undulata, ad 18 mm. longa, 10 mm. lata, subpetiolata, pallide viridia. *Cymae* solitariae, in apice productae, semel aut bis furcatae, 3-7 cyathia gerentes. Pedunculus 4-7 mm. longus, cylindricus, viridis; rami cymae 3-4 mm. longi. Prophyllum cyathii obliquum, bicarinatum, in apice bifidum, dorsaliter  $\frac{1}{3}$  incisum, infra apertum, involucri paulo superans. *Involucrium* breviter pedicellatum, carnosum, 2.5 mm. longum, 2.5 latum, cupuliforme, in apice obliquum, truncatum, infra apertum, in margine integrum, alborivide, lobos interiores, subquadratos, fimbriatos, 0.75 mm. longos superans. Bracteolae paucae, filiformes, infra minutissime setuligerae, apice clavatae. Ovarium exsertum, reflexum, ovoideum, glabrum, viride. Styli usque ad basim divisi, 1 mm. longi; stigma obtusum, rugosum. *Capsula* et *semen* ignotum.

TROPICAL EAST AFRICA: Somalia, Upper Scebeli, Gala Karor n'r Bulu Burti, 3°54'N., 45°36'E., 200 m. alt.; Oct. 8, 1953, *Bally B 9380* (E.A. = type, K.).

**Monadenium trinerve** Bally, spec. nov.

Affinis *Monadenio yattano* Bally sed caulibus tenuioribus, teretibus, haud tuberculatis, dichasiis bifurcatis, 7 involucria gerentibus differt.

Herba succulenta. Radix raphaniformis. *Caules* solitarii, erecti, ad 15 cm. alti, cylindrici, ad 7 mm. crassi, glabri, virides. *Folia* spiraliter disposita, carnosa, elliptica aut rhomboidea, in apice acuta, in basi cuneata, ad 5.5 cm. longa, 2.5 cm. lata, trinervia, in margine integra aliquando crispata. Stipulae minutissimae, rudimentariae. *Dichasia* axillaria, bifurcata, ad 7 involucria gerentia. Pedunculus carnosus, cylindricus, 12-18 mm. longus; cymae rami ad 8 mm. longi, pallide virides, longitudinaliter atroviride striati. Prophyllum cyathii subcarnosum, 7 mm. longum, 6 mm. diam., bicarinatum, in apice bifidum, sinuatum, albescens, purpureo-pictum. *Involucrium* doliiforme, 5 mm. altum, 4 mm. diam., carnosum, subtus usque ad  $\frac{1}{2}$  apertum, margine integrum, paulo incrassatum, flavum. Styli usque ad basim divisi, in apice bilobati, incrassati. *Capsula* et *semen* ignotum.

TROPICAL EAST AFRICA: Kenya, Southern Prov., Machakos Distr., Emali Station, 2°9'S., 37°28'E., March 1950, *C.G. Mac Arthur* (Bally, E 109) (E.A. = type).

**Monadenium yattanum** Bally, spec. nov., var. **yattanum**.

Affinis *Monadenio stapelioidei* N.E.Br., sed cymis laxius dispositis, semper viridibus, pedunculis longioribus, crassioribus, marginibus capsulae haud carinatis differt.

Planta succulenta, espinosa, glabra, perennis, caulibus numerosis, haud ramosis. Radix raphaniformis. *Caules* plus minusve 20 cm. longi, 10-14 mm. crassi, cylindrici, carnosi, virides, tessellati aut tuberculati, phyllopodiis leviter turgescens, infra elongatis, ad 27 mm. longis, 18 mm. latis, apicem ramorum versus 4,5 mm. longis et 6 mm. latis. Cicatrix folii reniformis, 1.5 mm. alta, 4 mm. lata, sub cicatrice cymae rotunda producta. *Folia* in apice ramorum laxe rosulata, valde carnosae, oblanceolata, supra concava, intense viridia, infra pallide viridia, haud carinata. Stipulae minutissimae, rudimentariae, lineares. *Cymae* axillares, circa. 31 mm. longae, 13 mm. latae, semel furcatae. Pedunculus ad 25 mm. longus, carnosus, cylindricus, viridis; rami cymae ad 5 mm. longi. Prophyllum cyathii obliquum, 6.5 mm. 8 mm. latum, in apice bifidum, obtuse bicarinatum, latere anteriore apertum, viride, longitudinaliter purpureostriatum. *Cyathium* prophyllum plus minusve aequans, 6-7 mm. longum, cupuliforme, latere anteriore usque ad dimidium apertum, lobos interiores subquadratos, fimbriato-denticulatos superans, sufflavum, margine integro, incrassatum. *Capsula* exserta, reflexa, 7 mm. longa, 6 mm. lata, trilobata, in angulis carinis binis obsita. Styli 2 mm. longi, triente inferiore connati, in apice bilobati; stigma obtusum, paulo incrassatum. *Semen* obtuse tetragonum, in basi et apice truncatum, rugulosum, fuscum, carunculatum, 3.5 mm. longum, 2 mm. diam.

TROPICAL EAST AFRICA: Kenya, Southern Prov., Machakos Distr., Yatta Plateau, at Makipensi, 1°10'S., 37°30'E., 1300 m. alt., June 9, 1954, *Bally B 9750* (E.A. = type, K.).

Var. **gladiatum** Bally, var. nov.

A typo caule solitario, sparse ramoso, tuberculis longioribus, leviter reflexis, foliis trinerviis, oblanceolatis, pedunculis brevioribus, carinis capsularum dentatis differt.

TROPICAL EAST AFRICA: Kenya-Tanganyika Border, 10-15 miles north-east of Loliondo, 2°57'S., 36°42'E., 2000 m. alt. appr., May 1948, *Norman Wakeford* (Bally E 329) (E.A. = type, cult., K.).

**Monadenium spinescens** (Pax) Bally, comb. nov. = *Stenadenium spinescens* Pax in *Engl. Jahrb.* 30: 342. 1902.

F. PAX created the genus *Stenadium* as distinct from *Monadenium*, based mainly on a misinterpretation of the inner lobes of the former which he saw as a continuous fringe of filiform segments. However, the study of fresh material from the type-locality, collected by the writer in 1942, showed the fringe to consist of 5 distinct lobes, as in *Monadenium*.

The narrow, oblong, glandular lobe outside and behind the involucre which PAX considered to be a further distinctive character, is no more than a reduction in width of the gland-tipped involucre wall which characterizes the genus *Monadenium* but which, as a rule, more or less surrounds the lobes.

TANGANYIKA: Southern Highlands Prov., Chunya Distr. Itonia (Iromwa) Mountain, 1300 m. alt., July 1899 *F. Goetze 1099*, (type in hb. B. destroyed *ibid.*, Sept. 3, 1942, *Bally E 134*, (E.A.=topo-type, K.).

**Monadenium echinulatum** Stapf, forma **glabrescens** Bally, f. nov. = *Monadenium pedunculatum* Mansf. (ms.).

A typo foliis semper glabris, prophylo cyathii minore, stylis longius connatis, capsula glabra differt.

TROPICAL EAST AFRICA: Tanganyika, Eastern Prov., Mahenge Distr., Kilwa, 8°33'S., 37°23'E.; June 14, 1932, *H.J. Schlieben 2381* (type, B.).

**Monadenium ellenbeckii** N.E. Br., forma **caulopodium** Bally, f. nov. = *Monadenium zavattarii* Chiov. in *Miss. Biol. Borana. Racc. Bot. Angiosp.-Gymnosp.*: 103. 1939.

A typo caulibus numerosis, decumbentibus, haud ramosis differt.

TROPICAL EAST AFRICA: Ethiopia, Borana-Sidama Prov., between Mega and Dubuluk, 4°2'N., 38°21'E., 1600 m. alt., May 2, 1937, *Cufodontis 616*, (type, FI.).

**Monadenium guentheri** Pax, var. **mammillare** Bally, var. nov.

A typo caulibus crassioribus, viridioribus, tuberculis brevioribus, rotundatis, spinis tenuioribus differt.

TROPICAL EAST AFRICA: Tanganyika, Tanga Prov., Lasa Hill, summit, 4°35'S., 38°05'E., 1380 m. alt.; Sept. 6, 1935, *P.J. Greenway 4047* (E.A.=type, K.).

**Monadenium invenustum** N.E. Br., var. **angustum** Bally, var. nov.

A typo foliis angustioribus haud petiolatis, haud crispatis, involucris angustioribus differt.

TROPICAL EAST AFRICA: Kenya, Central Prov., foot of Mutomo Hill, 2°10'N., 38°05' E., 660 m. alt.; Jan. 28, 1942, *Bally B 1693* (E.A.=type K.).

**Monadenium laeve** Stapf, forma **depauperata** Bally, f. nov.

A typo caulibus brevioribus, plus minusve setuligeris, foliis minoribus, paginas duas setuligeras, prophylo cyathii depauperato differt.

TROPICAL EAST AFRICA: Tanganyika: Southern Highlands Prov., Kyimbila Distr. at Kibila, Sept. 25, 1912, *A. Stolz 1568* (type, K.).

**Monadenium letestuanum** Denis, var. **rotundifolium** Bally, var. nov.

A typo foliis orbiculato-spathulatis, dichasiis minutissime puberulis differt.

TROPICAL EAST AFRICA: French Equatorial Africa, Oubangi Chari, Haute Kotto, at Yalinga, June 4, 1922 *Le Testu* 3865 (type, in Hb. Le Testu, Caen, France).

**Monadenium majus** (Pax) N.E. Br., forma **floribundum** Bally, f. nov.

A typo caulibus numerosis ex radice unica productis, foliorum haud carinatis, prophyllis rotundioribus, pallidioribus differt.

TROPICAL EAST AFRICA: Ethiopia, Borana-Sidamo Prov., Curre Liban, 5°2'N., 39°30'E., 1600 m. alt., Sept. 21, 1953, *Bally B* 9282 (E.A.=type, K.).

**Monadenium schubei** (Pax) N.E. Br., var. **formosum** Bally, var. nov.

A typo caulibus tenuioribus, haud ramosis, podariis obtusioribus, prophyllis albescentibus differt.

TROPICAL EAST AFRICA: Tanganyika, Tanga Prov., South Pare Distr., Makanya, 4°20'S., 37°52'E., 800 m. alt., Nov. 21, 1934, *Bally E* 1 (E.A.=type, K.).

**Monadenium stapelioides** Pax, forma **congestum** Bally, f. nov.

A forma typica tuberculis minoribus, numerosioribus, foliis crebrioribus, lanceolatis aut subulatis, cymis sessilibus, ad apicem dense congregatis differt.

TROPICAL EAST AFRICA: Tanganyika, Northern Prov., Masai Distr., betw. Naidigidigo and Loliondo, 2°05'S., 35°42'E., 1850 m. alt., Sept. 30, 1944, *Bally E* 333 (E.A.=type, K.).