

NOTES ON THE SPECIES OF ERYTHRINA. VI.

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Introduction

Conspectus of species of Erythrina is in preparation which covers the genus worldwide. Data which for various reasons cannot be included in the Conspectus are given in this paper. Rupert Barneby, my co-author of Conspectus, contributed very substantially to it, particularly in organizing the genus into subgenera and sections, and in description and discussions of these. The drawings of all known species are also his and they will be of invaluable help in identifications. In the present paper, in addition to the description of new species, he was very helpful in the studies of various difficult species.

In this paper extension of ranges are noted for several species, 3 species and 1 variety are reduced to synonymy for the first time, 3 species and 1 subspecies (Erythrina caribaea, Erythrina tuxtlana, Erythrina salviiflora and Erythrina herbacea subsp. nigrorosea), are described as new, and Erythrina lysis-temon was placed in the synonymy of Erythrina princeps which was reinstated as a valid species.

A. Subgenus Micropteryx Walpers

1. Section Duchassaingia (Walpers) Krukoff

1. Erythrina fusca Loureiro, Fl. Cochinch. 427. 1790.

Jamaica: Portland: C. D. Adams 12305 (MO). Nicaragua: near Rio San Juan, Bunting & Licht 893. Panama: Foster 2180 (US) (Canal Zone), Wilbur & Weaver 11169 (US) (Colon). Venezuela: al lado de Rio Mansanares, Torres 2081 (VEN); Delta Amacuro: Maria Matilda Suarez s. n. (Herb. Nac. Ven. 76281) (VEN). Colombia: Antioquia: Medellin, Lorenzo Uribe Uribe 544 (COL). Ecuador: Guayas: Dodson & Thien 1258 (MO). Peru: San Martin: Mariscal Cáceres, Dtto. Campanilla, Schunke 4283. Brazil: Bahia: Itabuna, Maguire ser. number 58326, J. P. Lanna Sobrinho 4856 (US), 5351 (US).

This is the first record of the species from Department of San Martin. Six collections of this species from Herbarium of the Universidad de los Andes, Merida, Venezuela were examined and annotated. However through error they were not recorded. These collections are from the States of Merida and Delta Amacuro.

2. Section Cristae-galli Krukoff

2. Erythrina crista-galli L. Mant. 99. 1767.

Erythrina crista-galli L. var. leucochlora A. Lombardo,
Flora arborea y arborescente del Uruguay, ed. 2, 69. 1964.

Brazil: Distrito Federal: gallery forest, Irwin et al.
8888. Argentina: Corrientes: A. Krapovickas et al. 16823 (MO,
WIS).

The var. leucochlora was described from Uruguay as a white
-flowered form with pallid foliage, comparable to albino mutants
known in E. falcata, E. berteroana, E. caffra and other species.

This is the first record of the species from Federal Dis-
trict.

3. Section Micropteryx

4. Erythrina dominguezii Hassler, Physis 6:123. 1922.

Argentina: Corrientes: V. Marunak 1142 (MO).

This is the first record of the species from the province
of Corrientes.

5. Erythrina ulei Harms, Verh. Bot. Ver. Brand. 48:172. 1907.

Peru: Loreto: Coronel Portillo: Dtto. Galleria, Manuel
Castillo S. 14 (US), 23 (US), 39 (US), 51 (A).

6. Erythrina verna Velloso, Fl. Flum. 304. 1825.

Brazil: Minas Gerais: J. P. Lanna Sobrinho 7200 (US).

7. Erythrina poeppigiana (Walpers) O. F. Cook, Bull. U. S.
Dept. Agr. Bot. 25:57. 1901.

Venezuela: Merida: La Mucuy, Oberwinkler 13239 (VEN).
Colombia: Cundinamarca: alt. 1500 m, Lorenzo Uribe Uribe 502
(COL). Ecuador: Esmeraldas: Little & Dixon 21196, 21235,
Carlos Jativa 336.

Ten collections of this species from Herbarium of the Uni-
versidad de los Andes, Merida, Venezuela were examined and
annotated. However through error they were not recorded. They
were from the States of Merida and Barinas.

B. Subgenus Erythrina Krukoff

4. Section Suberosae Krukoff

8. Erythrina suberosa Roxburgh, Fl. Ind. 3:253. 1832.
Erythrina sublobata Roxburgh, Fl. Ind. 3:255. 1832.

Erythrina alba Roxburgh ex Wight & Walker-Arnott, Prod. Flor. Penins. Ind. Orient. 1:261. 1834 (nomen).
Erythrina maxima Roxburgh ex Wight & Walker-Arnott, Prod. Flor. Penins. Ind. Orient. 1:261. 1834 (nomen).
Erythrina suberosa Roxburgh var. glabrescens Prain, Jour. Asiat. Soc. Bengal 66(2):410. 1897.

E. alba and E. maxima are provisional names which appeared as captions on Roxb. plate #104 (= Fl. Ind. 1st edition, 1832 plate #3253 and = Fl. Ind. 2nd edition, 1874 plate #543), published as E. suberosa, and on Roxb. plate #105 (= Fl. Ind. 1st edition, 1832 plate #3255 and = Fl. Ind. 2nd edition, 1974 plate #543), published as E. sublobata.

Without field studies and cultural experiments we are not prepared to recognize the variety E. suberosa var. glabrescens.

6. Section Hypaphorus (Hasskarl) Krukoff

13. Erythrina subumbrans (Hasskarl) Merrill in Philipp. Jour. Sci. Bot. 5:113. 1910.

Erythrina mysorensis Gamble, Kew Bull. 1919:222. 1919

In earlier papers (5c, p. 226 and 5d, p. 136) E. mysorensis was listed as a probable synonym of the common and widespread E. variegata, this opinion based on crucial phrases in the protologue: "calyx spathaceus... carinae petalae liberae." Recently the senior author found at Kew an unpublished drawing of a specimen annotated by Gamble as E. mysorensis and said to have been prepared there from a specimen on loan from Calcutta which was returned June 26, 1919. This excellent drawing, which must be considered authentic for E. mysorensis, surprisingly shows a tomentose calyx shallowly cleft on both sides, therefore two-lipped, and keel-petals connate, slightly shorter than the wings, and about three times shorter than the standard. In all details this drawing portrays not E. variegata, but E. subumbrans (Hasskarl) Merrill. As we are informed that no type of E. mysorensis survives today in the herbarium of the Botanical Survey of India (CAL) we propose to designate the Kew drawing as neotype. The name E. mysorensis is accordingly transferred to the synonymy of E. subumbrans.

7. Section Breviflorae Krukoff & Barneby

14. Erythrina breviflora A. DeCandolle, Prodr. 2:413. 1825.

Mexico: Jalisco: 20 km SE of Autlán, alt. 1700 m, Rzedowski 14533 (ENCB); Michoacan: Waterfall 16438 (US), D. & V. Ugent & R. Flores C. 1700 (alt. + 2185 m) (WIS), 1713 (alt. + 2185 m) (WIS); Guerrero: W. R. Anderson & Ch. Anderson 4933 (MICH) (W of Chilpancina, alt. 2020 m); Mexico: Mexico: 38483 (US); Morelos: J. M. Diaz Moreno 233 (ENCB) (alt. 2100 m), R. Palacios s. n. (15/IX - 1965) (N of Cuernavaca), s. n. (5/VIII -

1970) (Cerro del Tepozteco, alt. 1800 m); Puebla: alt. + 2130 m, Sharp 44932 (MEXU).

Pods of Anderson & Anderson 4933 are armed with very small spines, whereas these of all other collections so far examined are not aculeate.

This is the first record of the species from the State of Puebla from where previously we had only 5 collections of E. breviflora fma. petraea.

14a. Erythrina breviflora fma. petraea (Brandeggee) Krukoff, Brittonia 3:255. 1939.

See comments under E. leptorhiza.

14b. Erythrina breviflora fma. oaxacana Krukoff, Brittonia 3:256. 1939.

See comments under E. leptorhiza.

8. Section Edules Krukoff

15. Erythrina edulis Triana; M. Micheli, Jour. de Bot. 6:145. 1892.

Colombia: Cundinamarca: Lorenzo Uribe Uribe 1376 (COL).
Peru: Huanuco: Dwyer 6223; Ancash: C. Earle Smith, Jr. & Jacinto Bas 4963 (US); Ayacucho, eastern Massif of Cordillera Central, T. R. Dudley 11875 (NA). Ecuador: Dodson & Thien 1811 (MO), 1960 (MO).

9. Section Stenotropis (Hasskarl) Krukoff

16. Erythrina speciosa Andrews, Bot. Repos. 7: pl. 443. 1806.

Brazil: Distrito Federal: Irwin et al. 18085; Minas Gerais: Serra da Pomba: J. P. P. Carauta 870 (US); Bahia: Itabuna, N. T. Silva s. n. (Maguire Ser. Number 58369).

10. Section Pseudo-edules Krukoff & Barneby

18. Erythrina schimpffii Diels, Bibl. Bot. 116:96. 1937.

Ecuador: Pastaza: alt. 1500 m, Dodson & Thien 1944 (MO).

This is the first record of the species from the province of Napo-Pastaza.

11. Section Leptorhizae Krukoff

- 20.
- Erythrina leptorhiza
- A. DeCandolle, Prodr. 2:413. 1825.

Mexico: Mexico: A. Pineda R. 788 (ENCB) (mun. Chalco, alt. 2700-2750 m), Garcia Saucedo s. n. (ENCB) (cerca de Tlamanantla), S. Mille Pagaza 54 (ENCB) (Huixquilucan, alt. 2350 m), M. Mita-stein 200 (ENCB) (km 42, carr. antigua Mexico - Puebla); Federal District: Rzedowski 26060 (ENCB) (Tlahuac, alt. 2600 m), M. Bopp O. 125 (ENCB) (Sierra de Guadalupe); Morelos: Sierra de Morelos, alt. 2050 m, Hinton 17163 (ENCB).

Excellent collections of this species cited above throw doubts on two forms of E. breviflora (forma petraea and forma oaxacana). Average terminal leaflets of E. leptorhiza are approximately 8x11cm whereas branchlets with mature leaves on some of the collections examined have terminal leaflets 1.5 cm x 2.5 cm.

12. Section Erythrina

- 22a.
- Erythrina herbacea
- L. subsp.
- herbacea
- .
- Erythrina herbacea
- L. Sp. Pl. 706. 1753. Sp. Plant. 706. 1753, sens. str.

Mexico: Tamaulipas: vicinity of Ciudad Victoria, Runyon 972 (US), Palmer 119, 544 (US), Kenoyer & Crum 3315 (GH), Robert M. King 4509 (US).

The above cited specimens were reexamined by us in 1972 and found to belong here.

- 22b.
- Erythrina herbacea
- L. subsp.
- nigrorosea
- Krukoff & Barneby, subsp. nov.

A subsp. herbacea vexillo roseo (nec rubro) calyce nigro (nec rubescenti) patriaque aliena australi abstans.

Mexico: Oaxaca: on the Gulf slope of Isthmus of Tehuantepec, near Matias Romero: Krukoff 1970-83 (NY-holotype). Mexico: Tamaulipas: P. S. Martin & C. Saravia 1301 (ENCB), Crutchfield & Johnston 5228 (TEX) (3 miles N of Tampico), 5342 (TEX) (4 miles from the Matamoros - Victoria road); San Luiz Fotosi: Barkley 17M099, J. Rzedowski 24729 (ENCB) (alt. 950 m); Veracruz: Tres Valles - Las Maravillas, Guadalupe Martinez-Calderon 1383 (MICH), 1546 (MEXU), Chiang 412 (MEXU).

Above are cited the new collections examined since the publication of the 5th Supplement. All collections cited in the 5th Supplement under E. standleyana (except those from Tabasco, Campeche and Yucatan which are of E. standleyana) and five collections from Tamaulipas cited here under E. herbacea subsp. herbacea, belong with this subspecies.

The collectors state on the label of #5342 "flrs. pink, not scarlet, as in Texas", on the label of #5228 "corolla pinkish", and on the label of #17M099 "pink-red flowers".

Distribution: Known from 64 collections in Mexico (Tamaulipas, San Luis Potosi, Hidalgo, Puebla, Veracruz, Oaxaca).

The original description of E. standleyana (1, p. 301) was based on twenty-five collections, ten from Cuba, eleven from Yucatan, and one each from Campeche, Isla Cozumel (Quintana Roo), Peten, and Belize, indicating a compact and natural range on the karst limestones of Yucatan Peninsula and western Cuba. At the same time the related E. herbacea was known of course from many collections in southeastern United States from the Carolinas to south peninsular Florida and west to the Gulf Coast prairies of Texas; and further from scattered stations around the Gulf Coast of Mexico in Tamaulipas, San Luis Potosi, and Veracruz. Between 1939 and 1969 additional records came to light which extended the range of E. herbacea into Hidalgo, Puebla, and Oaxaca. These two species, as defined in 1939, appeared to differ not only in characters of foliage (see key following), but also in color of the flower, the standard of E. standleyana being pink, that of E. herbacea bright red.

Very soon after publication of the monograph, however, difficulties began to arise in correlating foliage and flower-color. Already in 1938 Mexia and shortly afterward Alexander encountered in Oaxaca a plant exactly agreeing with the frutescent aspect of E. herbacea in characters of foliage but pink-flowered. During the field-work described in Supplement V (5c, pp. 246-249) the same entity was encountered first on the Gulf slope of Isthmus of Tehuantepec near Matias Romero, and from this point followed intermittently northward through Veracruz into Tamaulipas, its northern limit apparently coinciding very nearly with the tropic line south of Ciudad Victoria. This small, frutescent Erythrina is especially attractive because of its pale pink standard contrasting with a black calyx, in this respect obviously different from typical red-flowered E. herbacea. Pressed flowers of this group soon lose their pigmentation and it is therefore not possible to state with absolute assurance that all populations of the E. herbacea type found southward from Tropic of Capricorn are pink-flowered, but we have since the season of 1970 strong presumptive evidence that this is the case and we propose to distinguish them

collectively from the northern, red-flowered, typical E. herbacea as the new subsp. nigrorosea. This subspecies embraces all those pink-flowered collections from Oaxaca northward over the Gulf plain mistakenly (as we now realize after revision of available material of the complex) cited as E. standleyana in Supplement V (5c, p. 256). While the latter is certainly sometimes and very likely always pink-flowered, it can be recognized instantaneously by the foliage and by the nodding, not ascending flower-buds. The keel-petals of E. standleyana are shorter or at least never longer than the wings, those of E. herbacea sens. lat. commonly but not quite always longer. In different parts of its range E. herbacea shows considerable variation in size and in relative proportions of the inner petals, a variation that appears somewhat random, although in general the keel tends to be proportionately longer northward, reaching a maximum in the Carolinas. No fully reliable difference in this respect can be claimed between E. herbacea and E. standleyana, but the tendency is evident and often decisive. While the mutually exclusive ranges of the two pink-flowered Mexican erythrinas are now fairly well documented, field-work is still required to establish the precise northern limit of ssp. nigrorosea in Tamaulipas and the width of the discontinuity, if there is one, in southeastern Mexico between ssp. nigrorosea and E. standleyana.

In summary we key the three entities as follows:

1. Terminal leaflets broadly ovate (not flabellate-deltate); buds nodding; keel-petals usually shorter than rarely equaling wings; standard pink and calyx black; Cuba, Belize, Guatemala (Petén), Mexico (Yucatan, Campeche, Quintana Roo).....
23. E. standleyana.
1. Terminal leaflets flabellate-deltate; buds erect; keel-petals usually longer than wings.
2. Standard pink; calyx black; Mexico (Oaxaca, Veracruz, Puebla, Hidalgo, S. Luis Potosí, Tamaulipas + north to lat. 25° 30'.....
22b. E. herbacea subsp. nigrorosea.
2. Standard red; calyx not black. U.S.A. and Tamaulipas + south lat. 25° 30'.....
22a. E. herbacea subsp. herbacea.

23. Erythrina standleyana Krukoff, Brittonia 3:301. 1939.

Mexico: Yucatan: Enriquez 193 (MEXU).

24. Erythrina flabelliformis Kearney, Trans. N. Y. Acad. 14:32. 1894.

Mexico: Chihuahua: Pennington 536 (TEX); Jalisco: cerro of Colli, alt. 1650 m, C. L. Diaz Luna 43 (ENCB).

26. Erythrina lanata Rose, U. S. Dept. Agr. N. Am. Fauna 14: 81. 1899.

Mexico: Guerrero: Crisman & Willis 209 (TEX) (near Ocotito, alt. + 1070 m), Rzedowski 27008 (ENCB) (mun. Chilpancingo, alt. + 1550 m), W. R. Anderson & Ch. Anderson 5699 (MICH) (3 - 4 km W of Mazatlan, alt. + 1540 m); Freeland & Spetzman 172 (Acapulco) (MEXU).

We reexamined various collections and found the sagittate keel-petals usually at least slightly, and sometimes much longer than the wings as stated in the monograph (1, p. 290).

27. Erythrina goldmanii Standley, Contr. U. S. Nat. Herb. 20: 181. 1919.

Mexico: Chiapas: W. L. Wonderly 62 (MICH), L. Hilario A. s. n. (Esquintla, alt. 80 m), C. D. Johnson 134-68 (MO).

28. Erythrina caribaea Krukoff & Barneby, sp. nov.

E. folkersii Krukoff affinis sed foliolorum mox glabrescentium nec non axis inflorescentiae pube appresse puberula grisea (nec tomentella rufidula), floribus ad anthesin adscendentibus (nec laxae deflexis), vexilloque elliptico vel lanceolato-elliptico (nec oblongo-oblancoolato) absimilis.

Tree, leafy at anthesis, usually armed with spines; branchlets rather stout, usually aculeate; petioles 3.5-15 cm long, about 1 mm in diam, spineless, soon glabrous; petiolules about 6 mm long and 0.8 mm in diam; soon glabrous; leaflet-blades chartaceous, spineless soon glabrous, not ceriferous beneath; terminal leaflets broadly ovate 9-10.5 cm long, 8-10 cm broad, shortly acute at apex, rounded at base; secondaries about 5 per side; rachis 15-24 cm long, puberulent, soon glabrous; pedicels about 0.3 cm long and 0.4 mm in diam, densely puberulent; calyx chartaceous, campanulate, about 14-19 mm long on the carinal side and 12-15 mm on the vexillar side, gradually much narrowed (usually about 2 mm broad) toward base, ampliate to 5-6 mm toward apex, concave, at margin entire, sparsely and minutely puberulent when young, soon glabrous; standard narrowly elliptic, 6-7 cm long, 0.8-1.0 cm broad, usually rounded at

apex; wings narrowly oblong, 8-12 mm long and 2.4-2.7 mm broad; keel-petals 8-11 mm long, united at exterior margin, half-ovate to cuneate at base, claw 3-4 mm long, the basal angle obtuse, not hastate; pod 15-18 cm long, 12-14 mm diam, + 8-ovulate, moderately or between some seeds deeply constricted, the valves stiffly coriaceous, externally glabrate and blackish when ripe, dehiscent first through the ventral suture, the endocarp papery, separating from mesocarp; seeds + 10-11 mm x 7-8 mm, indistinctly ridged dorsally, the testa uniformly scarlet, the hilum elliptic, 4.5 mm x 1.5 mm, greyish-white. (Fruits drawn from Marino Rosas R. 423 (A).

Type locality: Tabasco (about 10 km from Villahermosa toward Chable), Mexico.

Mexico: Veracruz: Krukoff 86, 95; Manuel Martinez 25 (MEXU); Marino Rosas R. 423 (alt. 1325 m) (A), 1195 (alt. 190 m) (A); Tabasco: Krukoff 1970-46 (NY-holotype; flrs. - 20/II-1970) 1970-51 (Tenosique); Oaxaca: Matuda 32247 (US); Chiapas: between Tapilula and the boundary line with Tabasco, Krukoff 1970-45.

This species is related to E. folkersii Krukoff, which it resembles in the form of the deeply campanulate to subcylindric calyx oblique at orifice, but differs in features of pubescence, attitude of the flowers, and shape of standard. In E. folkersii the young foliage and especially the axis of the inflorescence are loosely and densely tomentulose with brownish hairs, the lower flowers at anthesis stand deflected at about 45° below horizontal, and the standard, although somewhat variable in outline, is prevailing oblong-oblongeolate. By contrast the foliage of E. caribaea is only minutely pubescent when young and early glabrous, the axis of the inflorescence is appressed-puberulent with gray hairs, the flowers ascend at about 45° above horizontal, and the standard is elliptic to lance-elliptic.

29. Erythrina folkersii Krukoff & Moldenke, *Phytologia* 1:286. 1938.

Mexico: Veracruz: Misantla, Comission Dioscorea 2525 (MEXU), 2823 (MEXU); Oaxaca: munic. Chiltepec, G. Martinez -Calderon 51, 1393; Chiapas: near Tuxtla Gutierrez, Comission Dioscorea 1825, 1842. Guatemala: Peten: between Porto Mendes and San Luis, along road, Krukoff 1972/4.

In March 1972 the senior author made a special trip to Peten to check on the erythrinads between Rio Dulce and Flores. Between Porto Mendes and San Luis 86 plants of E. folkersii and 3 plants of E. standleyana were found.

E. folkersii can be identified in sterile condition from other species of sect. Erythrina as follows:

Areoles of leaflets beneath charged with many minute whitish wax-particles, these discrete one from the next and therefore not covering the surface of the areole which appears minutely farinose-ceriferous.... 29. E. folkersii.

Areoles of leaflets not charged with wax-particles, or if so these so closely set as to appear confluent under magnifications of X 20, the surface of the areoles then appearing pallidly lepidote (sometimes in age disintegrating into microscopic free particles)..... 28. E. caribaea and other spp. of sect. Erythrina.

30. Erythrina tuxtlana Krukoff & Barneby, sp. nov.

Affinitatis incertae a sympatrica E. folkersii (cum qua inflorescentiae pube filamentosa fusca partim furcata congruit) calycis ore subsymmetrice truncato (nec post vexillum profunde recesso), carinae petalis truncatis obtusissimis, foliisque glabris distinctissima. Ab E. cochleata, quoad legumen valde contortum simili, calyce haud calcarato-dentato seminumque colore dissimili longe distat.

Tree, leafy at anthesis, armed with spines; branchlets rather stout, usually aculeate; petioles about 18 cm long, spineless, glabrous; petiolules about 6 mm long, 0.8 mm in diam, glabrous; leaflet-blades thin chartaceous, glabrous in all parts, spineless, not ceriferous beneath; terminal leaflets usually elliptic about 12 cm long, about 4.8 cm broad, acuminate at apex and cuneate at base; secondaries + 5 per side; rachis 19-21 cm long, densely tomentellous with deciduous filamentous brown, partly forked hairs, soon glabrous proximally; pedicels pubescent as rachis; calyx chartaceous, tubular-campanulate, about 20 mm long on the carinal side, about 19 mm long on the vexillar side, about 4 mm broad at base, gradually ampliate to about 6 mm at apex, at margin convex, entire, appressed-tomentellous throughout; standard narrowly elliptic, up to 8.5 cm long, about 1.2 cm broad, attenuate at apex and at base; wings rounded at apex, narrowed at base, subequal or slightly longer than keel-petals, about 5 mm long and about 3 mm broad; keel-petals firmly connate, rounded at apex, cuneate at base, about 6 mm long and 4 mm broad; stamens about 6 cm long, separate for about 2.5 cm; pistol + 4.5 cm long, the ovary and gynophore densely tomentellous with brown hairs; fruit-pedicels about 3 cm and up to 2 mm in diam; pods subligneous, usually 13-16 cm long and about 1.6 cm broad, slightly constricted between seeds, after coiled into a circle and much twisted when mature, conspicuously and irregularly undulate-crenulate on the ventral side, with a stipe 2.5--3 cm long, with an acumination 2.5--4 cm long, usually 1-3 seeded; seeds scarlet, with a narrow dark line, extending from the hilum for approximately 1 mm toward

the chalazal end, about 11 mm long and 7 mm broad.

Type locality: Oaxaca (mun. Tuxtepec, cortina de la presa M. Aleman), Mexico.

Mexico: Oaxaca: L. Gonzales Quintero 1837 (ENCB, NY-holotype) (frts., 25/X-1964); Veracruz: Montepio, 19 km E of Cate-maco, tropical forest, L. Gonzales Quintero 2211 (ENCB) (flrs. 19/III-1965).

A species of unknown close affinity, notable for the combination of deeply cylindro-campanulate, subtruncate calyx, minute truncate keel-petals scarcely half as long as the calyx, glabrous foliage, and greatly contorted pod with undulately crenulate sutures. For geographical reasons it may be compared usefully with E. folkersii, similar in the dense but deciduous pubescence of brown filamentous, partly forked hairs that clothes the axis of inflorescence, but different in the tomentulose young foliage, acute keel-petals, and particularly the oblique calyx-mouth, deeply recessed behind the standard. The flowers of E. folkersii are reflexed at full anthesis; unfortunately the material available material of E. tuxtlana does not provide evidence on the attitude of the flower. The pod of E. tuxtlana immediately suggests that of the Central and Northern South American E. cochleata; in outward form they are virtually identical. But the five-spurred calyx and pure red seeds (without black line below hilum), not to mention the different foliage, set E. cochleata far apart, and we interpret the similarity in the fruits as one more example of parallel evolution in which the genus is so rich. So far as Mexico is concerned, no other Erythrina has foliage like that of E. tuxtlana and none with calyx at all similar in size and proportions has similarly minute or truncate keel.

31. Erythrina smithiana Krukoff, Brittonia 3:323. 1939.

Ecuador: Guayas: alt. 50 m, Dodson & Thien 719; Esmeraldas: alt. 70 m, Little & Dixon 21164.

The collectors state on the label of "21164" "calyx rojo, corolla rosado".

32. Erythrina cochleata Standley, Contr. U. S. Nat. Herb. 20: 179. 1919.

Colombia: Antioquia: Quebrada Zuniga, entre Medellin & Envigado, alt. 1600 m, Lorenzo Uribe Uribe 729 (COL).

This is the first record of the species from the department of Antioquia.

34. Erythrina chiapasana Krukoff, Brittonia 3:304. 1939.

Mexico: Chiapas: Krukoff 1971/16 (Comitan, Finca Las Margaritas), L. Gonzalez Quintero 3425 (ENCB) (La Ceiba, alt. 130 m), C. D. Johnson 138-68 (MO).

35. Erythrina atitlanensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):162. 1970.

Guatemala: Solola: Santiago de Atitlan, Krukoff 1972-11.

38. Erythrina tajumulcensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):176. 1970.

Guatemala: San Marcos: entre Godinez & Patzun, Krukoff 1972-13.

39. Erythrina chiriquensis Krukoff, Brittonia 3:322. 1939.

Panama: Chiriqui: along trail north of Cerro Punta, T. Croat 10497.

41. Erythrina macrophylla A. DeCandolle, Prodr. 2:411. 1825.

Guatemala: Solola: San Andres Semetabaj, Krukoff 1972-10.

44. Erythrina steyermarkii Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):175. 1970.

We reexamined various collections and found keel-petals always longer than the wings as stated on the original description.

47. Erythrina huehuetenangensis Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):172. 1970.

Guatemala: Barillas: near Finca San Isidro, cafetal de Manuel Castaneda, Krukoff 1972-8 (flrs. - Febr. 1972).

49. Erythrina costaricensis M. Micheli, Bull. Herb. Boiss. 2: 445. 1894.

Panama: Cerro Campana: rain forest, Porter et al. 4280 (MO). Colombia: Magdalena: Foster 1423 (A) (alt. 3400 m); Antioquia: Duque 1482 (US) (alt. 1500 m). Ecuador: Imbabura: Ibarra, Jose Marrero & E. L. Little, Jr. 6139 (US).

We reexamined all available slides and flowers of all collections available at NY. In all collections from San Isidro General (Costa Rica), the type locality, including the type collection, as well as in 7 collections from other localities in

Costa Rica and 13 collections from Panama, keel-petals are longer than wings. Only in 3 collections from Costa Rica (including one from Turrialba, Costa Rica) keel-petals were found to be shorter than the wings.

52. Erythrina berteriana Urban, Symb. Ant. 5:370. 1908.

Mexico: Chiapas: Matuda 17601. Costa Rica: Alajuela: near Zarcero, Austin Smith A-29. Panama: Chiriqui: alt. 3800 ft. W. & C. von Hagen 2125; Canal Zone: Dwyer et al. 4690 (MO).

In Krukoff 1970-19 and 1970-22, collected between La Tinta and Panzos, Alta Verapaz, Guatemala, the lower flowers at full anthesis tending to reflex against the raceme as in E. folkersii which is growing in the same region.

Krukoff 1970-1 with deep red flowers collected at alt. 800 m near Sanarate, El Progreso, Guatemala, probably is the most handsome form of this species.

53. Erythrina rubrinervia H. B. K. Nov. Gen. & Sp. 6:434. 1824.

Venezuela: Merida: Bernardi 1280 (MER) (alt. 1500-1600 m), B. & F. Oberwinkler 13906 (VEN) (alt. 1750 m); Barinas: Bernardi 6859 (alt. 850-1000 m). Colombia: Cundinamarca: Lorenzo Uribe Uribe 668 (COL), Fred A. Barkley 38823 (GH).

This is the first record of this species from the State of Barinas.

54. Erythrina mexicana Krukoff, Brittonia 3:309. 1939.

Inasmuch as we segregated closely related E. salviiflora and distantly related E. caribaea from this species, we have decided to cite all collections of E. mexicana reexamined by us in 1972.

Mexico: Rose 4023 (US); San Luiz Potosi: Nelson 4386 (F, NY, US) (lvs., frts. - 2/V-1898); Mexico: Hinton 5333 (F, K, NY-holotype) (lvs., flrs., frts. - 13/XII-1933), and 6157 (F, K, M, NY) (lvs., frts. - 13/VI-1934) (Temascaltepec); Veracruz: Gary N. Ross 209 (US) Ocotil Chico, + 630 m, Beaman 5161 (GH) (laguna Catemaco, alt. 600 m); Guerrero: Langlasse 676 (B, K, P) (lvs., flrs.), Hinton 14708 (lvs., frts. - 24/X-1939) (gar-rizo - Sto. Domingo, alt. 850 m); Oaxaca: Ynes Mexia 9234 and Schultes & Reko 952 (Distr. Choapam, alt. 450 m (lvs., frts. - March and May), 687 (Distr. Tuxtepec, alt. 350 m).

55. Erythrina salviiflora Krukoff & Barneby, sp. nov.

Habitu toto, foliis, seminibus, et praesertim calycis submembranacei forma E. mexicanam (cum qua, allopatrica, mexicana,

hucusque confusa fuit) arcte simulans sed carinae petalis inter se liberis (nec concretis monophyllis) necnon florum alabastris deflexis anguste fusiformibus apice sigmoideo-incurvis (nec adscendentibus obtusis rectis) cito diagnoscenda.

Medium size tree, leafy at anthesis, armed with spines; branchlets rather stout, aculeate; petioles 14-34 cm long, often aculeate, soon glabrous; petiolules 10-12 mm long, 1-2 mm in diam, soon glabrous; leaflet-blades chartaceous, spineless, pubescent with white strigillose hairs when young, soon glabrous, minutely reticulately ceriferous beneath; terminal leaflets rhombic-ovate, 12-24 cm long, 7-17 cm broad, long-acuminate at apex, rounded or broadly cuneate at base; secondaries 8-9 per side; rachis 19-55 cm long, puberulent, soon glabrescent or glabrous proximally; pedicels about 0.6 cm long and 0.4 mm in diam, densely puberulent; calyx thin-chartaceous, tubular-campanulate, about 20 mm long on the carinal side and 18 mm on the vexillar side, gradually much narrowed (usually about 1 mm broad) toward base, ampliate to 5-6 mm toward apex, at margin obscurely denticulate and often lacerate at anthesis, provided with a tooth on the upper carinal side (imparting to the calyx-apex a sharply acute appearance), sparsely and minutely puberulent when young, soon glabrous; standard scarlet, narrowly oblanceolate, about 7.5 cm long and 1.5 cm broad, rounded at apex, cuneate at base; wings rounded at apex, narrowed at base, subequal or slightly longer than keel-petals, about 7 mm long and 2.5 mm broad; keel-petals separate, long-acuminate dorsally at apex, narrowed at base about 6.5 mm long and 4 mm broad; stamens about 6.5 cm long, separate for about 3.2 cm; pistil about 5.5 cm long, the ovary and gynophore densely pubescent with rather spreading hairs; fruit-pedicels about 1 cm long and 1 mm in diam; pods subligneous 14-30 cm long and about 1.5 cm broad, constricted between seeds, with a stipe 4-5 cm long and an acuminate beak 3-5 cm long, usually many-seeded; seeds uniformly scarlet, about 11 mm long and 7 mm broad.

Type locality: Suchitepequez (mun. Chicacao, Finca El Naranjo, alt. 1070 m), Guatemala.

Guatemala: P. Preuss 1389 (B), 1389a (B); San Marcos: Giesemann s. n. (Kr. Herb. 9240, 9365, 15129, 15365) (Finca La Union), Steyermark 37565 (F), Krukoff 1969-55 (San Rafael Pie de La Costa, alt. + 1070 m); Quetzaltenango: Steyermark 33556 (F), 33722 (F), 52127 (alt. 850 m), Krukoff 1968-504 (near Finca Patzulin, alt. + 1000 m); Suchitepequez: F. Rosengarten, Jr. s. n. (Kr. Herb. 15124), Steyermark 46733 (F) (Volcan Santa Clara, 1250-2560 m), Krukoff 1967-2 (NY-holotype), 1969-58, 1971-8 (all at Finca Naranjo, alt. + 1170 m), 1969-57 (mun. Chicacao, Finca Colima, alt. 900 m), 1969-59 (Finca Los Horizontes, alt. 1700 m); Solola: Steyermark 48032 (above Finca Moca, alt. 1250-1400 m), Krukoff 1969-8, 1969-14, 1969-60,

1969-162, 1969-163, 1969-164 and 1969-165 (all at Finca Montequina, alt. 1070-1150 m), 1968-506 (Finca Monte de Oro).

This species is related to E. mexicana and E. rubrinervia, (and also to E. lanceolata). Characters common to all four are thinly chartaceous foliage minutely ceriferous beneath, usually rhombic-ovate terminal leaflets, thin-textured calyces borne on puberulent or strigulose (never tomentulose) axes, and seeds of uniform red color, lacking a black line below the hilum. In the cylindric calyx much narrowed toward base and strongly recessed behind the standard E. mexicana resembles the northwardly vicariant, entirely Mexican E. mexicana and the distantly allopatric subandean E. rubrinervia; but differs from both in having free keel-petals and sharply deflexed, narrowly flask-shaped flower buds that are curved into a shallow sigmoid figure. The characters of keel-petals and deflexed buds which differentiate E. salviiflora from E. mexicana and E. rubrinervia are characters shared with the southwardly vicariant E. lanceolata, very similar in facies but readily distinguished by a very short calyx not or scarcely oblique but bilabiate at the mouth, more-over little or not curved in bud.

The ecology of E. salviiflora have been described recently (5a, p. 166) under the mistaken title of the still poorly known E. mexicana, the differential characters of which have just been mentioned. The species occupies a narrow belt at elevations of + 900--1500 m along the Pacific slope of the Guatemalan highlands, just above the belt occupied by E. berteriana, but nevertheless flowering about a month earlier in the year. Characters useful for field-recognition of these two species are found in calyx, pod and seeds. While the calyces are similar in size and form, that of E. salviiflora is of the same red color as the standard, that of E. berteriana part green and part pinkish. Pods of E. salviiflora are on average longer and more regularly constricted, while the seeds, as already pointed out, are uniformly red, lacking the black line below the hilum found in E. berteriana. Further differences of E. berteriana are united keel-petals, and ascending flower-buds.

13. Section Gibbosae Barneby & Krukoff

57. Erythrina gibbosa Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10:34. 1934.

Costa Rica: Puntarenas: San Viro, Al Gentry s. n. (Aug. 11, 1967) (WIS).

14. Section Corallodendra Krukoff

62. Erythrina pallida Britton & Rose, Bull. Torrey Club 48: 332. 1922.

Venezuela: cult. in Jard. Bot. Caracas: Aristeguieta 7974; Bolivar: Reserva Forestal La Paragua, Carlos Blanco 762 (VEN).

This is the first record of the species from the State of Bolivar.

64. Erythrina eggersii Krukoff & Moldenke, Phytologia 1:289. 1938.

St. Thomas: Baron von Eggers s. n. (May 21, 1876) (WIS), s. n. (Jan. 7, 1877) (WIS).

17. Section Caffrae Barneby & Krukoff

71. Erythrina princeps A. Dietrich in Otto & Dietrich Allg. Gartenzeitung 2:305. 1834.

Erythrina lysistemom Hutchinson, Kew Bull. 1933:422. 1933.

Erythrina caffra Thunberg var. mossambicensis Baker f., Jour. Bot. London 76:238. 1938.

The name E. princeps A. Dietrich, tentatively interpreted by Krukoff (1, p. 334) as a synonym of E. caffra Thunberg (or some garden form of it, is here adopted with confidence as the earlier name for what passes currently as E. lysistemom Hutchinson. Krukoff described a dissected flower from an authentic specimen of E. princeps grown in Berlin Botanical Garden in 1844, formerly in Kunth's herbarium at Berlin. This specimen as also the type, dated 1834, was destroyed (H. Scholz in litt., 1972) during the war, but the latter survives in the form of Field Museum Negative 2375 (NY!), which we here designate as neotype. The differences noted by Krukoff between E. princeps and genuine E. caffra are just those which Codd (Bothalia 6(3): 508. 1955) used to separate E. lysistemom from E. caffra; and the exceptionally clear photograph shows the narrow declined flower with included androecium that characterizes E. lysistemom. From herbarium evidence it appears that E. princeps was widely diffused in European stoves during mid-XIX century, but later was lost sight of and never correctly identified with the wild plant.

Another synonym of E. princeps is E. caffra var. mossambicensis Baker f. (Torre 523, BM-holotype, COI).

D. Subgenus Chirocalyx (Meisner) Harvey ex Louis24. Section Dichilocraspeden Harms

80. Erythrina mildbraedii Harms in Mildbr. Deutsch. Zentr.-Afr. Exp. 1907/1908, 2:264. tab. 30. 1911.

Erythrina problematica Duvigneaud & Rochez, Fl. Congo Belge Ruanda - Urundi 6:123. 1954. (sine descr. latin.)

We have examined the holotype of E. problematica (from Zaire) : J. de Wilde 509 (BR) and find that it is not significantly different from E. mildbraedii. The formal publication of E. problematica in Bull. Jard. Bot. Etat Brux., 25: 1955, promised by the authors, never realized.

25. Section Chirocalyx

92. Erythrina sigmoidea Hua, Bull. Mus. Hist. Nat. Par. 3:327. 1897.

Erythrina sudanica Baker f., Leg. Tr. Afr. 2:371. 1929.

We have examined the holotype of E. sudanica (Sudan: Darfur province, alt. 1080 m) H. Lynes 564 (BM-holotype) and found that it falls well within our concept of E. sigmoidea.

94. Erythrina abyssinica Lamarck, Encycl., Bot. 2:392. 1788; ex DC. Prodr. 2:413. 1825; Gillett in Kew Bull. 15:426. 1962.

Erythrina suberifera (Welwitsch) ex Baker, in Oliver Fl. Trop. Africa 2:183. 1871.

Erythrina mossambicensis Sim, For. Fl. Port. E. Afr. 43. tab. 54. 1909.

Erythrina abyssinica Lamarck ex DC. subsp. suberifera (Welwitsch ex Baker) Verdcourt, Kew Bull. 24:284. 1970.

The status of E. suberifera, which we here list in the synonymy of E. abyssinica, remains controversial and cannot be settled satisfactorily without extensive field studies. In our reduction we follow Majot-Rochet & Duvigneaud (in Flora Congo Belge Ruanda - Urundi 6:120, as E. tomentosa R. Brown ex Richard) and Torre (in Conspectus Fl. Angolensis 3(2):248. 1966) dissenting at least provisionally, from the more recent opinion of J. B. Gillett, quoted by Verdcourt (in Kew Bull. 24: 284. 1970) who recognizes E. suberifera as subspecifically distinct. The chief differential characters are found in the polymorphic form of the calyx-teeth, which vary from linear or

linear-caudate in typical E. abyssinica to shortly obovate or spatulate in what have been called E. suberifera. Intermediate forms described from Angola, Rhodesia and Zaire are numerous but it is not known whether these represent introgression between two marginally sympatric species or part of a continuous clinal variation. On the other hand we recognize as distinct the obviously allied E. sigmoidea in which the calyx teeth become yet shorter and in bud are displayed in a flattened rosette, this characteristic calyx being, in the material seen, correlated with differences in pubescence.

The reduction of E. mossambicensis to E. abyssinica is somewhat tentative inasmuch as we have failed to find type-material for comparison, even at University of Natal where the first set of Sim's Angolan collections are preserved. Assuming that the type is lost, we would designate the cited plate, which displays leafy branchlets, flowers and pods, as neotype. The picture strongly suggests one of the forms of E. abyssinica widespread in Mozambique which would fall within subsp. suberifera as defined by Verdcourt.

E. Subgenus Erythraster Barneby & Krukoff

26. Section Erythraster

97. Erythrina euodiphylla Hasskarl, Hort. Bogor. 178. 1858.

This species is reported as having all petals green and leaves fetid when fading (Baker, C. A. and R. C. Bakhuizen van der Brink, Jr., 1963, Flora of Java 1:628. 1963). This information should be checked as the adjective "euodiphylla" means good-smelling leaf.

101. Erythrina velutina Willdenow, Ges. Nat. Freunde Berlin Neue Schr. 3:426. 1801.

Venezuela: Carabobo: Elbert L. Little, Jr. s. n. (Herb. Univ. de Los Andes 16218) (MER); Anzoategui: Luis Ruiz Teran 350 (MER).

Appendix IList of Known Species of ErythrinaA. Subgenus Micropteryx Walpers1. Sect. Duchassaingia (Walpers) Krukoff1. *E. fusca* Loureiro2. Sect. Cristae-galli Krukoff2. *E. crista-galli* L.3. *E. falcata* Benth3. Sect. Micropteryx4. *E. dominguezii* Hassler5. *E. ulei* Harms6. *E. verna* Velloso7. *E. poeppigiana* (Walpers) O. F. CookB. Subgenus Erythrina4. Sect. Suberosae Krukoff8. *E. suberosa* Roxburgh9. *E. microcarpa* Koorders & Valet10. *E. stricta* Roxburgh11. *E. resupinata* Roxburgh5. Sect. Arborescentes Krukoff12. *E. arborescens* Roxburgh6. Sect. Hypaphorus (Hasskarl) Krukoff13. *E. subumbrans* (Hasskarl) Merrill7. Sect. Breviflorae Krukoff & Barneby14. *E. breviflora* Alph. DeCandolle14a. *E. breviflora* forma *petraea* (Brandege) Krukoff14b. *E. breviflora* forma *oaxacana* Krukoff

8. Sect. Edules Krukoff
15. *E. edulis* Triana
9. Sect. Stenotropis (Hasskarl) Krukoff
16. *E. speciosa* Andrews
10. Sect. Pseudo-edules Krukoff & Barneby
17. *E. polychaeta* Harms
18. *E. schimpffii* Diels
11. Sect. Leptorhizae Krukoff
19. *E. montana* Rose & Standley
20. *E. leptorhiza* Alph. DeCandolle
21. *E. horrida* Alph. DeCandolle
12. Sect. Erythrina
- 22a. *E. herbacea* L. subsp. *herbacea*
- 22b. *E. herbacea* L. subsp. *nigrorosea* Krukoff & Barneby
23. *E. standleyana* Krukoff
24. *E. flabelliformis* Kearney
25. *E. coralloides* Alph. DeCandolle
26. *E. lanata* Rose
27. *E. goldmanii* Standley
28. *E. caribaea* Krukoff & Barneby
29. *E. folkersii* Krukoff & Moldenke
30. *E. tuxtlana* Krukoff & Barneby
31. *E. smithiana* Krukoff
32. *E. cochleata* Standley
33. *E. hondurensis* Standley
34. *E. chiapasana* Krukoff
35. *E. atitlanensis* Krukoff & Barneby

36. *E. cobanensis* Krukoff & Barneby
37. *E. williamsii* Krukoff & Barneby
38. *E. tajumulcensis* Krukoff & Barneby
39. *E. chiriquensis* Krukoff
40. Insufficient material; will be described later.
41. *E. macrophylla* Alph. DeCandolle
42. *E. guatemalensis* Krukoff
43. *E. globocalyx* Porsch & Cufodontis
44. *E. steyermarkii* Krukoff & Barneby
45. *E. florenciae* Krukoff & Barneby
46. Still under a study
47. *E. huehuetenangensis* Krukoff & Barneby
48. *E. lanceolata* Standley
49. *E. costaricensis* M. Micheli
50. *E. barqueroana* Krukoff & Barneby
51. *E. americana* Miller
52. *E. berteriana* Urban
53. *E. rubrinervia* H. B. K.
54. *E. mexicana* Krukoff
55. *E. salviiflora* Krukoff & Barneby
56. *E. castillejiflora* Krukoff & Barneby
13. Sect. Gibbosae Barneby & Krukoff
57. *E. gibbosa* Cufodontis
14. Sect. Corallodendra Krukoff
58. *E. amazonica* Krukoff
59. *E. similis* Krukoff
60. *E. peruviana* Krukoff

- 61. *E. mitis* Jacquin
- 62. *E. pallida* Britton & Rose
- 63a. *E. corallodendrum* L. var. *corallodendrum*
- 63b. *E. corallodendrum* L. var. *bicolor* Krukoff
- 63c. *E. corallodendrum* L. var. *connata* Krukoff
- 64. *E. eggersii* Krukoff & Moldenke
- 65. *E. buchii* Urban
- 66. *E. leptopoda* Urban & Ekman
- 67. *E. elenae* Howard & Briggs
 - 15. Sect. Cubenses Krukoff
- 68. *E. cubensis* C. Wright
 - 16. Sect. Olivianae Krukoff & Barneby
- 69. *E. oliviae* Krukoff
 - 17. Sect. Caffrae Barneby & Krukoff
- 70. *E. caffra* Thunberg
- 71. *E. princeps* A. Dietrich
 - 18. Sect. Humeanae Barneby & Krukoff
- 72. *E. humeana* Sprengel
- 73. *E. zeyheri* Harvey
 - 19. Sect. Acanthocarpae Barneby & Krukoff
- 74. *E. acanthocarpa* E. Meyer
 - C. Subgenus Tripterolobus Barneby & Krukoff
 - 20. Sect. Tripterolobus
- 75. *E. greenwayi* Verdcourt
 - D. Subgenus Chirocalyx (Meisner) Harvey ex Louis
 - 21. Sect. Bruceanae Barneby & Krukoff
- 76. *E. brucei* Schweinfurth

22. Sect. Macrocymbium (Walpers) Barneby & Krukoff
77. *E. vogelii* Hooker f.
78. *E. senegalensis* Alph. DeCandolle
23. Sect. Dilobochilus Harms
79. *E. excelsa* Baker
24. Sect. Dichilocraspeden Harms
80. *E. mildbraedii* Harms
25. Sect. Chirocalyx
81. *E. pygmaea* Torre
82. *E. mendesii* Torre
83. *E. baumii* Harms
84. *E. decora* Harms
85. *E. livingstoniana* Baker
86. *E. tholloniana* Hua
87. *E. addisoniae* Hutchinson & Dalziel
88. *E. droogmansiana* DeWildeman & Th. Durand
89. *E. orophila* Ghesquiere
90. *E. sacleuxii* Hua
91. *E. haerdii* Verdcourt
92. *E. sigmoidea* Hua
93. *E. latissima* E. Meyer
94. *E. abyssinica* Lamarck
- E.* Subgenus Erythraster Barneby & Krukoff
26. Sect. Erythraster
95. *E. variegata* L.
96. *E. tahitensis* Nadeau
97. *E. euodiphylla* Hasskarl

98. *E. vespertilio* Benth
 99. *E. insularis* F. M. Bailey
 100. *E. merrilliana* Krukoff
 101. *E. velutina* Willdenow
 101a. *E. velutina* Willdenow forma *aurantiaca* (Ridley) Krukoff
 102. *E. grisebachii* Urban
 103. *E. burtii* Baker f.
 104. *E. burana* R. Chiovenda
 105. *E. perrieri* R. Viguier
 106. *E. schliebenii* Harms
 107a. *E. melanacantha* Taubert ex Harms subsp. *melanacantha*
 107b. *E. melanacantha* Taubert ex Harms subsp. *somala* (Chiovenda) Gillet

Appendix II

Authors of African Species

- | | |
|-------------------------------|---|
| Baker, J. G. | - <i>excelsa</i> , <i>livingstoniana</i> (2). |
| Baker f., E. G. | - <i>burtii</i> (1). |
| Chiovenda, R. | - <i>burana</i> (1). |
| DeCandolle, Alph. | - <i>senegalensis</i> (1). |
| DeWildeman, E. & Th. Durand | - <i>droogmansiana</i> (1). |
| Dietrich, A. | - <i>princeps</i> (1). |
| Ghesquière, J. | - <i>orophila</i> (1). |
| Gillet, J. B. | - <i>melanacantha</i> subsp. <i>somala</i> (1). |
| Harms, H. | - <i>baumii</i> , <i>decora</i> , <i>mildbraedii</i> ,
<i>schliebenii</i> (4). |
| Harvey, W. H. | - <i>zeyheri</i> (1). |
| Hooker f., W. J. | - <i>vogelii</i> (1). |
| Hua, Henri | - <i>sacleuxii</i> , <i>sigmoidea</i> ,
<i>tholloniana</i> (3). |
| Hutchinson, J. & J.M. Dalziel | - <i>addisoniae</i> (1). |
| Lamarck, J.B.A.P.M. de | - <i>abyssinica</i> (1). |
| Loureiro, João de | - <i>fusca</i> (1). |
| Meyer, E. | - <i>acanthocarpa</i> , <i>latissima</i> (2). |
| Schweinfurth, G. A. | - <i>brucei</i> (1). |
| Sprengel, K. | - <i>humeana</i> (1). |
| Taubert, P. H. W. | - <i>melanacantha</i> subsp. <i>melanacantha</i> (1). |

Thunberg, C. P. P.	- <i>caffra</i> (1).
Torre, A. R.	- <i>mendesii</i> , <i>pygmaea</i> (2).
Verdcourt, Bernard	- <i>greenwayi</i> , <i>haerdii</i> (2).
Viguiier, R.	- <i>perrieri</i> (1).

Appendix III

Collectors of the type specimens of African species

Addison, F.	- <i>addisoniae</i> (1).
Baum, H.	- <i>baumii</i> (1).
Bruce, James	- <i>abyssinica</i> (1).
Burt, B. D.	- <i>burtii</i> (1).
Cabra, Capt.	- <i>droogmansiana</i> (1).
Collector undesignated	- <i>caffra</i> , <i>fusca</i> , <i>humeana</i> , <i>princeps</i> , <i>sigmoidea</i> (5).
Dinter, Kurt	- <i>decora</i> (1).
Drege, J. F.	- <i>acanthocarpa</i> , <i>latissima</i> (2).
Ghesquière, J.	- <i>orophila</i> (1).
Greenway, P. J.	- <i>greenwayi</i> (1).
Haerdi, F.	- <i>haerdii</i> (1).
Kirk, Sir John	- <i>livingstoniana</i> (1).
Mann, Gustav	- <i>excelsa</i> (1).
Mendes, Eduardo	- <i>mendesii</i> , <i>pygmaea</i> (2).
Mildbraed, G. W. J.	- <i>mildbraedii</i> (1).
Milizia Forestale	- <i>burana</i> (1).
Perrier, Alfred	- <i>perrieri</i> (1).
Puccioni and Stefanini	- <i>melanacantha</i> subsp. <i>somala</i> (1).
Riva, Domenico	- <i>melanacantha</i> subsp. <i>melanacantha</i> (1).
Roussillon,	- <i>senegalensis</i> (1).
Sacleux, R. P.	- <i>sacleuxii</i> (1).
Schlieben, H. J.	- <i>schliebenii</i> (1).
Steudner, von H.	- <i>brucei</i> (1).
Thollon, Francois-Romain	- <i>tholloniana</i> (1).
Vogel, E.	- <i>vogelii</i> (1).
Zeyher, C. L. P.	- <i>zeyheri</i> (1).

Appendix IV

Countries of origin of the type specimens of African species

Senegal	- <i>senegalensis</i> (1).
Guinée	- <i>sigmoidea</i> (1).
Sierra Leone	- <i>addisoniae</i> (1).
Fernando Po	- <i>vogelii</i> (1).
Cameroon	- <i>excelsa</i> (1).
Gabon	- <i>tholloniana</i> (1).
Zaire Republic	- <i>droogmansiana</i> , <i>mildbraedii</i> , <i>orophila</i> (3).

Ethiopia	- abyssinica, brucei, burana, melanacantha subsp. melanacantha (4).
Somalia	- melanacantha subsp. somala (1).
Tanzania (incl. Zanzibar)	- burtii, greenwayi, haerdii, sacleuxii, schliebenii (5).
Mozambique	- livingstoniana (1).
Angola	- baumii, mendesii, pygmaea (3).
S. W. Africa	- decora (1).
S. Africa	- acanthocarpa, caffra, humeana, latissima, zeyheri (5).
Madagascar	- perrieri (1).
Viet-Nam	- fusca (1).
Cultivated	- princeps (1).

Appendix V

List of African species which are known to occur in various countries

Senegal	- senegalensis (1).
Gambia	- senegalensis (1).
Mali	- excelsa, mildbraedii, senegalensis, sigmoidea (4).
Portuguese Guinea	- senegalensis, sigmoidea (2).
Guinea	- addisoniae, mildbraedii, senegalensis, sigmoidea (4).
Sierra Leone	- addisonia, mildbraedii, senegalensis (3).
Liberia	- mildbraedii, senegalensis (2).
Ivory Coast	- addisoniae, excelsa, mildbraedii, senegalensis, vogelii (5).
Ghana	- addisoniae, mildbraedii, senegalensis, vogelii (4).
Togo	- senegalensis, vogelii (2).
Dahomey	- senegalensis (1).
Nigeria	- addisoniae, excelsa, mildbraedii, tholloniana, senegalensis, sigmoidea, vogelii (7).
Fernando Po	- vogelii (1).
Chad	- sigmoidea (1).
Ubangi-Shari	- sigmoidea (1).
Cameroon	- droogmansiana, excelsa, mildbraedii, senegalensis, sigmoidea (5).
Gabon	- droogmansiana, mildbraedii, tholloniana, senegalensis (4).
Congo (Brazzaville)	- addisoniae (1).

Zaire Republic	- abyssinica, baumii, droogmansiana, excelsa, mildbraedii, orophila, tholloniana (7).
Ruanda	- abyssinica (1).
Sudan	- abyssinica, excelsa, sigmoidea, (3).
Ethiopia	- abyssinica, brucei, burana, burtii, melanacantha subsp. melanacantha, melanacantha subsp. somala (5 + 1).
Eritrea	- abyssinica (1).
Somalia	- melanacantha subsp. somala (1).
Socotra	- melanacantha subsp. somala (1).
Uganda	- abyssinica, excelsa, mildbraedii (3).
Kenya	- abyssinica, burtii, excelsa, princeps, melanacantha subsp. melanacantha, sacleuxii (6).
Tanzania	- abyssinica, burtii, excelsa, greenwayi, haerdii, princeps, melanacantha subsp. melanacantha, sacleuxii, schliebenii, variegata (10).
Mozambique	- abyssinica, humeana, latissima, livingstoniana, princeps (5).
Swaziland	- humeana, latissima, princeps (3).
Malawi	- abyssinica, livingstoniana, princeps (3).
Zambia	- abyssinica, baumii, excelsa, livingstoniana (4).
Rhodesia	- abyssinica, baumii, humeana, latissima, livingstoniana, princeps, zeyheri (7).
Botswana	- latissima, princeps, zeyheri (3).
Angola	- abyssinica, baumii, droogmansiana, mendesii, pygmaea (5).
S. W. Africa	- decora, mendesii (2).
S. Africa	- acanthocarpa, caffra, humeana, latissima, princeps, zeyheri (6).
Comoro Island	- fusca, perrieri (2).
Madagascar	- fusca, perrieri, variegata (3).

Appendix VI

List of species which are known to occur
in various departments in Guatemala

Alta Verapaz	- berteroana, cobanensis, folkersii, guatemalensis, salviiflora, williamsii (6).
Baja Verapaz	- berteroana, guatemalensis (2).
Chimaltenango	- macrophylla (1).
Chiquimula	- berteroana (1).
El Progreso	- berteroana, guatemalensis (2).
El Quiche	- berteroana, chiapasana, macrophylla (3).
Esquintla	- berteroana, fusca (2).
Guatemala	- berteroana, macrophylla (2).
Huehuetenango	- barqueroana, berteroana, castillejiflora, chiapasana, goldmanii, guatemalensis, hue- huetenangensis, macrophylla (8).
Izabal	- berteroana, folkersii, fusca, hondurensis (4).
Jalapa	- berteroana (1).
Jutiapa	- berteroana, fusca (2).
Peten	- berteroana, folkersii, standleyana (3).
Quetzaltenango	- berteroana, macrophylla, salviiflora (3).
Retalhuleu	- berteroana (1).
Sacatepequez	- berteroana, macrophylla (2).
San Marcos	- berteroana, florenciae, macrophylla, salviiflora, tajumulcensis (5).
Santa Rosa	- berteroana (1).
Solola	- atitlanensis, berteroana, macrophylla, salviiflora (4).
Suchitepequez	- berteroana, salviiflora (2).
Totonicapan	- macrophylla (1).
Zacapa	- berteroana, guatemalensis (2).

Notes

As a result of field studies in 1969-71, carried out in the dry season when erythrinas are in flower and fruit, it is possible to report with some accuracy on the distribution of the species in parts of Guatemala. Eighteen of the 25 Erythrina known to occur in Central America have now been found within the borders of Guatemala, a greater number than in any other American country except Mexico. The Pacific lowlands or tierra caliente in departments Retalhuleu, Suchitepequez, and Escuintla, like the eastern lowlands or dry oriente in departments Santa Rosa, Jutiapa, Jalapa, and Chiquimula, are poor in species. Here we find only the common E. berteroana, widespread through lowlands of Central America and found in all departments of Guatemala except Chimaltenango and Totonicapan. Erythrina is again poorly represented in the highlands or tierra fria of departments Quetzaltenango, Totonicapan, El Quiche, Chimaltenango, and Sacatepequez, the home of E. macrophylla and E. chiapasana only. It is on the limestone soils at middle elevations (approximately 1300--2000 m in departments Huehuetenango and Alta Verapaz that the genus is most highly diversified; in this relatively small area are found nine species: E. cobanensis, E. williamsii, E. tajumulcensis, E. guatemalensis, E. huehuetenangensis, also E. folkersii, E. berteroana, E. barqueroana and E. castillejiflora on the lower elevations.

The Erythrina flora of Sierra de las Minas, Sierra de Santa Cruz, and Montaña del Mico is poorly known, as is that of the lowlands of northern Huehuetenango, El Quiche, and Alta Verapaz. From these areas we can expect new records, possibly even undescribed species.

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(In order to conserve space, we are citing here only the papers which are not cited in Supplements III and V).

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