NOTES ON THE SPECIES OF ERYTHRINA. VII.

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Contents

Introduction

Since the last of this series of papers was submitted for publication many new collections have been examined and 120 cited in this paper. Extensions of range are noted for 9 species. One specific (E. fissa Presl.) one varectal and three formal names are reduced to synonymy for the first time. Two species (E. pudica Krukoff & Barneby and E. berenices Krukoff & Barneby) are described as new and E. lanata Rose ssp. occidentalis (Standley) Krukoff & Barneby is reinstated as valid.

Appendix V in which species are listed by countries, and departments or provinces or states will be found useful as a short cut for identification of specimens in various countries, except for Nicaragua, Mexico, Ecuador and Bolivia which are poorly collected. New species are expected for Nicaragua especially from the higher elevations on the Cordillera Central and many new extensions of range and some novelties are expected in all of these countries.

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

Honduras: Colon (=Mosquitia): Gracias a Dios, month of Rio Platino, sea coast, Al. Gentry 7570 (MO). Panama: Panama: Dwyer et al. 5093 (MO). French Guiana: Oldeman BC.1 (CAY), B-740 (CAY).

The first record of the species for Colon.

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

Guatemala: Huehuetenango: Barillas, cult., Krukoff 1973-14. Argentina: Santiago del Estero: R. Maldonado 486 (F). Paraguay: Gerard W. Teague 520 (Villarrica) (BM), 600 (near Asuncion) (BM).

In connection with the designation of E. crista-galli L. as a National Flower of Argentina (Decreto #138,974, Dec. 28, 1972 of Minister of the Agriculture) Angel L. Cabrera prepared an excellent paper on this species (El Seibo, published by Minist. de Obras Publicas Prov. Buenos Aires 1-16. 1943). Among other topics the following are discussed in detail: geographic distribution, habit and habitat, illustrations (33 illustr. are cited), fungi and insects attacking the species, and bibliography (46 citations).

3. Erythrina falcata Bentham in Mart. Fl. Bras. 15(1):172. 1859.

Bolivia: Cochabamba: Trujillo & Stewart 1972/s.n.

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

Guatemala: Suchitepequez, Chicacao, finca Naranjo, cult., Krukoff 1973-11 (seeds only). Brazil: Bahia: Raimundo S. P. 1160 (UB), 1233 (UB). Ecuador: Esmeraldas: Little & Dixon 21235 (F). Peru: San Martín: Woytkowski 6239 (MO).

12. Erythrina arborescens Roxburgh, Hort. Beng. 53. nomen. 1814; Pl. Coromandel, 3:14, pl. 219. 1819.

In three species of sect. Suberosae, (E. suberosa, E. stricta and E. resupinata), leaflets are ceriferous beneath (the pallid particles are concentrated into filiform bodies lying around the periphery of each areole). They are minutely scurfy-ceriferous in E. microcarpa and not ceriferous in E. arborescens.

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

Erythrina mysorensis Gamble, Fl. Madras, 1918 (Part 2):354. 1918, ined. Kew Bull. 1919:222. 1919.

Our recent reduction (1972, p. 4) of E. mysorensis Gamble, the type of which was thought lost, has been confirmed by study of a phototype kindly supplied by the Director of the Calcutta herbarium. The specimen (A. Meebold 9728, Nov. 1908, from Mysore, Chickewalli, 900 m), consisting of a leaf, two racemes in flower, and dissected petals skillfully displayed, certainly represents E. subumbrans (Hassk.) Merr.

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

Mexico: Jalisco: R. Gonzalez T. 475 (MICH); Michoacan: mun. Uruapan, F. Ventura A. 2462 (F).

In Supplement VI (Krukoff 1972, p. 6) under E. leptorhiza we already expressed doubts on two forms of E. breviflora (forma petraea and forma oaxacana).

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

Panama: Chiriqui: vicinity of Bambito, Colombia: prov. de Mariquita, J. J. Triana 4334 (BM), Croat 10629 (MO). Ecuador: Acosta-Solis 12762 (F); Quito: alt. 2850 m, Acosta-Solis 13544 (F); Imbabura: El Olivo, alt. 2200 m, Acosta-Solis 12949 (F); Pichincha: alt. 2200-2400 m, Acosta-Solis 16402 (F). Peru: Cajamarca: alt. 2500 m, Woytkowski 6972 (MO); Pasco: Villa Rica, Woytkowski 7354 (MO).

The first record of the species from Panama and the second collection from Bolivia. It is still not known whether these collections are from cultivated plants or from trees grown in the wild. The first collection of E. edulis from Imbabura, Ecuador.

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

Brazil: Dist. Federal: E. P. Heringer 8885/1079 (RB); São Paulo: Krukoff Herb. 1973-19, 1973-20.

17. Erythrina polychaeta Harms, Notizbl. Bot. Gart. Berlin 9: 295. 1925.

Pods and seeds of this species are still not known. Seeds of this species and E. schimpffii the only two known species of Sect. Pseudo-edulis have not yet been studied for alkaloids, amino acids or chromosomes.

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

Ecuador: Imbabura: ± 2225 m, Acosta-Solis 13394 (F).

The first record of the species from Imbabura.

Sterile specimens of this species can be distinguished from those of E. edulis, as mature leaflets of the former are reticulate-ceriferous beneath whereas they are minutely scurfy in the latter.

19. Erythrina montana Rose & Standley, Contr. U. S. Nat. Herb. 20:179. 1919.

Pods and seeds of this species are still not known. Leaflets of this species as well as of E. horrida are microscopically papillate beneath, the buds erect.

20. Erythrina leptorhiza Alph. DeCandolle, Prodr. 2:413. 1825.

Mexico: México: Sierra de Alcaparrosa, Rzedowski 26300 (MICH).

22b. Erythrina herbacea L. subsp. nigrorosea Krukoff & Barneby, Phytologia 25:6. 1972.

Mexico: Oaxaca: near Santo Domingo, alt. ± 530 m, E. W. Nelson 2699; Chiapas: Thorne & Lathrop 40491 (MEXU).

The first record of this species from the State of Chiapas.

25. Erythrina coralloides Alph. DeCandolle, Prodr. 2:413. 1825.

Under this well-known species are concealed vexatious problems which require extensive field-work for solution. Typical E. coralloides, as we understand it, is characterized by a short and dense raceme of subhorizontally spreading, bright red flowers, a small, brownish-pubescent, symmetrically campanulate calyx, and a keel (never longer and usually distinctly shorter than the wings) with basal angles truncate or rounded, not produced backward into hastate or sagittate barbs. Plants of this sort are known from the length of Sierra Madre Oriental between southern Nuevo León and Veracruz, mostly on the Gulf slope, and extend southward along the Gulf-Balsas divide to northern Oaxaca. From Veracruz they extend westward along the Neovolcanic belt to the Valley of Mexico, where they are extensively planted in parks and gardens. In the southern part of its main range E. coralloides is in a broad sense sympatric with E. americana, which has a very similar inflorescence, calyx and keel-petals, so that flowering plants are not easy to distinguish, the most certain and reliable differential characters being in the hysteranthous foliage, ceriferous in E. americana, not so in E. coralloides. The natural range of E. americana appears to be much more restricted than that of E. coralloides; it belongs to a drier and lower zone around the edge of the eastern lobe of the Balsas Depression in Morelos and adjoining Guerrero and Puebla, extending east in desert climate to the

headwaters of Rio Papaloapan and to northeastern Oaxaca; it is extensively planted in the city of Orizaba, but whether native there is quite uncertain. The problem of distinguishing these species is however not taxonomic, but a matter of securing specimens with mature leaves.

In the central segment of the Transverse Volcanic Range, between western Mexico and Guadalajara, and around the foothills of the Lerma-Santiago river northward, E. coralloides is represented by populations or perhaps individual trees that differ to variable degree in the shape and proportion of the inner petals, and rarely further in color of the standard. Whereas the keel of typical E. coralloides, as already mentioned, is truncate at base and shorter than the wings, we find westward an increasing tendency for the keel-blades to develop sharply retorse basal lobes and at the same time the wings dwindle, finally becoming distinctly shorter than the keel. The extreme in this direction, as represented by Krukoff 1970/130 from near Juchitlan, Jalisco, or Arsène 10483 from Querétaro, has the arrowhead keel and tiny wings found normally in E. lanata, very different from those normal in E. coralloides of Sierra Madre Oriental. However there are more numerous collections showing transitions between the two types. The widely distributed Pringle 6839 from Tula, Hidalgo, is a good example, having a more or less sagittate keel but the proportionately long wings of genuine E. coralloides.

Interpretation of the floral variation is handicapped at present by two circumstances. In the first place, we have almost no correlation between flowers and foliage, and in no instance do we possess mature leaves from the same tree as a flower of the extreme lanata type. Secondly, we have no means of distinguishing, in the herbarium, between trees growing without cultivation and those which may have been planted, possibly brought westward as garden flowers along the mountains and through the Bajio country from the valley of Mexico. Careful study of the situation in the field and observation of particular trees at various seasons of the year are prerequisites for determining whether there are in reality two species, or two geographic races of one species, or whether the variation in the form of keel reflects introgression from E. lanata. The ranges and ecological requirements of E. lanata and E. coralloides are so far as known mutually exclusive, but so little is known of their exact dispersal along the Balsas slope of the Transverse Volcanic Range that we cannot presume to make any prophetic statement on this point.

Two striking individual variants should be mentioned here; we have leaves of neither. A tree from Santa María del Rio in San Luis Potosí (Rzedowski 8767) has a greatly elongated, loosely flowered inflorescence, the rachis (including peduncle) up to 3 dm long. In form and proportions of the inner petals, the flower resembles that of Pringle 6839 already mentioned, which has the normal, short and congested raceme of E. coralloides. A remarkable tree from between Jiquilpan and Quiroga,

Michoacán (Krukoff 1970/132) has a flower typical of E. coralloides in shape of petals, but sharply deflected from the rachis; furthermore the standard is pink, not red. The pink standard might suggest another genetic infiltration from E. lanata, but nothing else about the plant supports this hypothesis. The last-mentioned is currently under cultivation in California and it is hoped that more will eventually be known about its true nature.

We have reexamined numerous collections of E. coralloides complex and of the unrelated E. americana and we placed under E. coralloides the following collections:

	Nuevo Leon	---	2 collections
(?)	Tamaulipas	---	3 " (no mature leaves are on these collections but they probably belong here rather than with E. americana)
	San Luiz Potosi	---	7 collections
	Guanajuato	---	4 "
	Hidalgo	---	7 "
	Mexico & Distr. Fed.	---	6 "
	Puebla	---	15 "
	Veracruz	---	11 "
	Oaxaca	---	3 "
	State undesign.	---	1 "

The occurrence of this species in the States of Morelos and Guerrero is not yet certain.

Below are mentioned the States where the collected specimens were found to deviate from typical plants of the species.

Guanajuato: Of the four collections placed with this species Duges s.n. (GH) has the keel slightly longer than the wings, whereas in Gilly 137 (MICH) the keel is ± equal to the wings. The keels in these two collections are not sagittate.

Hidalgo: Of the seven collections placed with this species Pringle 6839 and Nelson 3880 have the keels distinctly sagittate and Beechey s.n. (K) - slightly sagittate. Of the two collections from ± 10 km west of Ixmiquilpan Boke & Lent 43 (MICH) has the sagittate keel whereas in L. González Q. 2321 (MEXI) the keel is not sagittate. In all of these collections the wings are longer than the keel.

Distr. Fed. and Mexico: Of the five collections placed with this species Matuda 21035 has the keel slightly sagittate but shorter than the wings.

26. Erythrina aff. coralloides Alph. DeCandolle

We are tentatively placing here the collections, discussed at length under E. coralloides, with distinctly sagittate keel and the wings shorter than the keel. None of these has mature leaves.

Mexico: Jalisco: Krukoff 1970-127 (US) (+ 20 km before reaching Guadalajara from the east, 1970-128 (US) (near Guadalajara), 1970-130 (near Juchitlan); Michoacán: Krukoff 1970-131 (near Jiquilpan), 1970-133 (near Quiroga); (?)Querétaro: Arsène 10483 (US).

There is no certainty that the label on Arsène 10483 indicating that the collection is from Querétaro is correct.

We have no evidence that the typical E. coralloides is found in the wild in Jalisco and Michoacán.

27. Erythrina pudica Krukoff & Barneby, sp. nov.

Affinis E. lanatae Rose cum qua statura humili, inflorescentiae pube alba, vexillo roseo (nec coccineo), seminibusque ad hilum nigro-maculatis (nec nigro-lineolatis) congruit sed imprimis carinae petalorum alis subaequilongorum forma semi-ovata basi truncata nec hastatim retro-auriculata, ulterius a subsp. lanata (provinciae vicinae oaxacanae incola) vexillo dorso parcissime hirtello vel fere glabro nec albo-lanato abhorrens.

Small spiny trees, leafless at anthesis (Mar-Apr), the foliage unknown. Rachis, pedicels and calyces densely tomentulose with fine, soft, partly branched, ± entangled, white hairs. Rachis (including peduncle) 2.5--3 dm long, laxly manyflowered in the distal half, the flowers at full anthesis deflected to 45° to the axis. Pedicels at anthesis 1--2.5 mm long, in fruit thickened, glabrate, 4--5 mm long. Flower-buds declined, narrowly ovoid-ellipsoid. Calyx at full anthesis 12.5--13.5 mm long, 5--7 mm diam, contracted at base into an obliquely obconic hypanthium, symmetrically or a little obliquely truncate at orifice, the margin membranous, the dorsal tooth callous-thickened but not produced. Standard narrowly elliptic-oblanceolate 5.5--7 X ± 1 cm, pink, dorsally papillate and charged when young with a few scattered weak readily deciduous hairs. Wings 12--13 mm long, narrowly oblong, straight, 2.5--3 mm wide, the inner margins imbricate over the staminal column. Keel slightly longer or slightly shorter than wings, 12--13 mm long, the claws 3--4 mm long, the blades connate, subtruncate at base, undulately dentate below the free, short-acuminate tips, 3--4 mm wide. Androecium up to 4.5--6 cm long, the stamens of different lengths, the anthers 2.5--3 mm long. Pod beanlike, 1--1.5 dm long, contracted at base into a compressed stipe ± 2 cm long and at apex into an acumen up to 3.5 cm long, moderately constricted between the 3--13 seeds, the stiffly leathery valves

at maturity glabrate except at very base, inconspicuously veined, becoming highly torulose after dehiscence. Seeds scarlet, hard, lustrous, 7--10 mm long, with a conspicuous black spot above the brownish hilum.

Mexico: Chiapas: on a mountain slope, between Ocozocoantla and Cintalapa, Krukoff 1970-79, 1970-80 (NY-holotype), Moore 2543 (GH).

This is an ungainly treelet or arborescent shrub, flowering sparely from leafless branches toward the end of the dry season. It was thought at first to represent a form of E. lanata, to which it is obviously related. Characters common to the two are relatively small stature, white-tomentulose floral rachis and young calyces, and a pink standard long and slender in proportion to the campanulate calyx. The standard as it emerges from the calyx bears a few short scattered hairs which are deciduous by full anthesis, in this respect obviously different from the silvery-tomentulose standard of subsp. lanata, but resembling that of the distantly allopatric subsp. occidentalis. The flowers of E. pudica, and apparently the buds before anthesis, are deflected from the floral rachis, the standard eventually forming an angle of about 45 degrees from vertical. Most of the available material of E. lanata sens. lat. gives no information as to attitude of the flower, which disjoints readily from the axis when dry, but we do know that the races of subsp. occidentalis in Colima have loosely ascending flowers, and there is no evidence that those of subsp. lanata are different in this respect. Field observations, however, are much needed. The important differential characters of E. pudica are found in the form of the keel-petals and their length in relation to the wings. As mentioned in the discussion of E. lanata, we find that throughout its range the keel-petals are uniformly sagittiform, the blades being produced backwards in the form of pronounced auricles bent inwards toward the short claws, and at the same time are longer than the similarly but less pronouncedly auriculate wings. The keel of E. pudica, which is of about the same length as the narrowly oblong-non-auriculate wings, takes a much less specialized form, the blades being simply truncate at base, precisely as in E. coralloides or E. americana. From these two species E. pudica differs in its spindly stature, lowland chaparral habitat, white rather than sordid pubescence of the rachis and buds, pink flowers, a more deeply constricted pod, and seeds which bear at the hilum the black spot characteristic of E. lanata, not the black line of the E. coralloides complex.

It should be noted that while the geographic discontinuity between E. lanata in central Oaxaca and E. pudica in western Chiapas is inconsiderable in terms of kilometers, the two species occupy distinct floristic territories, E. lanata being entirely on the Pacific slope and west of the Tehuantepec lowlands, E. pudica beyond the isthmus and on the headwaters of a stream

draining northward to the Gulf of Mexico.

The epithet pudica, bashful, refers to the nodding flower.

28a. Erythrina lanata Rose subsp. lanata.

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

Mexico: Guerrero: Ryan & Floyd 19 (TEX) (near Agua del Obispo, alt. ± 1070 m); Michoacán: Pringle 5358 (GH).

In order to determine the appropriate taxonomic status of the pink-flowered Erythrina described herein as E. pudica, we were obliged to revise all available material of E. lanata Rose, the species most similar and closely related. This Erythrina is characterized by relatively small stature, a white-tomentellous rachis and young calyx, a rather strongly constricted pod, a pink or flesh-colored standard, seeds marked at the hilum with a conspicuous black spot, and most importantly and constantly by a keel longer than the wings that, laid out, takes the form of an arrowhead with recurved, barblike auricles. The flower and its parts are subject to great variation in size, but the proportions of keel to wings, and of standard to the relatively short-campanulate calyx, remain essentially uniform and provide the best specific characters. The range of E. lanata lies along the coast and lower slopes of the coastal cordillera from southern Sinaloa through Nayarit and its off-shore islands, western Jalisco, Colima, and Guerrero to southern Oaxaca, and inland at scattered points to central Oaxaca and to the Balsas Depression in Guerrero, southwest México and Michoacán.

It has long been thought that E. lanata consisted of two geographic races, one southeastern, corresponding with the nomenclaturally typical form described from Acapulco, Guerrero, the other northwestern, northward from far western Jalisco, including the type population of E. occidentalis Standley at Mazatlán, Sinaloa. However the real differences between such races have not been well understood and the lack of good collections from the middle part of the species-range left the line of geographic segregation ill-defined. Since the date of the monograph (Krukoff, 1939) botanical exploration of Nueva Galicia by McVaugh and associates has changed this situation radically; we now have ample and excellent material from Colima and Jalisco and in consequence are in a stronger position to analyze the racial situation within the species.

North and westward from the boundary between Colima and Guerrero the standard of E. lanata is sparsely and inconspicuously hirtellous with fine hairs that never conceal the papillate surface of the petal's back and which tend to fall off by

full anthesis, or are sometimes altogether absent. By contrast all known flowers from the Balsas Depression within Michoacán, southwest México, and Guerrero, from the Pacific slope in the same latitudes, and from Oaxaca, have a densely lanate standard, silvery-white at early anthesis or often permanently, the pubescence at first concealing the papillate back of the petal and only tending to rub off in uneven patches as the flower ages. Generally associated with the glabrate standard is a relatively wide pod accommodating relatively large seeds. However, measurements of all seeds available showed a range in length of (7) 8--12 (13) mm with averages of 9.5--12 mm in the range of the glabrate standard, 9--10.5 mm in the range of the lanate standard, a difference no doubt statistically significant, but hardly useful in taxonomic practice. Since we have found no other characters of moment separating E. lanata and E. occidentalis, we propose to treat these two entities as subspecies, as noted below.

Due to lack of flowering material, there remains only some question as to the identity of the E. lanata found in the western lobe of the Balsas Depression around Apatzingan and Tancítaro, Michoacán, a critical area lying near the transition zone between the two subspecies. If the species conforms to common patterns of dispersal in southern Mexico, these populations should prove to belong with subsp. lanata.

Key to the subspecies of E. lanata

1. Standard densely lanate dorsally, the pubescence concealing the surface of the petal, at least in the developing young flower, often permanently. Balsas Depression and Sierra Madre del Sur in the same latitudes (Michoacán, SW México, and Guerrero) SE along the Pacific slope to S and interior Oaxaca... subsp. lanata

1. Standard thinly hirtellous when young or permanently, commonly glabrate in age, sometimes truly glabrous, the vesture never concealing the papillate back of the standard, even in the developing young flower. Pacific slope and coastal plain from Colima NW through W Jalisco, Nayarit (incl. Islas Sta. María) to S Sinaloa... subsp. occidentalis

28b. Erythrina lanata Rose subsp. occidentalis (Standley) Krukoff & Barneby, stat. nov.

E. occidentalis Standley, Contr. U. S. Nat. Herb. 20:180. 1919.

Mexico: Sinaloa: south of Culiacán, Dressler 982 (GH); Colima: Manzanillo, on rocky slope near the sea, Stork, et al. 25186.

30. Erythrina caribaea Krukoff & Barneby, Phytologia 25:9. 1972.

Mexico: Veracruz: Krukoff 1970-85 and 1970-96 (near San Andrés Tuxtla), 1970-88 and 1970-89 (between Acayucan and Minutitlan); 1970-92 (near Soleapan); J. Chavelas P. et al. ES-2426 (MEXU) and ES-2842 (MEXU) (San Lorenzo, Texlochtitlan); Helia Bravo H. 14 (MEXU) (Zapoopan de Cabaño); Mario Souza 2850 (MEXU) and 2851 (US) (Las Tuxtlas); Antonio Lot 996 (F) (near Mendoza, alt. ± 1500 m), Guadelupe Martinez-Calderón 3004 (F) (near Catemaco, alt. 40 m), Mario Rosas R. 1290 (F) (Cerro de Chicola, alt. ± 1500 m); Tabasco: Krukoff 1970-47 and 1970-48 (MEXU) (between Villahermosa and Chable), 1970-50 (Tenosique); Oaxaca: Guadelupe Martinez-Calderón 1393 (MEXI) (Chiltepec); Chiapas: Krukoff 1970-41 (near Tapilula, along the road from Cristóbal de las Casas to Villahermosa); Campeche: along road between Escárcega and Chetumal, Krukoff 1970-53, 1970-55; along road between Escárcega and Candelaria, Hernández et al. ES-260 (MEXU).

In Krukoff 1970-41 the lower fully mature flowers are declined toward the rachis. No need to tell that E. folkersii was collected in the same locality.

This is the first record of the species from Campeche.

E. caribaea was described in the 6th Supplement in 1972 and previously, many collections which are cited above, were erroneously placed with other species. We are now able to give a rather complete region of its distribution. It is confined to the eastern Mexican seaboard, being found in southern Veracruz, eastern Oaxaca (trespassing the border to the extreme western Chiapas), Tabasco and western Campeche. The only other species of Erythrina recorded from Tabasco is E. herbacea ssp. nigrorosea and from Campeche -- E. standleyana.

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

Mexico: Veracruz: José Vera Santos 2777 (El Palmar) (US, MEXU), Comisión Dioscoreas 8535 (Zapoapan) (MEXU), A. Gómez Pompa 115 (Fortuño) (MEXU), Victor Manuel Toledo 306 (San Andrés Tuxtla). Guatemala: Petén: Molina 15838 (EAP).

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

Costa Rica: Cartago: L. J. Poveda 128 (Turrialba, Puente Río Cojón) (CR); Anastasio Alfaro s.n. (CR 30527), s.n. (CR 30528), s.n. (CR 30529), s.n. (CR 30530) (all from Finca La Fuente, Peralta, alt. ± 1300 m).

On a trip to Costa Rica in February 1973, the senior author ascertained that this species is a very large tree found from the coast of Atlantic to elevations of ± 1300 m. It is common on Finca La Fuente, Peralta, Cartago, near Turrialba.

35. Erythrina hondurensis Standley, Field Mus. Publ. Bot. 4:309. 1929.

Nicaragua: Zelaya: alt. ± 21 m, Lewis E. Long 160 (F).

Mature leaflets of this species are pallid and minutely scurfy, not reticulate-ceriferous beneath as those of E. lanceolata.

New collections of this species from Guatemala would be welcome.

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

Guatemala: Huehuetenango: near Estancia, Krukoff 1973-16.

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

Guatemala: Solola: Santiago de Atitlan, along the road to San Pedro, Krukoff 1973-24, 1973-28.

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

Guatemala: San Marcos: Aldea Feria, Krukoff 1973-29.

New collections of this species from Mexico would be welcome.

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

Panama: Chiriqui: alt. ± 1750 m, Al. Gentry 5992 (MO).

New entities related to this species are expected from Nicaragua and Costa Rica. Collections in flower and in fruits are needed before they can be described. These are briefly cited below.

In Nicaragua Verne Grant 870 (NY) (flrs only) was collected in rain forest, alt. ± 1150 m, on western slopes of Mt. Mombacho, near Grenada. Leaves and fruits are needed for its understanding.

In Costa Rica Krukoff collections from Zarcero, alt. ± 1700 m, (Krukoff 1969-104, 1969-105, 1969-112, 1969-113 and 1969-146) and from Zapote de Alfara Ruiz (Krukoff 1969-239), all from the province Alajuela, are especially difficult to interpret. Some

of these are probably hybrids and the problem, as often in this genus, is one of separating the grain from the chaff.

42. Erythrina macrophylla Alph. DeCandolle, Prodr. 2:411. 1825.

Guatemala: Quezaltenango: Krukoff 1973-15.

43. Erythrina guatemalensis Krukoff, Amer. Jour. Bot. 28:688. 1941.

Guatemala: Huehuetenango: Barillas, Krukoff 1973-26.

44. Erythrina globocalyx Porsch & Cufodontis, Arch. Bot. Sist. Fitog. & Genet. 10:35, pl. 1. 1934.

Costa Rica: San José: from Frailes to Tarvaca, Ray W. Lent. 1163 (F).

46. Erythrina florenciae Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):171. 1970.

Guatemala: San Marcos: Krukoff 1972-12 (between Godinez & Patzun), 1973-23 (arriba de Feria).

47. Erythrina berenices Krukoff & Barneby, sp. nov.

E. huehuetenangensi Krukoff & Barneby et E. florenciae Krukoff & Barneby affinis, cum ea carinae alis superatae petalis inter se liberis congruens sed calyce ventricoso asymmetrice nunc de latere nunc subventraliter fisso, ab hac calyce minus carnoso, petalis carinae liberis, ab ambabus (allopatricis) seminibus maturis firmis nitidis nec mollibus rugosis abstans.

Trees to ± 15 m, leafy at anthesis, armed with spines, the branchlets rather stout, usually aculeate; petioles 16--24 cm long, unarmed, soon glabrous; petiolules ± 12 mm long, 2 mm diam, soon glabrous; leaflet-blades chartaceous, brown-villosulous when young early glabrate, beneath unarmed, not ceriferous, microscopically papillate; terminal leaflets usually broadly ovate, ± 17 X 13 cm, broadly cuneate at base, acuminate at apex; secondary veins 5--7 each side; rachis ± 10--14 cm long, densely pubescent with brown filamentous, flexuously entangled, partly branched hairs; pedicels at anthesis ± 7 mm long, 1.5 mm diam, pubescent like rachis; calyx (dry) subcoriaceous, broadly campanulate to tubular, 2--3 cm long, ± 4 mm diam at base, ampliate to 0.7--1.2 cm at or below middle, the orifice asymmetrically bilabiate, shallowly cleft one side and deeply (in fruit almost to hypanthium) on the other, when young brownish-pilosulous; standard erect, straight, narrowly oblong-oblanceolate ± 6 cm long, 1.5 cm wide; wings narrowly oblanceolate, 9.5--14 mm long, nearly straight, 2--3.5 mm wide and hooded at obtuse apex, beyond middle imbricate over the staminal sheath; keel 7--11 mm long, the petals separate from the first, the claws 2--4 mm, the

the obliquely half-obovate blades subtruncately rounded at apex, slightly convex along the exterior margins, abruptly narrowed but not at all sagittate at interior margin; androecium ± 5.5 cm long, the longer filaments free for ± 2 cm, the anthers 3--3.3 mm long; pedicels in fruit 7--12 mm long, 2--3 mm diam; pod 18--25 cm long, when immature densely pubescent with short brown hairs, blackish and glabrescent when ripe, irregularly constricted between the 5--8 seeds, narrowed at base into a stipe 2.5--5 cm long, and at apex into an acuminate beak ± 3 cm long; seeds reniform, scarcely compressed, obscurely keeled dorsally, 10--11 X 6.5--7.5 mm, firm and hard, the testa smooth, lustrous, scarlet, with a faint black line at the white hilum.

Mexico: Veracruz: Mario Souza 3464 (NY-holotype, MEXU, US) (flrs., imm. frts); Gilly et al. 179 (MICH) (Jalapa); Gomez Pompa 1159 (MEXU) (Sierra de Chiconquiaco, alt. 1280 m; Charles L. Smith 1834 (EAP) (Jalapa).

Local names: Cosquelite cimarón (Gilly 179).

The keel-petals of E. berenices, which are at once free from each other and obtusely spatulate, fortuitously resemble those of some members of Sect. Corallodendrum but the large, cylindric or irregularly inflated and baggy calyx has no counterpart in that section. Keel-petals quite similar although substantially smaller, are known also within Sect. Erythrina in the case of the Guatemalan E. huehuetenangensis, which we suspect to be the closest known ally, and in E. florenciae, although here connate by their exterior margins. Both of these species differ from E. berenices in their densely congested, conelike spikes of young flowers and in the remarkable soft seeds, which become coarsely wrinkled when dry. All three of these species inhabit cool rain-forest at considerable elevations. They differ much in habit, E. florenciae and E. berenices becoming trees of majestic stature, whereas E. huehuetenangensis is a small, straggly, very spiny one of inconsiderable size.

We take pleasure in dedicating this handsome coral-tree to Dr. Bernice G. Schubert, foremost contemporary authority on the intricate genus Desmodium.

Mature seeds of this species would be welcome.

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

Costa Rica: Puntarenas, Monte Verde on the Sierra de Tilaran, near the border of Puntarenas, Alajuela and Guanacaste, alt. 1500 m, Peter Feinsinger s.n. (F). Panama: Chiriquí:

Liesner 496 (Barica Peninsula) (MO), Croat 22010 (10 miles west of Puerto Armuelles) (F); Canal Zone: Croat 12519A (MO), Gentry 1905 (MO).

51. Erythrina barqueroana Krukoff & Barneby, Phytologia 22(4): 260. 1971.

Guatemala: Huehuetenango: Barillas: 1st centro of Rio Ixcan, Krukoff 1973-1.

52. Erythrina americana Miller, Gard. Dict. ed. 8, #5. 1768.

We have reexamined numerous collections of E. americana in connection with our studies of E. coralloides complex and placed under E. americana the following collections:

	Veracruz	---	9 collections
	Hidalgo	---	1 "
	Mexico & Distr. Fed.	---	2 "
	Morelos	---	11 "
(?)	Guerrero	---	3 "
	Puebla	---	3 "
	Oaxaca	---	10 "

No mature leaves are on the three collections from the State of Guerrero but they probably belong here rather than with E. coralloides. Their keels are not sagittate and the wings are narrow and much longer than the keels.

53. Erythrina berteroana Urban, Symb. Ant. 5:370. 1908.

Guatemala: Suchitepéquez: Nahualate, finca El Salvador, Krukoff 1973-13; Escuintla: along the road from Palin to Antiqua, near the boundary line of munic. Esquintla and munic. Antigua, Krukoff 1973-2 (forma). Costa Rica: San José: J. R. Hunter ACM 22 (F). Panama: Chiriquí: P. Busey 487 (MO); Veraguas: Al. Gentry 3050 (MO), Liesner 839 (MO); Coclé: El Valle de Antón, Helen Kennedy et al. 2114 (MO); Canal Zone: Helen Kennedy et al. 2207 (MO), 2211 (MO).

Calyx on Krukoff 1973-2 nearly truncate.

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

Mexico: Veracruz: Martinez 345 (San Lorenzo Tenochtitlan) (MEXU); Mario Souza 2998 (MEXU) and 3350 (MEXU) (both from las Tuxtlas). Oaxaca: munic. Ixtlán, Wm. L. Graham 1389 (MICH).

56. Erythrina salviiflora Krukoff & Barneby, Phytologia 25:14. 1972.

Guatemala: Suchitepequez: Finca Naranja, Krukoff 1973-12; Solola: Finca Montequina, Krukoff 1973-25, 1973-27.

57. Erythrina castillejiflora Krukoff & Barneby, Mem. N. Y. Bot. Gard. 20(2):165. 1970.

The protologue incorrectly described the calyx as recessed behind the standard when it is in reality recessed in fron of keel, a feature found in no other member of Sect. Erythrina. However the drawing of the flower published in the same paper is correct.

Pods and seeds of this species are not known.

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

Costa Rica: Puntarenas: Peninsula de Osa, Helen Kennedy 1951 (MO). Panama: Cocle: El Valle de Anton, Al. Gentry 6794 (MO), E. A. Lao 276 (MO), Helen Kennedy et al. 2212 (MO).

60. Erythrina similis Krukoff, Brittonia 3:271. 1939.

New collections of this species, particularly in fruit, from Paraguay, Brazil and Bolivia are badly needed.

62. Erythrina mitis Jacquin, Hort. Schoenb. 2:47. 1797.

Venezuela: Sucre: peninsula de Paria, Cerro Patao, Steyermark & Agostini 91268.

The new record of the species for Sucre.

The painting of Erythrina (labelled as of "E. umbrosa H.B.K.") prepared for Mutis and reproduced in crude form in Rev. Acad. Colomb. 2: . 1939 is based on elements of two species: a leaf of E. fusca; with flowers, pod and seed of E. poeppigiana. The standard is shown yellow rather than bright orange, and the constriction of the pod is exaggerated. In any case no detail of the plate can possibly have been derived from E. umbrosa H.B.K., a proven synonym of E. mitis.

68. Erythrina elenae Howard & Briggs, Jour. Arn. Arb. 34:183. 1953.

Flowers of this species are still not known.

71. Erythrina caffra Thunberg, Prodr. Pl. Cap. 121. 1800.

Erythrina fissa K. B. Presl. Symb. Bot. 1:69. 1832.

Chirocalyx pubescens Walpers, Linnaea 23:741. 1850.

The holotype of Erythrina fissa (and Chirocalyx pubescens) (PRC) is plainly conspecific with E. caffra.

72. Erythrina lysistemon Hutchinson, Kew Bull. 1933:422. 1933.

South Africa: Nelspruit: Krukoff Herb. 1973-21 (Marie Doyer s.n.).

73. Erythrina humeana Sprengel, Syst. 3:243. 1826.

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

Dr. L. E. Codd kindly points out that we were in error in taking up the name E. princeps for what has long been known as E. lysistemon. Having examined a copy of the phototype (Field Neg. 2375) he identified E. princeps as E. humeana, a species known to have been in cultivation in Europe early in the XIX century, before E. lysistemon had become known to botanists, even as a herbarium specimen. The original error on Krukoff's part arose long ago, when he understood E. humeana imperfectly as having always the subtrilobate leaflets of what has been called E. humeana var. raja. The phototype of E. princeps shows one perfect leaf with rhombic-ovate leaflets, of a type which he did not then associate with E. humeana. Dr. Codd points out further and very correctly that the inflorescence of E. humeana is longer and looser than that of E. lysistemon, and the standard broader and more rounded at tip. These differential characters are clearly shown in the phototype of E. princeps and there can be no doubt whatever that the identity of the species is now settled.

82. Erythrina pygmaea Torre, Bol. Soc. Brot. (Ser. 2) 39:213. 1965.

Flowers of this species are not yet known.

84. Erythrina baumii Harms, in Warb. Kunens - Sambesi Exped. 263:1903.

In Krukoff and Barneby 1972, p. 28 we reported this species from Rhodesia. Polhill informs us that Drummond & Cookson 6225 (K) on basis of which this report was made is from Zambia.

89. Erythrina droogmansiana DeWildeman & Th. Durand, Bull. Suc. Roy. Bot. Belg. 40:19. 1901.

Uganda: Bunyoro District: Budongo Forest, T. J. Synnott 600, 635 (frts), 898, 1340.

In letter of June 1, 1973 Verdcourt informed us that these excellent collections of the species are conspecific with Eggeling 5321 (poor flowering material without leaves) which is

the basis of "Erythrina sp. C" and with Eggeling 3375 (K) (leaves associated with a detached pod) which is the basis of "Erythrina sp. D" provisionally described in Flora of Tropical East Africa (2):538, 560. 1971.

This is the first record of the species from Uganda.

94. Erythrina latissima E. Meyer, Comm. Pl. Afr. Austr. 1:151. 1836.

South Africa: Nelspruit, Krukoff Herb. 1973-17 (Marie Doyer s.n.).

Numerous seed collections of this species as well as of E. abyssinica recently became available to us. Without any exceptions seeds of E. latissima are about twice as large as those of E. abyssinica.

95. Erythrina abyssinica Lamarck, Encycl., Bot. 2:392. 1788; ex DC. Prodr. 2:413. 1825.

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

Through the kindness of Dr. E. R. Thorp of Durban, South Africa, we have received on loan flowering material from a tree grown in the Botanic Gardens there under the name "E. mocambicensis". This material (NH 59823), which represents a form of A. abyssinica Lamk., agrees well with the protologue of E. mossambicensis Sim (For. Fl. Port. E. Afr. 43, Pl. LIV. 1909) and helps to settle the status of this hitherto somewhat ambiguous name. No type of E. mossambicensis is known to survive.

96. Erythrina variegata L. Herb. Amboin. 10. 1754; Amoen. Acad. 4:122. 1759.

Brazil: Bahia: Itabuna, cult. T. S. Santos 1088 (UB).

97. Erythrina tahitensis Nadeau, Enum. Pl. Tahiti 80. 1873.

Erythrina sandwicensis Degener var. sandwicensis forma sandwicensis, Pacific Science 13:168. 1959.

Erythrina sandwicensis Degener var. sandwicensis forma alba H. St. John, Pacific Science 13:168. 1959.

Erythrina sandwicensis Degener var. sandwicensis forma lutea H. St. John, Pacific Science 13:168. 1959.

Erythrina sandwicensis Degener, var. luteosperma H. St. John, Pacific Science 13:168. 1959.

Hawaii: K. R. Woolliams s.n. (Krukoff Herb. 1973-18).

The reduction of E. sandwicensis Degener to synonymy of E. tahitensis Nadeau is fully discussed in Jour. Arn. Arb. 53:136. 1972. In its Hawaiian range the species varies somewhat in color of standard and seeds, but no more than many continental members of the genus. Albino mutants are known in E. cristagalli, E. falcata, E. berteroana, E. caffra, E. variegata, and are likely to occur in many others. The standard of E. berteroana, as noted by Standley (Field Mus., Bot. 18:540. 1937) varies from bright red to pink, the former commonest in the temperate highlands, the paler type prevalent in tierra caliente; it is not known experimentally whether these color shades are inherited. The standard of the rare E. oliviae, however, varies from yellowish-green to vivid orange-buff on a single tree. The standard of E. caffra, commonly vermilion red, varies through shades of terra-cotta, orange, and cream, with no geographic correlation, and African students of Erythrina have never treated such minor variants as taxonomically significant. For this reason we list St. John's fma. alba and fma. lutea as straight synonyms of E. tahitensis. The var. luteosperma St. John appears to have been based on an unusual tree in which the normal red coloring was lost not only from the standard but also from the seeds. There is no evidence at present that this represents more than an individual variant.

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

It would be interesting to check on Barneby's suggestion that this species with green flowers and leaves which are fetid when fading is pollinated by bats.

100. Erythrina insularis F. M. Bailey, Queensl. Agr. Jour. 1: 228. 1897.

Recent collections of E. merrilliana in fruit indicate that this may prove to be a synonym of E. insularis which is probably based on an outlying population of E. merrilliana. New collection of E. insularis in flower from Turtle Island, Queensland, Australia are needed as this species is known only from fruit collection.

107. Erythrina schliebenii Harms, in Mildbr. Notizbl. Bot. Gart. Berlin 12:512. 1935.

Fruits of this species not yet known, are needed for comparison with those of closely related E. perrieri.

Species excluded from the genus

The holotype of E. bracteata K. B. Presl., Symb. Bot. 1: 70. 1832, presently at Praha (PRC) recently became available on which was also based Corallodendron bracteatum (K. B. Presl.) Kuntze, Rev. Gen. 172. 1891. It has been examined at the New York Botanical Garden by Mary T. Kalin Arroyo and found to be conspecific with Camptosema isopetalum (Lamarck) Taubert in Engler & Prantl. Natur. Pflanzenfam. (III). 3:368. 1894.

Appendix V

Lists of species which are known to occur in various countries in the wild (American)

U.S.A. ..... 2 spp.

West Indies ..... 12 spp., 2 var.

Mexico ..... 22 spp., 2 ssp. & 2 forms (Oaxaca-13 spp., 1 form)

Central America ..... 28 spp. (Guatemala-18 spp.)

South America ..... 22 spp., 1 form

Species native to U.S.A. (2 spp.)

herbacea subsp. herbacea, flabelliformis.

Species native to the West Indies (incl. Trinidad) (12 spp. and 2 var.)

fusca			eggersii
standleyana			buchii
berteroana			leptopoda
pallida			elenae
corallodendrum	var.	corallodendrum	cubensis
"	var.	bicolor	velutina
"	var.	connata	grisebachii

Antigua (2): corallodendrum var. bicolor, velutina.

Aruba (1): velutina.

Cuba (7): fusca, standleyana, berteroana, elenae, cubensis, velutina, grisebachii.

Camaguey (1): berteroana.
Habana (4): fusca, berteroana, velutina, grisebachii.
Isla de Pinos (3): standleyana, berteroana, cubensis.
Las Villas (5): fusca, berteroana, elenae, cubensis, grisebachii.
Matanzas (2): berteroana, grisebachii.
Oriente (4): fusca, berteroana, cubensis, grisebachii.
Pinar del Rio (5): fusca, standleyana, berteroana, cubensis, grisebachii.

Curacao (1):	velutina.
Dominica (1):	corallodendrum var. bicolor.
Dominican Rep. (4):	fusca, berteroana, buchii, velutina.
Gran Cayman (1):	velutina.
Grenada (2):	corallodendrum var. bicolor, velutina.
Guadeloupe (2):	fusca, corallodendrum var. bicolor.
Haiti (5):	berteroana, corallodendrum var. corallodendrum, buchii, leptopoda, velutina.
Jamaica (3):	fusca, corallodendrum var. corallodendrum, velutina.
Marie Galante (1):	corallodendrum var. bicolor.
Martinique (2):	fusca, pallida (?), corallodendrum var. bicolor.
Monserrat (1):	corallodendrum var. bicolor.
Puerto Rico (3):	fusca, berteroana, eggersii.
St. Croix (1):	corallodendrum var. connata.
St. John (1):	corallodendrum var. corallodendrum.
St. Kitts (1):	corallodendrum var. bicolor.
Sta. Lucia (1):	corallodendrum var. corallodendrum, corallodendrum var. bicolor.
St. Thomas (2):	corallodendrum var. connata, eggersii.
St. Vincent (3):	fusca, pallida, corallodendrum var. bicolor.
Trinidad and Tobago (3):	fusca, pallida, velutina.
Vieques (1):	eggersii.

Species native to Mexico (22 spp, 2 ssp. and 2 forms)

breviflora, breviflora fma. petrae, breviflora fma. oaxacana, montana, leptorhiza, horrida, herbacea subsp. herbacea, herbacea subsp. nigrorosea, standleyana, flabelliformis, coralloides, pudica, lanata subsp. lanata, lanata subsp. occidentalis, goldmanii, caribaea, folkersii, tuxtlana, chiapasana, tajumulcensis, florenciae, berenices, americana, berteroana, mexicana, oliviae.

Note: Four additional species (E. guatemalensis, E. huehuetenangensis, E. barqueroana, and E. castillejiflora) likely will be found in the extreme eastern Chiapas when this is explored. Extension of range is also expected.

Aguas Calientes (-).	
Baja California (1):	flabelliformis.
Campeche (2):	standleyana, caribaea.
Chiapas (10):	herbacea ssp. nigrorosea, pudica, goldmanii, caribaea, folkersii, chiapasana, tajumulcensis, florenciae, berteroana, mexicana.
Chihuahua (1):	flabelliformis.
Coahuila (-).	
Colima (2):	breviflora, lanata subsp. occidentalis.
Durango (2):	montana, flabelliformis.
Guanajuato (3):	breviflora, leptorhiza, coralloides.
Guerrero (3):	breviflora, lanata subsp. lanata, mexicana.
Hidalgo (5):	breviflora, leptorhiza, herbacea subsp. nigrorosea, coralloides, americana.
Jalisco (5):	breviflora, leptorhiza, flabelliformis, aff. coralloides, lanata subsp. occidentalis.
Mexico and Fed. District (6):	breviflora, leptorhiza, coralloides, lanata subsp. lanata, americana, mexicana.
Michoacan (5):	breviflora, leptorhiza, flabelliformis, aff. coralloides, lanata subsp. lanata.
Morelos (3):	breviflora, leptorhiza, americana.
Nayarit (2):	montana, lanata subsp. occidentalis.
Nuevo Leon (1):	coralloides.
Oaxaca (13):	breviflora, breviflora forma oaxacana, horrida, herbacea subsp. nigrorosea, coralloides, lanata subsp. lanata, goldmanii, caribaea, folkersii, tuxtlana, florenciae, americana, mexicana.
Puebla (6):	breviflora, breviflora forma petraea, leptorhiza, herbacea subsp. nigrorosea, coralloides, americana, oliviae.

Querétaro (1):	standleyana.
San Luis Potosi (5):	leptorhiza, montana, herbacea subsp. nigrorosea, coralloides, mexicana.
Sinaloa (3):	montana, flabelliformia, lanata subsp. occidentalis.
Sonora (1):	flabelliformis.
Tabasco (2):	herbacea subsp. nigrorosea, caribaea.
Tamaulipas (1):	herbacea subsp. herbacea, herbacea subsp. nigrorosea.
Tlaxcala (1):	leptorhiza.
Veracruz (9):	herbacea subsp. nigrorosea, coralloides, caribaea, folkersii, tuxtlana, chiapasana, berenices, americana, mexicana.
Yucatan (1):	standleyana.
Zacatecas (2):	montana, flabelliformis.

Species native to Central America (incl. Panama) (28 spp.)

fusca
poeppigiana
standleyana
goldmanii
folkersii
cochleata
hondurensis
chiapasana
atitlanensis
cobanensis
williamsii
tajumulcensis
chiriquensis
macrophylla
guatemalensis
globocalyx
steyermarkii
florenciae
huehuetenangensis
lanceolata
costaricensis
barqueroana
berteroana
rubrinervia
mexicana
salviiflora
castillejiflora
gibbosa

Belize (3 spp.)

fusca, standleyana, folkersii.

Guatemala (18 spp.)

fusca, standleyana, goldmanii, folkersii, hondurensis, chiapasana, atitlanensis, cobanensis, williamsii, tajumulcensis, macrophylla, guatemalensis, florenciae, huehuetenangensis, barqueroana, berteroana, salviiflora, castillejiflora.

Alta Verapaz (5):	folkersii, cobanensis, williamsii, guatemalensis, berteroana.
Baja Verapaz (2):	guatemalensis, berteroana.
Chimaltenango (1):	macrophylla.
Chiquimula (1):	berteroana.
El Progreso (2):	guatemalensis, berteroana.
El Quiche (3):	chiapasana, macrophylla, berteroana.
Esquintla (2):	fusca, berteroana.
Guatemala (2):	macrophylla, berteroana.
Huehuetenango (8):	goldmanii, chiapasana, macrophylla, guatemalensis, huehuetenangensis, barqueroana, berteroana, castillejiflora.
Isabal (4):	fusca, folkersii, hondurensis, berteroana.
Jalapa (1):	berteroana.
Jutiapa (2):	fusca, berteroana.
Peten (3):	standleyana, folkersii, berteroana.
Quetzaltenango (3):	macrophylla, berteroana, salviiflora.
Retalhuleu (1):	berteroana.
Sacatepequez (2):	macrophylla, berteroana.
San Marcos (5):	tajumulcensis, macrophylla, florenciae, berteroana, salviiflora.

Santa Rosa (1):	berteroana.
Sololá (4):	atitlanensis, macrophylla, berteroana, salviiflora.
Suchitepéquez (2):	berteroana, salviiflora.
Totonicapan (1):	macrophylla.
Zacapa (2):	guatemalensis, berteroana.

El Salvador (3 spp.)

fusca, macrophylla, berteroana.

Ahuachapán (1):	berteroana.
Cabañas (-).	
Chalatenango (-).	
Cuscatlán (-).	
La Libertad (2):	fusca, berteroana.
La Paz (1):	fusca.
La Union (-).	
Morazán (1):	berteroana.
San Miguel (-).	
San Salvador (2):	macrophylla, berteroana.
Santa Ana (1):	berteroana.
San Vicente (-).	
Sonsonate (1):	berteroana
Usulután (-).	

Note: Extension of ranges of the above referred to three species are expected in El Salvador.

Honduras (6 spp.)

fusca, hondurensis, macrophylla, lanceolata, berteroana, gibbosa.

Atlántida (1):	hondurensis.
Bay Islands (=Islas de la Bahia) (-).	
Choluteca (-).	
Colón (=Mosquitia) (1):	fusca.
Comayagua (3):	fusca, lanceolata, berteroana.
Copan (1):	berteroana.
Cortés (4):	fusca, hondurensis, lanceolata, berteroana.
El Paraiso (3):	fusca, lanceolata, berteroana.
Morazán (2):	lanceolata, berteroana.
Intibucá (2):	macrophylla, berteroana.
La Paz (1):	lanceolata.
Lempira (-).	
Ocotepeque (3):	macrophylla, lanceolata, berteroana.
Olancho (4):	fusca, lanceolata, berteroana, gibbosa.
Santa Barbara (1):	lanceolata.

Valle (-).
Yoro (2): fusca, lanceolata.

Note: New species are expected from the higher elevations in Honduras also extensions of range.

Nicaragua (5 spp.)

fusca, hondurensis, steyermarkii, lanceolata, berteroana.

Boaco (-).
Carazo (-).
Chinandega (-).
Chontales (2): steyermarkii, berteroana.
Esteli (2): fusca, berteroana.
Granada (2): fusca, berteroana.
Jinotega (1): berteroana.
León (1): berteroana.
Madriz (-).
Managua (1): berteroana.
Massaya (-).
Matagalpa (3): fusca, lanceolata, berteroana.
Rivas (1): fusca.
Zelaya (= Bluefields) (3): fusca, hondurensis, steyermarkii.

Note: New species are expected from the higher elevations in Nicaragua (from the Cordillera Central, etc.) and many new extensions of range.

Costa Rica (8 spp.)

fusca, cochleata, globocalyx, steyermarkii, lanceolata, costaricensis, berteroana, gibbosa.

Alajuela (6): fusca, cochleata, steyermarkii, lanceolata, berteroana, gibbosa.
Cartago (7): fusca, cochleata, steyermarkii, lanceolata, costaricensis, berteroana, gibbosa.
Guanacaste (5): fusca, steyermarkii, lanceolata, costaricensis, berteroana.
Heredia (2): fusca, berteroana.
Limón (3): cochleata, costaricensis, gibbosa.
Puntarenas (5): fusca, steyermarkii, costaricensis, berteroana, gibbosa.
San José (6): fusca, globocalyx, lanceolata, costaricensis, berteroana, gibbosa.

Panama (7 spp.)

fusca, poeppigiana, chiriquensis, costaricensis, berteroana, rubrinervia, gibbosa.

Bocas del Toro (3):	fusca, costaricensis, gibbosa.
Canal Zone (3):	fusca, costaricensis, berteroana.
Chiriquí (4):	chiriquensis, costaricensis, berteroana, gibbosa.
Coclé (2):	berteroana, gibbosa.
Colón (2):	fusca, costaricensis.
Darien (5):	poeppigiana, costaricensis, berteroana, rubrinervis, gibbosa.
Los Santos (1):	berteroana.
Panama (4):	fusca, costaricensis, berteroana, rubrinervia.
Pearl Islands (-).	
San Blas (intendencia) (-).	
Veraguas (1):	berteroana.

Note: E. edulis which was collected recently in the province of Chiriqui is regarded here as a cultivated plant.

Species native to South America (22 spp. and 1 form)

fusca
crista-galli
falcata
dominguezii
ulei
verna
poeppigiana
edulis
speciosa
polychaeta
schimpffii
smithiana
cochleata
costaricensis
berteroana
rubrinervia
amazonica
similis
peruviana
mitis
pallida
velutina
" forma aurantiaca

Venezuela (8)

fusca, poeppigiana, edulis, berteroana, rubrinervia, mitis, pallida, velutina.

Amazonas (-).	
Anzoátegui (3):	fusca, poeppigiana, velutina.
Apure (1):	fusca.
Aragua (2):	fusca, velutina.
Barinas (2):	poeppigiana, rubrinervia.
Bolívar (4):	fusca, poeppigiana, mitis, pallida.
Carabobo (4):	fusca, poeppigiana, mitis, velutina.
Cojedes (-).	
Delta Amacuro (1):	fusca.
Falcón (3):	poeppigiana, pallida, velutina.
Federal District (4):	fusca, poeppigiana, mitis, velutina.
Guarico (2):	fusca, velutina.
Lara (4):	fusca, poeppigiana, rubrinervia, pallida.
Mérida (5):	fusca, poeppigiana, rubrinervia, mitis, pallida.
Miranda (4):	poeppigiana, mitis, pallida, velutina.
Monagas (2):	fusca, poeppigiana.
Nueva Esparta (-).	
Portuguesa (=Bolívar) (-).	

Sucre (3):	poeppigiana, mitis, velutina.
Tachira (3):	poeppigiana, edulis, rubrinervia.
Trujillo (2):	poeppigiana, mitis.
Yaracuy (2):	poeppigiana, mitis.
Zamora (-).	
Zulia (3):	fusca, poeppigiana, berteroana.

Guiana (2 spp.)

fusca, amazonica.

Surinam (2 spp.)

fusca, amazonica.

French Guiana (2 spp.)

fusca, amazonica.

Colombia (10 spp.)

fusca, ulei, poeppigiana, edulis, cochleata, costaricensis, berteroana, rubrinervia, amazonica, velutina.

Amazonas (1):	fusca
Antioquia (4):	fusca, edulis, cochleata, costaricensis.
Arauca (-).	
Atlántico (2):	fusca, berteroana.
Bolívar (2):	fusca, berteroana.
Boyacá (4):	poeppigiana, edulis, costaricensis, rubrinervia.
Caldas (4):	poeppigiana, edulis, cochleata, rubrinervia.
Caqueta (1):	poeppigiana.
Cauca (4):	fusca, poeppigiana, edulis, rubrinervia.
Choco (2):	costaricensis, berteroana.
Cundinamarca (6):	fusca, poeppigiana, edulis, cochleata, costaricensis, rubrinervia.
Goajira (2):	berteroana, velutina.
Huila (5):	fusca, poeppigiana, edulis, costaricensis, rubrinervia.
Jurado (-).	
Magdalena (6):	fusca, edulis, costaricensis, berteroana, rubrinervia, velutina.
Meta (1):	poeppigiana.
Nariño (1):	poeppigiana.
Norte de Santander (3):	poeppigiana, edulis, rubrinervia.
Putumayo (3):	poeppigiana, edulis, amazonica.
Santander (1):	rubrinervia.
Tolima (3):	poeppigiana, edulis, rubrinervia.
Uraba (-).	

Valle (5):	fusca, poeppigiana, edulis, costaricensis, rubrinervia.
Vaupés (-).	

Ecuador (10 spp.)

fusca, ulei, poeppigiana, edulis, polychaeta, schimpffii, smithiana, rubrinervia, peruviana, velutina.

Azuay (1):	edulis.
Bolívar (4):	edulis, polychaeta, schimpffii, smithiana.
Cañar (2):	edulis, schimpffii.
Carchi (-).	
Chimborazo (4):	edulis, polychaeta, schimpffii, smithiana.
Cotopaxi (1):	schimpffii.
El Oro (3):	poeppigiana, edulis, smithiana.
Esmeraldas (3):	poeppigiana, edulis, smithiana.
Galapagos Islands(1):	velutina.
Guayas (5):	fusca, edulis, schimpffii, smithiana, velutina.
Imbabura (2):	edulis, schimpffii.
León (-).	
Los Ríos (6):	fusca, poeppigiana, edulis, polychaeta, schimpffii, smithiana.
Loja (2):	edulis, smithiana.
Manabi (1):	velutina.
Napo-Pastaza (5):	ulei, poeppigiana, edulis, schimpffii, peruviana.
Oriente (-).	
Pichincha (2):	edulis, schimpffii.
Santiago-Zamora (2):	poeppigiana, peruviana.
Tungurahua (2):	edulis, schimpffii.

Peru (9 spp.)

fusca, falcata, ulei, poeppigiana, edulis, rubrinervia, amazonica, peruviana, velutina.

Amazonas (1):	edulis.
Ancachs (1):	edulis.
Apurímac (1):	edulis.
Arequipa (-).	
Ayacucho (1):	edulis.
Cajamarca (1):	edulis.
Cuzco (5):	falcata, ulei, poeppigiana, edulis, rubrinervia.
Huancavelica (-).	
Huánuco (3):	ulei, poeppigiana, edulis.
Ica (-).	

Junín (3):	falcata, ulei, edulis.
Lambayeque (1):	velutina.
Libertad (1):	falcata.
Lima (-).	
Loreto (6):	fusca, ulei, poeppigiana, edulis, amazonica, peruviana.
Madre de Dios (1):	falcata.
Moquegua (-).	
Pasco (1):	edulis.
Piura (-).	
Puño (1):	rubrinervia.
San Martín (3):	fusca, poeppigiana, rubrinervia.
Tacna (-).	
Tumbes (-).	

Brazil (11 spp. and 1 form)

fusca, crista-galli, falcata, dominguezii, ulei, verna, poeppigiana, speciosa, amazonica, similis (?), velutina, velutina fma. aurantiaca.

Acre (2):	verna, poeppigiana.
Alagoas (-).	
Terr. Amapa (1):	fusca.
Amazonas (3):	fusca, ulei, amazonica.
Bahia (4):	fusca, verna, speciosa, velutina.
Ceará (1):	velutina.
Distrito Federal (3):	crista-galli, dominguezii, speciosa.
Espirito Santo (1):	speciosa.
Goiás (1):	dominguezii.
Maranhão (5):	crista-galli, falcata, ulei, verna, amazonica.
Mato-Grosso (3):	dominguezii, verna, similis (?)
Minas Geraes (6):	fusca, crista-galli, falcata, verna, speciosa, velutina.
Pará (3):	fusca, ulei, amazonica.
Paraná (3):	crista-galli, falcata, speciosa.
Paraiba (1):	velutina.
Pernambuco (2):	fusca, velutina.
Piaui (2):	fusca, velutina.
Rio de Janeiro and Guanabara (5):	crista-galli, falcata, verna, speciosa, velutina.
Rio Grande do Norte (-).	
Rio Grande do Sul (2):	crista-galli, falcata.
Terr. Rondônia (2):	fusca, ulei.
Terr. Roraima (-).	
Santa Catarina (3):	crista-galli, falcata, speciosa.
São Paulo (5):	crista-galli, falcata, verna, speciosa, velutina.
Sergipe (-).	

Paraguay (4 spp.)

crista-galli, falcata, dominguezii, similis.

Note: New collections of E. similis are badly needed.

Uruguay (1 sp.)

crista-galli.

Argentina (3 spp.)

crista-galli, falcata, dominguezii.

Buenos Aires (1):	crista-gallii.
Catamarca (-).	
Chaco (2);	crista-galli, dominguezii.
Córdoba (-).	
Corrientes (2):	crista-galli, dominguezii.
Entre Ríos (1):	crista-galli.
Formosa (1):	dominguezii.
Jujuy (3):	crista-galli, falcata, dominguezii.
Los Andes (-).	
Mendoza (-).	
Misiones (2):	crista-galli, falcata.
Neuquén (-).	
Pampa Central (-).	
Rioja (-).	
Rosario (-).	
Salta (2):	falcata, dominguezii.
San Juan (-).	
San Luiz (-).	
Santa Fe (2):	crista-galli, falcata.
Santiago del Estero (1):	crista-galli.
Tucumán (2):	crista-galli, falcata.

Bolivia (8 spp.)

fusca, crista-galli, falcata, dominguezii, ulei, poeppigiana, rubrinervia, similis.

Chaco (-).	
Chuquisaca (-).	
Cochabamba (2):	falcata, ulei.
El Beni (2):	fusca, poeppigiana.
La Paz (4):	falcata, poeppigiana, ulei, rubrinervia.
Oruro (-).	
Pando (1):	fusca.
Potosí (-).	
Santa Cruz (3):	dominguezii, verna, rubrinervia.
Tarija (-).	

Note: Two collections of E. edulis were seen from Bolivia but it is possible that they are cultivated plants.

Bibliography

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

5e. Krukoff, B. A. & R. C. Barneby. Notes on the species of Erythrina. VI. Phytologia 23: 1-31. 1972.