



A revision of *Cressa* L. (Convolvulaceae)

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Received June 1999; accepted for publication December 1999

Previous treatments of the genus *Cressa* have ranged from splitting it into 19 species or lumping all the variation into *C. cretica* L., the type species. Morphological study reveals that there are four species, two in the Americas and two in the Old World. The American species are *C. truxillensis* Humb., Bonpl. & Kunth and *C. nudicaulis* Griseb. Africa and Eurasia support *C. cretica*. Australia and Timor have *C. australis* R. Br., although since the 1860s it has largely been misidentified and reported as *C. cretica*. Differences occur in several organs, but leaf shapes are distinctive in two species: *C. nudicaulis* has scale-like leaves, while in *C. cretica*, leaves are usually lanceolate. Peduncle lengths, stamen lengths, filament pubescence and ranges distinguish *C. truxillensis* from *C. australis*. A key and generic and specific descriptions are given with typification. Specimen citation represents the geographic ranges of each species.

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ADDITIONAL KEY WORDS:—biogeography common names halophytes morphology rhizomatous.

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INTRODUCTION

Variation in *Cressa* has been handled in two ways: extreme lumping into the single species *C. cretica*, or extreme splitting of every morphological variant into 19 species (Goodding, 1904; House, 1906; Heller, 1913; Rydberg, 1913; Choisy, 1845; Verdcourt, 1963; Ooststroom, 1972; Johnson, 1981, 1992). Neither of these extreme approaches is supported by the morphology and biogeography of the plants. More careful examination reveals that there are four morphotypes. Those in the New

World represent *C. nudicaulis* and *C. truxillensis* (e.g. O'Donell, 1959; Shinnars, 1970; Austin, 1982). The two in the Old World, however, are still being placed in a single species, *C. cretica* (Verdcourt, 1963; Ooststroom, 1972; Johnson, 1981, 1992). Old World plants are considered one species even though those in Europe, Africa and Asia are morphologically and geographically distinct from those in Australia.

Bentham (1869) thought it best to treat the Old World and Australian plants in the broad sense, *C. cretica*, although he too, like Brown (1810), and Choisy (1845), thought that the Australian plants were different from those in Europe. Hallier (1893) considered the plants in Eurasia and Africa to be *C. cretica*. Of the others, he thought that the American (*C. truxillensis*) and the Australian plants (*C. australis*) were the same. O'Donell (1959: 261) disagreed and separated *C. truxillensis*, but made no comment on the Australian plants.

Ooststroom (1972) continued calling the Australian and Timor plants *C. cretica*. However, he had misgiving about doing so, because he noted several differences between the Eurasian and Australian plants.

Subtle differences are known in species of several genera in this family. That, and incomplete knowledge of phenetic plasticity, among other things, have caused the variation in past treatments. Several traits distinguish the four morphotypes (Table 1). Leaf shape, peduncle length, sepal ciliation, corolla tube vs lobe lengths, and filament basal pubescence distinguish *C. cretica* from the other Old World populations. There are trends in several other characteristics that also suggest differences. These differences are not as obvious as traits that distinguish *C. nudicaulis* from the others, but are equivalent to those that separate *C. truxillensis* from both *C. cretica* and *C. australis*. Examination of all the named populations indicates that Brown (1810) and Hallier (1893) were correct in considering the Australian plants a species distinct from *C. cretica*.

Among the North American plants there has been a tendency to recognize numerous varieties (e.g. Munz, 1973; Hickman, 1993). These varieties are minor life-form differences that reflect no geographical distinctions. One of the important criteria for distinguishing varieties has been whether or not the plants are erect or decumbent. Field studies show both to grow beside each other in the same places (e.g. Austin, 1990, 1991, 1992; Austin & Austin, 1992). There are comments on herbarium labels that younger plants are erect and older decumbent. This variation is worthy of further elaboration, but is not indicative of specific or varietal differences.

TAXONOMY

Cressa L., Sp. Pl. 223. 1753.

Type species: C. cretica L.

ROOTS horizontal, geminate, with lateral branches leading upward to produce above-ground parts. PERENNIAL SUBSHRUB OR HERB, usually much-branched. STEMS at first erect and then becoming decumbent, apparently short-lived, grey appressed pilose to sericeous. LEAVES on main branches often larger than those on branchlets, the blade 1–12 mm long, lanceolate, ovate or elliptic to scale-like, sessile or shortly petiolate. FLOWERS solitary, axillary, 5–8 mm long, sessile or on short peduncles, bracteate, in spicate to head-like clusters at tips of branchlets, bracteoles unequal in length. SEPALS ovate to obovate, imbricate. COROLLA salverform, the limb 5-lobed,

TABLE 1. A comparison of some distinguishing traits of the four species of *Cressa*.

Trait	<i>C. cretica</i>	<i>C. australis</i>	<i>C. truxillensis</i>	<i>C. nudicaulis</i>
Leaf attachment	Sessile	Petioles 0.5-2 mm long	Petioles 0.5-2 mm long	Sessile
Leaf shape	Ovate-lanceolate to ovate	Elliptic-oblong	Elliptic to lanceolate or ovate-lanceolate	Reduced and scale-like
Leaf width	1-2(-6) mm	(1-)3-5 mm	1-4 mm	c. 1 mm
Leaf tip	Usually acuminate	Acute	Usually acute	Acute
Leaf base	Cuneate, rounded or ± cordate	Cuneate	Cuneate, sometimes obtuse	Deloid
Peduncle length	<1 mm long	1-2 mm long	2-6 mm long	1-2 mm long
Bracteole shape	Mostly linear	Ovate-oblong	Ovate to ovate-lanceolate	Elliptic to ovate
Bracteole length and width	2-3 mm long, 1 mm wide	3-4 mm long, 1 mm wide	2-3 mm long, mostly 1 mm wide	2-3 mm long, 1-1.5 mm wide
Outer sepal shape	Ovate	Obovate	Obovate to elliptic	Elliptic
Corolla tube length	2-3 mm long	3.5-4 mm long	3-3.5 mm long	3-4 mm long
Corolla limb vs tube	Lobes shorter than tube	Lobes shorter than tube	About as long as the tube	About as long as the tube
Filament base	Glabrous	Glabrous	Pubescent with glandular indumentum	Pubescent with glandular indumentum
Anther length	0.6-1 mm long	1.3-1.5 mm long	1-1.5 mm long	1.6-2 mm long

the lobes mostly ovate, imbricate, spreading to reflexed. STAMENS exerted; filaments filiform; styles exerted. OVARY 2-locular, 4-ovulate; styles 2, distinct to the base; stigmas capitate. FRUIT capsular, ovoid, unilocular, 2-4-valved, usually 1-seeded. SEEDS 3-4 mm long, glabrous and smooth and shining to reticulate, dark brown.

Etymology, Cressa: Greek, based on *kris* or *kriti*, "from Crete", a Cretan woman; *Cressus* was also the old name for what is currently Candia (English) or *Iráklion* (Greek), a city on the northern side of Crete; apparently not etymologically related to *cress* or *cressa* (Cruciferae) of Germanic derivation.

All of the species are halophytes, apparently adapted for living in virtually any type of substrate from alkaline soils to volcanic lava or clays and sands. Among the associated species are other known halophytes such as *Salicornia* L. and *Halosarcia* P. G. Wilson (Chenopodiaceae), *Sporobolus virginicus* (L.) Kunth and *Alloteropsis* J. Presl (Poaceae), and *Eleocharis* R. Br. & *Fimbriostylis* Vahl (Cyperaceae). The life form, usually called geophytic and chamaephytic, but apparently a rhizomatous cryptophyte, is also poorly known.

KEY TO SPECIES

1. Leaves on branchlets (Fig. 1C) reduced and scale-like *C. nudicaulis*
1. Leaves on branchlets (Fig. 1A, B, D) normally developed with blade and petiole.
2. Leaves on branchlets with petioles <0.5 mm long, the blades mostly ovate-lanceolate, tips mostly acuminate..... *C. cretica*
2. Leaves on branchlets with petioles 0.5-2 mm long, the blades mostly elliptic-oblong to elliptic, tips acute.
3. Peduncles 2-6 mm long. Corolla lobes $\geq 2/3$ as long as the tube; stamens 4-6 mm long, filament base glabrous *C. truxillensis*
3. Peduncles 1-2 mm long. Corolla lobes *c.* $1/2$ as long as the tube; stamens 2.5-3 mm long, filaments basally pubescent with glandular indumentum *C. australis*

Cressa australis R. Br., Prodr. 490. 1810.

Type. Australia. Queensland. Broad Sound. On label back: 'Broad Sound prope ejus [epes ortum?] in inundatis salsis'. *R. Brown* 65 (holotype BM, n.v., photo FAU; isotype EDINB, n.v., photo FAU); *C. cretica* var. *australis* (R. Br.) Choisy in DC., Prodr. 9: 440. 1845.

SUFFRUTESCENT HERBS, the stems *c.* 20 cm tall, much-branched, appressed-strigose. **LEAVES** petiolate, 0.5-2 mm long, the blades elliptic-oblong, 5-11 mm long, (1-)3-5 mm wide, tip acute, basally cuneate, strigose-appressed. **FLOWERS** solitary, axillary, in terminal heads, the peduncles 1-2 mm long, the bracteoles ovate-oblong, unequal, 3-4 mm long, 1 mm wide, the pedicel absent. **SEPALs** $\pm$ equal, the outer obovate, 3-4 mm long, 2 mm wide, obtuse, hairy, the inner obovate, 3-3.5 mm long, 1 mm wide obtuse, the margins herbaceous. **COROLLA** white or rose, salverform, 5.5-6 mm long, the tube 3.5-4 mm long, the limb 5-lobed, the lobes obtuse, lobes shorter than tube, pubescent without, stamens exerted, 2.5-3 mm long, glabrous, 1.3-1.5 mm long, oblong. **OVARY** ovoid, 2-locular, apically hirsute, the styles unequal, 2.5-3 mm long, the stigmas capitate, smooth. **FRUIT** capsular, ovoid, 4-5 mm long,

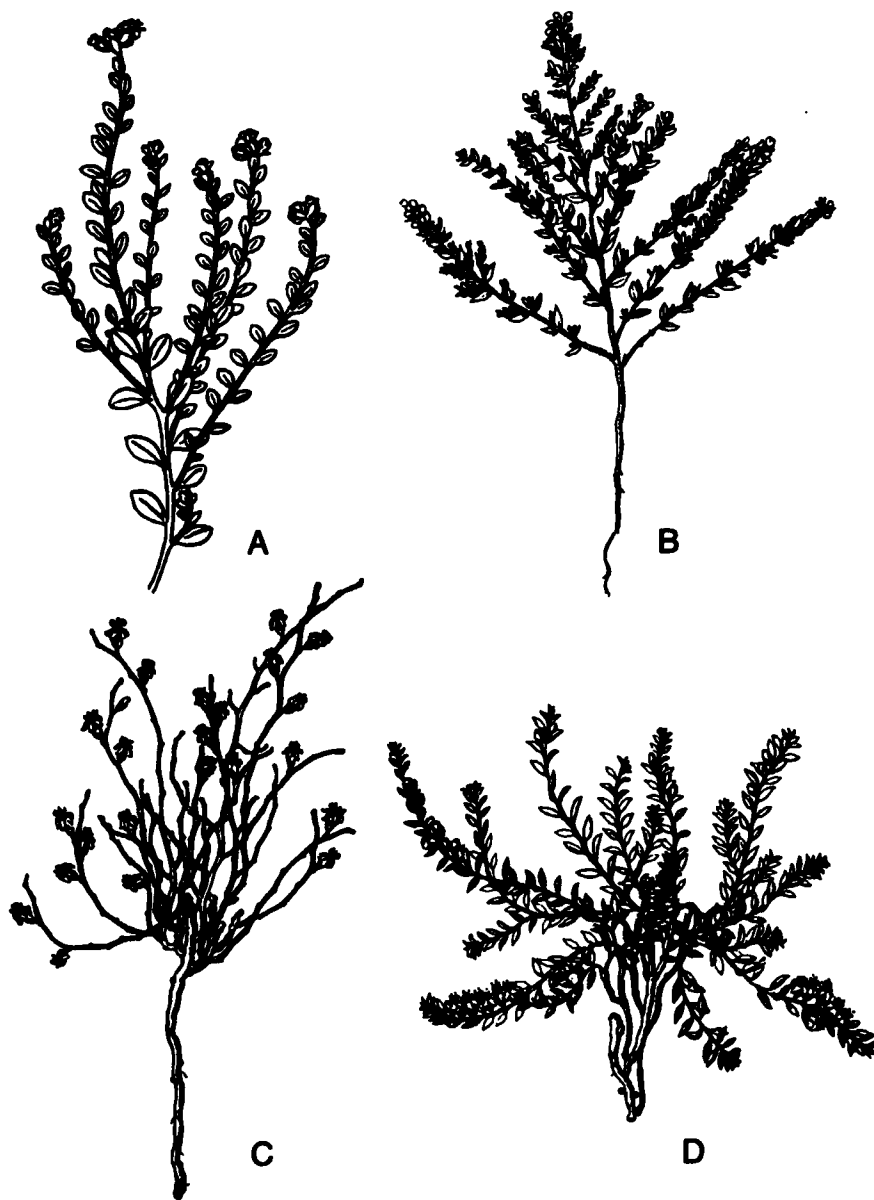


Figure 1. *Cressa* habit. A. *Cressa australis*; B. *Cressa cretica*; C. *Cressa nudicaulis*; D. *Cressa truxillensis*. Adapted and modified from Oostroom (1972:937), O'Donell (1959:259), and Gonçalves (1987:22). Artwork by Mardie Banks.

3 mm wide, brown, surrounded at least basally by the calyx, apically hirsute to villous, unilocular. SEEDS usually 1, ovoid, 3–3.5 mm, brown to dark brown, smooth, glabrous.

Distribution. Timor, Australia (Western Australia, Northern Territory, Southern Australia, Queensland, New South Wales, Victoria).

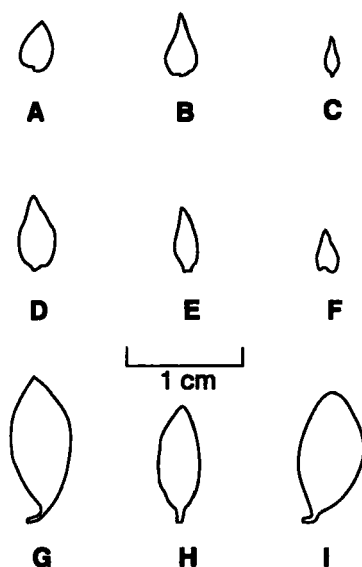


Figure 2. Variation in size and shape in *Cressa* leaves. A.–F. *Cressa cretica*. G.–H. *Cressa australis*. I. *Cressa truxillensis*. Specimen localities and collectors: A. Crete, after *Baldacci* 1899 (MO); B. Cyprus, after *Delessert* 1017 (MO); C. Africa, Sudan, after *Roberty* 5339 (MO); D. Egypt, Alexandria, after *Du Parquet* Oct. 1870 (MO); E. Africa, Algeria, after *Reverchon* July 1896 (MO); F. Pakistan, Karachi, after *Asad Raza* 21 (MO); G. Australia, Queensland, after *Elsol & Stanley* 724 (MO); H. Australia, South Australia, after *Badman* 1583 (BRI); I. Hawaii, after *Lorence* 6686 (MO). Artwork by Adrien Spano.

Common names. “Rosinweed” (from herbarium labels).

Recent illustrations. Ooststroom (1972: 937, fig. 5, as *C. cretica*), Johnson (1981: 285, fig. 379D, as *C. cretica*; 1992: 377, 378, as *C. cretica*).

Representative specimens

INDONESIA. Portuguese Timor. Batugadé. *Cinatti* 339 (L). AUSTRALIA. NEW SOUTH WALES. W of Warrego River at Poison Point on Bourke-Warnaaring Road. 5 xi. 1971. *Blaxell* 596 (BRI). NORTHERN TERRITORY. NE Laguna Station. 27. vii. 1949. *Perry* 2595 (BRI); Alice Springs, MT Dare Station. 4. iv. 1974. *Latz* 4775 (BRI); Alice Springs, Pietree WH, SSW Sandringham Station. 22. i. 1970. *Latz* 535 (BRI); Gulf of Carpentaria, Maria Island. 11. vii. 1972. Gulf of Carpentaria, Observation Island. 21. x. 1911. *Heill* 637 (BRI); *Dunlop* 2776 (BRI); Napperby Station. 20. i. 1972. *Henry* 387 (BRI); Ringwood Station. 4. x. 1973. *Henry* 1017 (BRI). QUEENSLAND. Burke District, Bentinck Island, SE corner near Njinjilki Lake. vi. 1963. *Tindale and Aitken s.n.* (BRI); Burke District, Karwmba. 12. vii. 1960. *Trapnell* 194 (BRI); Burke District. Bountiful Island. vi. 1901. *Bailey s.n.* (BRI); Burke District. Normantown. 19. v. 1935. *Blake* 8990 (2 sheets BRI); Burke District. N of Karumba. 7. ix. 1987. *Harris* 222 (BRI); Burke District. The Shell Ridge, N of Wernadinga Station. 30. iv. 1974. *Pullen* 8994 (BRI); Cook Distr. Annie River, Princess Charlotte Bay. 12. v. 1979. *Elson & Stanley* 724 (BRI, MO); Cook District. SW Mapoon. 7. viii. 1983. *Clarkson* 4949 (BRI); Cook District. Weipa, marine plain E of Andoom Creek. 6. viii. 1985. *Foster* FB6 (BRI); Gregory South District, Diamantina River, SE of Durrie. 20. x. 1978. *Purdie* 1391 (BRI); North Kennedy District, Mount Luce,

Bowen. ix. 1960. *Williams s.n.* (BRI); Wide Bay District, Elliott River area. 24. xii. 1963. *Fernhill AQ 275877* (BRI); Burke District. Carpentaria Island. 27. xi. 1802. *R. Brown* (BM); Gregory South District. Cuddapan Homestead via Windoral. 26. x. 1980. *Bolton 153* (BRI). SOUTH AUSTRALIA. Adelaide Plains, near Two Wells Railroad Station. 26. ii. 1969. *Copley 2518* (BRI); Lake Eyre Basin, NNE Etudunna HS. 25. ii. 1984. *Badman 1583* (BRI); Lake Eyre, Margaret Creek, W of Coward Spring Railway Siding. 4. iii. 1983. *Weber 8772* (BRI); Lake Eyre, E of Miranda Homestead Ruins, Pandie Pandie Station. 20. viii. 1991. *Badman 4953* (BRI). VICTORIA. Terrick Flora Reserve. 24. xi. 1985. *A. C. Beagnglehole 82687* (BRI). WEST AUSTRALIA. S of Wyndham on broad floodplain in Parry Lagoons. 27. vii. 1994. *Mitchell 3708* (BRI).

Brown actually collected *Cressa* in two places while he was in Australia, and there are six plants on a single sheet in BM. He collected No. 65 first (2 plants), and this was later followed by a plant gathered in Queensland that is labelled "*C. indica* Retz." in his handwriting. Apparently, he changed his mind about the identity of the second collection before the *Prodromus* was published because there he included only *C. australis*. Moreover, of *C. cretica* he said "a qua haud species differt *Cressa indica* Retz. . . ." The remaining three plants on the sheet are identified as *C. cretica* by handwriting different from Brown's.

Cressa cretica L., Sp. Pl. 223. 1753.

Type. Crete. Habitat in Cretae litoribus salsis, specimen 317.1 (LINN, n.v.; microfiche). *Anthyllis* Alpino, De Plantis exoticis 157, t. 156. 1656.

Polygonum creticum, thymi folio C. Bauhin, Pinax Theatri botanici 281. 1671.

Cressa cretica Ray, Historia Plantarum 215. 1686–88.

Lysimachiae spicatae purpureae affinis, flosculis in cacumine caulis, pluribus quasi in nodos junctis Pluk., Almagestum botanicum 236. t. 43. f. 6. 1696.

Quamoclit minima humifusa palustris, herniariae folio Tourn., Corollarium institutionum rei herbariae. 4. 1703.

Cressa cretica Magnol, Novus character plantarum. 212. 1720.

Cressa cretica L., Amoenitates academicae 1:395. 1749.

Cressa arabica Forssk., Flora Aegyptia Arabica 54. 1775. *Type*: Egypt. El Tûr ("Tor"), ix. 1762. *Forsskål 441* (holotype C); cf. Hepper and Friis (1994: 137) for information on other specimens collected by Forsskål.

Cressa humifusa Lam., Flore françoise 2:268. 1778 [nom. illeg.]

Cressa indica Retz., Observationes botanicae sex fasciculis comprehensae 4:24. 1786–1787. *Type*: India. "in salsis indiae. Or. Viget à Februario in lulium Cel." *König* (C has 3 sheets; photos FAU); *C. cretica* var. *indica* (Retz.) Choisy in DC., Prodr. 9: 440. 1845.

Cressa monosperma Stokes, A botanical materia medica 2:33. 1812 [nom. illeg.]

Cressa villosa Hoffmanns. & Link, Flore portugaise 1:372. 1809–1820. *Type*: Portugal. "dans les contrées de l'Algarve, inondees pendant l'hyver, siches en été." *Hoffmansegg* (HAL?, n.v.); *C. cretica* var. *villosa* (Hoffmanns. & Link.) Choisy in DC., Prodr. 9: 440. 1845.

Cressa intermedia T. Anderson, Journal Linnean Society 5 (suppl. 1):32. 1860. *Type*: Adan. *Andersen* (not found @ K, BM, L, WAG).

Cressa loscosii Trémols in Loscos, Tratado de Plantas de Aragon 1:38. 1877. *Type*: Spain. Aragon. in fovea La Saladeta inde Castelserás, ad oppidum Andorra, 10. ix. 1874–1875. *Loscos 61* (isotype MO).

Cressa microphylla St-Lag., Annales de la Société Botanique de Lyon 7:63, 123. 1880 [nom. illeg.]

Cressa ballii Batt. in Batt. & Trab., Flora de l'Algir (Dicots) 629. 1888. Type: Algeria. *Battandier* (AL?, not found).

SUFFRUTESCENT HERBS, the stems (4-)8-14(-23) cm tall, stems usually branched gray-green appressed-pilose. LEAVES sessile, the blades ovate-lanceolate to ovate, 2-5(-9) mm long, 1-2(-6) mm wide, tip acuminate, basally cuneate, rounded or $\pm$ cordate, grey-green appressed pubescent. FLOWERS solitary, axillary, aggregated at ends of branchlets, short-spicate, the peduncles <1 mm long, the bracteoles mostly linear, unequal, 2-3 mm long, 1 mm wide, the pedicel absent. SEPALS $\pm$ equal, the outer ovate, 3-4 mm long, 1.5-2 mm wide, acute to obtuse, the outer silky pubescent, the inner ovate, 2.5-3 mm long, 1-1.5 mm wide, acute, the margins herbaceous. COROLLA white with pink flush on lobes, salverform, 5-6 mm long, the tube 2, 3 mm long, the limb 5-lobed, the lobes obtuse, lobes shorter than tube, pubescent without; stamens exserted, 3 mm long, usually equal, glabrous, 0.6-1 mm long, oblong with the base cordate to $\pm$ bilobed; ovary ovoid, 2-locular, apically pilose, the styles unequal, 2-2.5 mm long, the stigmas capitate, smooth. FRUIT capsular, ovoid, 3-4 mm long, brown, surrounded at least basally by the calyx, apically pilose unilocular. SEEDS usually 1, ovoid, 3 mm, dark brown, glabrous.

Distribution. Europe (Portugal, Spain, France [Corsica], Italy [Calabria, Sardegna, Sicilia], Bulgaria, Albania, Islas Baleares, Malta, Crete, Greece), Africa (Guinea Bissau, Mauritania, Lybia, Egypt, Sudan, Ethiopia, Somalia, Kenya, Mozambique, Angola), Malagasy Republic, Iraq, Iran, Afghanistan, West Pakistan, India, Sri Lanka.

Common names. ανθυλλισ anthyllis (Greek; Alpini, 1656), "Hartzkraut" (German; Nikolov, 1996), "rosin-weed" (English; Nikolov, 1996), "cressa de Crète", "cresse à feuille d'herniaire" (French; Boulos, 1983; Nikolov, 1996), "cressa" (Italian; Pignatti, 1982), "ghorara", "melifa", "melliha", "nadwa", "nedewah", "shuwwayl" (Arabic; Boulos, 1983; Ghazanfar, 1994), "gūn" (Sindhi; Watt, 1889), "chavel", "khardi" (Marathi; Watt, 1889), "uppa sanaga" (Telugu; Watt, 1889), "panit-tanki" (Tamil; Austin, 1980).

Recent illustrations. Pignatti (1982: 385), Gonçalves (1987: 22, tab. 6), Ghazanfar (1994: 89, fig. 29).

Representative specimens

Africa. ALGERIA. Bougie. vii. 1896. *E. Reverchon s.n.* (MO). La Péria. viii. 1888. *J. Garrigues s.n.* (MO). NIGERIA. *Girapetro s.n.* (MO). SUDAN. Khartoum, Sunt forest. 13.xi.1945. *G. Roberty* (MO). TUNISIA. Gabès. i. 1907. *C. J. Pitard 195* (MO). El Djerid: between Kebili & Mansoura oases. 18.ix.1968. *Davis 48096* (MO), *Davis 48101* (MO). SENEGAL. Dagana: Richard-Toll. 3.i.1963. *J. G. Adam 19611* (MO). Rufirque: Lac Tanma. 27.vi.1956. *Jacques-Georges 12263* (MO); 24.ii.1948. *Jacques-Georges 687* (MO); 24.ii.1948. *Jacques-Georges 730* (MO), Dakar. Ngor. 23.x.1948. *Jacques-Georges 2236* (MO). Thie's. Mt. Rolland. 7.viii.1948. *Jacques-Georges 1697* (MO). St. Louis. Sanar. 29.xi.1955. *Jacques-Georges 11168* (MO). St. Louis. Djoudj. 28.iv.1964. *Jacques-Georges 19864* (MO). SOMALIA. Zeyal. 5.iii.1920. *E. Godman 148* (MO). Hobyo District: at Sabacaad. 29.v.1987. *R. G. Wieland 4388* (MO). MADAGASCAR. Mitsingo. x. 1952. *J. Bossier 3642* (MO).

Asia. WEST PAKISTAN. Virance-Nagar Parker Road. 26.xi.1970. *M. Qaiser et al.* 4152 (MO). Bund Murad. 12.i.1969. *M. Ashra s.n.* (MO). Karachi, Manghopir Road. 27.xi.1968. *A. Raza* 21 (MO). Way ló Ch Md. Barrage. 12.i.1969. *M. Ashref s.n.* (MO). Caut Md. Banj. 12.i.1969. *R. Abul Khew s.n.* (MO). Karachi University Campus. 7.ii.1972. *R. Abdul Hkair* 50 (MO). INDIA. BOMBAY. Hadh Island. 9.vii.1966. *Usha Gupta* 39 (MO). UTAR PRADESH. Delhi, Hindun river bank. x. 1958. *Mukherjee s.n.* (BRI). SRI LANKA. Jaffna District. *Thwaites s.n.* in 1890 (in part) (PDA). Mannar District. *Balasubramaniam & Austin* 6194 (FAU, PDA, US). Puttalam District. *Mueller-Dombois et al.* 69042712 (US). Ruhuna National Park. at Gajabawa. 6.vi.1968. *Cooray* 68060601R (MO).

Europe. GREECE. prope Athenas. 7–19.viii.1854. *T. Orphanides* 479 (MO). CRETE. Ghofi dist. Maleaviz. 6.vii.1899. *A. Baldacci* 238 (MO). MACEDONIA. *Friu s.n.* (MO). FRANCE. aux Pasgulers près d'Hyères (var. France). 28.viii.1857. *Huet* 527 (MO). CORSICA. Stagno del Sale. 4.viii.1933. *P. Aellen* 1304 (BRI, MO). SPAIN. ARAGON. in fovea La Saladeta inde Castelserás, ad oppidum Andorra, 10.ix.1874–1875. *Lascos* 61 (MO). MÁLAGA. pr. oppidum Antequera, loco dicto Laguna Herrera. 5.ix.1975. *G. Guardia* 278 (MO). ITALY. SARDEGNA. Cagliari. *Schleicher s.n.* (MO). CYPRUS. Larnaka. *M. Haradjian* 1017 (MO).

Middle East. IRAQ. 20 km W of College of Agriculture. Abu Gharaib. 12.vii.1971. *Hikmat A. Al-Ani et al.* 11657 (MO). Abu Ghraib. 11.xi.1961. *Barkley* 31Ir077 (MO). NE Hatra, Tharar Valley. 23.iv.1973. *Weinert & Mousawi s.n.* (MO). College of Agriculture, Abu Ghraib, Badhdad Liwa. 9.x.1963. *J. Brahim & H. Abbas* 6172 (MO). SAUDI ARABIA. Wādi Sawain, 125 km, Mahhak Bypass. 12.xi.1982. *Gasperetti* PG 420 (MO). L. Habaniyah Lake. 8.xi.1957. *F. E. Egler & N. Polunin s.n.* (MO). prope Used. 15.ix.1835. *W. Schimper* 720 (MO). EGYPT. Mariub. x. 1906. *R. Muschler s.n.* (MO); Ramli. *A. Setourneua s.n.* vii. 1876. (MO); environs d'Alexandria. x. 1870. *DuPasqilt s.n.* (MO). Minshah, Sennouris, Kom Aushim, Faiyum. 29.ix.1967. *Täckholm et al. s.n.* (MO). between Suez & Wadee Feiran. 11–15.v.1851. *G. P. Marsh s.n.* (MO). Bolaq, Kharge oasis. 13.iii.1962. *A. Sharubeim & S. Shalaby s.n.* (MO). Oberg road Sūnnūris–Faīyūm Misqu shore. 24.vi.1980. *A. Abbas & A. El Hediny* 14 (MO). El Qantara East. 24.vi.1979. *H. Nabwi & K. Abdel-Rahman* 14 (MO). Arment. iii. 1851. *Marsh s.n.* (MO). Burg el Arab. 8.ix.1974. *Täckholm s.n.* (MO). Cairo. *A. Wiest* 1835 (BRI). QATAR. 110 km N Daha. 9.v.1976. *M. I. Bajwa* 301–76 (MO). IRAN. Regio transcapica. Krasnowodsk. 28.x.1900. *P. Sintenis* 1305 (MO). Abu-Ghraib. 11.xi.1962. *Barkley* 32Ir077 (MO). Prov. Sistan. Kuh-I Malik Siah et Zabol (Nasratabad). 22.vi.1948. *F. Reehinger* 4094 (MO). Hill road near Dora, in Baghdad Liwa. 27.x.1956. *Reehinger & Naib* 80 (MO).

Cressa nudicaulis Griseb., Goett. Abh. 24:266. 1879.

Type. Argentina. Córdoba. *Lorentz & Hieronymus* 491 (isotype LIL, n.v.).

Cressa aphylla A. Heller, Contr. Herb. Franklin & Marshall College, no. 1:80, pl. 5. 1895. *Type*: USA. Texas. Nueces Co. Corpus Cristi. 31.v.1894. *Heller* 1811 (holotype UC, isotype MSC).

SUFFRUTESCENT HERBS. Stems 10–30 cm tall, stems usually much-branched, appressed sericeous to subsericeous. **LEAVES** sessile, reduce and scale-like, ovate, 1–4 mm long, *c.* 1 mm. the tip acute, deltoid to subcordate, glabrous. **FLOWERS** solitary, axillary, often concentrated toward the branchlet ends, the peduncles 1–2 mm long,

the bracteoles elliptic to ovate, unequal, 2–3 mm long, 1–1.5 mm wide, the pedicel absent. SEPALs $\pm$ equal, elliptic, 4–6 mm long, 2–2.5 mm wide, acute, the outer pubescent, the inner ovate, 3.5–4 mm long, 2.5–3 mm wide, acute to $\pm$ obtuse, with scarious margins. COROLLA white, salverform, 5–7 mm long, the tube 3–4 mm long, the limb 5-lobed, the lobes obtuse, about as long as the tube, pubescent without, stamens exerted, 5–6 mm long, usually equal, the filaments basally pubescent with glandular indumentum, the anthers 1.6–2 mm long, sagittate. Ovary obovoid, unilocular or $\pm$ bilocular basally, apically hirsute, the styles unequal, 3–5 mm long, the stigmas discoid, smooth. FRUIT capsular, ovoid, 4–5 mm long, brown, surrounded at least basally by the calyx, apically pubescent, unilocular. SEEDS 1–2, ovoid, hemiovoid if 2, 3 mm long, brown, finely reticulate.

Distribution. U.S.A. (Texas; Cameron Co., Kleberg Co.), MEXICO (Tamaulipas), ARGENTINA (Catamarca, Córdoba, La Rioja, Mendoza, San Juan).

Common names. “Leafless cressa” (Texas; Shinnars, 1970).

Recent illustrations. O’Donell (1959: 255, fig. 42).

Representative specimens

U.S.A. TEXAS: Cameron Co. vi. 1952. *Johnston* 249–5 (MSC); Kleberg Co. 6.vi.1970. *Correll & Correll* 38892 (UC); Nueces Co. 31.v.1894. *Heller* 1811 (MSC); Willacy Co. *Lundell & Lundell* 8775 (UC). MEXICO. TAMAULIPAS: 2.xii.1939. *Le Sueur* 630 (F). ARGENTINA. CATAMARCA: Dppo. La Paz. 14.x.1971. *Petersen* 9909 (UC). La Rioja: Dtto. Independencia. 17.xi.1963. *Heyward & Lagname* 3224 (NY, UC). State Unknown: Las Salinas. 17.ii.1971. *Ellenberg* 4513 (FAU, GOET).

Cressa truxillensis Humb., Bonpl. & Kunth, Nov. Gen. Sp. Pl. 3:93. 1819.

Type. Peru. Trujillo. *Humboldt & Bonpland* 3727 (microfiche seen; isotype F); *C. cretica* var. *truxillensis* (Humb., Bonpl. & Kunth) Choisy in DC., Prodr. 9: 440. 1845. *C. australis* var. *petiolata* Meisn. in Mart., Fl. Bras. 7:329. 1869; O’Donell, Bol. Soc. Argent. Bot. 6:153. 1957. Type: Argentina. Buenos Aires. *Tweedie* (holotype M, n.v.). *C. depressa* Goodd., Bot. Gaz. 37:58. 1904. Type: USA. Nevada. Virginia River. 6 v. 1902. *Goodding* 726 (isotype UC).

C. insularis House, Bull. Torrey Bot. Club 33:315. 1906. Type: Mexico. Revillagigedo Islands. Socorro Island. *Barkelaw* 252 (holotype US; isotype UC).

C. erecta Rydb., Bull. Torrey Bot. Club 40:466. 1913. Type: USA. Utah. Salt Lake City Co. near Beck’s Hot Springs, vii. 1905. *Garrett* 870f (holotype NY).

C. minima Heller, Muhlenbergia 8:140. tab. 17. 1913. Type: USA. Nevada. Washoe Co. n side Peavine Mt., 1.vii.1907. *Heller & Kennedy* 8663a (holotype UC?; isotype L, n.v.; photo FAU). *C. pumila* sphalm. on tab. 17; *C. truxillensis* var. *minima* (Heller) Munz, Aliso 4:96. 1958.

C. vallicola Heller, Muhlenbergia 8:140. tab. 17. 1913. Type: USA. California. Santa Clara Co., San José. 4. 1908. *Heller* 8936a (holotype UC; isotype L, n.v.; photo FAU); *C. truxillensis* var. *vallicola* (Heller) Munz, Aliso 4:96. 1958.

C. arenaria Willd. in Roem. & Schult., Syst. Veg. 6:207. 1829. Type: “In Americ. merid. Humb. et Bonpl.” There are two sheets. Sheet 1, with XIII on the label, has “in Guanchaco areniosis” in Bonpland’s hand; sheet 2 simply has in the upper right corner the numeral 2 along with *Cx. arenaria* written D.F.L. von Schlechtendal. The label on the folder has “Habitat in America meridionali”, in Willdenow’s hand. *Humboldt* 3227 (sheet 1 here designated lectotype, B-W 05422, n.v., photo FAU).

C. multiflora Willd. in Roem. & Schult., Syst. Veg. 6:207. 1829. Type: Willdenow has written IX on a small label with the name *Cressa* and a drawing of the flower, along with the name "Truxillo" written by Humboldt. The label on the folder has "Habitat in America meridionali", a short description in Latin, and *Cressa multiflora* in Willdenow's hand. *Humboldt s.n.* (holotype B-W 05420, n.v., photo FAU).

SUFFRUTESCENT HERBS. STEMS 5–40 cm tall, usually branched, appressed pubescent or hirsute to sericeous. **LEAVES** petiolate, these 0.5–2 mm long, the blades elliptic to lanceolate or ovate-lanceolate, 3–10 mm long, 1–4 mm wide, tip usually acute, basally cuneate, sometimes obtuse, with pubescence like stems. **FLOWERS** mostly solitary, axillary, usually concentrated in the upper leaf axils and appearing almost spicate, the peduncles 2–6 mm long, the bracteoles ovate to ovate-lanceolate, acute, unequal, 2–3 mm long, mostly 1 mm wide, the pedicel absent. **SEPALs** $\pm$ equal or the inner slightly longer, the outer obovate, elliptic, 3–4 mm long, 2.5–3 mm wide, obtuse or acute, the outer pubescent, the inner obovate, the inner 3–4.5 mm long, 2–3 mm wide, acute, with scarious margins, the inner only at the apex. **COROLLA** white, salverform, 5–6.5 mm long, the tube 3–3.5 mm long, the limb 5-lobed, the lobes obtuse to $\pm$ acute, about as long as the tube, somewhat pubescent without; stamens exserted, 4–6 mm long, usually equal the filaments basally pubescent with glandular indumentum, the anthers 1–1.5 mm long, oblong with the base cordate to $\pm$ bilobed; ovary ovoid, unilocular to $\pm$ bilocular, apically somewhat hirsute, the styles unequal, 3–5 mm long, the stigmas capitate, smooth. **FRUIT** capsular, ovoid, 5–6 mm long, brown, surrounded at least basally by the calyx, apically hirsute, unilocular. **SEEDS** usually 1, ovoid, 3–4 mm long, brown, glabrous.

Distribution. U.S.A. (Arizona, California, Texas, Utah, Oregon, Nevada), MEXICO (Baja California, Chihuahua, Coahuila, San Luis Potosí, Sinaloa, Sonora, Revillagigedo Islands), ECUADOR (Guayas), PERU (Ancash, Arequipa, Cajamarca, Ica, Lima, La Libertad, Tumbes), CHILE (Atacama), ARGENTINA (Buenos Aires, Chubut, Córdoba, Corrientes, La Pampa, La Rioja, Mendoza, Nenquén, Río Negro, Santa Cruz, Santa Fe, San Juan, Santiago del Estero, Tucumán, Río Negro).

Common names. "Alkali weed" (California; Hickman, 1993), "tripa de pollo" (Argentina; O'Donell, 1959).

Recent illustrations. O'Donell (1959: 259, fig. 43), Austin (1982: 10, fig. 3), Hickman (1993: 521, 523).

Representative specimens

U.S.A. ARIZONA: Pinal Co. 1.v.1937. *Peebles 13233* (AMES); Yuma Co. in 1855., *Schott s.n.* (F). **CALIFORNIA:** Alameda Co. 2.ix.1928. *Mason 4943* (UC); Colusa Co. 14.viii.1936. *Yates 6133* (UC); Contra Costa Co. 7.vi.1900. *Davy 6678* (UC); Glenn Co. *Davy 4274* (UC). Inyo Co. 20.vi.1936. *Kerr 11* (UC). Modoc Co. 15. viii. 1947. *Mason 13541* (UC). San Diego Co. 5.vi.1904. *Chandler 5333* (UC). Santa Clara Co. 21.vi.1887. ex herb. *San José State Normal School* (UC). Yolo Co. viii. 1894. *R. Austin s.n.* (UC). **NEW MEXICO:** Dona Ana Co. 3.v.1903. *Wootton s.n.* (UC). **OREGON:** Lake Co. 30.vi.1927. *Peck 15380* (UC). **TEXAS:** Bailey Co. *Rosson 617a* (UNM); Culbertson Co. 20.vi.1947. *Meyer & Meyer 2172* (UC); Starr Co. 17.iii.1966. *Correll 32210* (UC); Ward Co. 14.iv.1902. *Tracy & Earle 23a* (MSC, UC). **UTAH:** Juab Co. 10.vii.1943. *Maguire & Holmgren 21854* (UC). Salt Lake Co. 17.viii.1909. *Clements s.n.* (UC).

HAWAII. OAHU. near Pearl City. 11.vi.1895. *A. A. Heller* 2410 (MO). MOLOKAI. E. Molokai. 5.i.1979. *Tsugaru & Nishino* 5232 (MO); Puuloa. 28.vii.1932. *O. Degener* 5996 (MO); Molokai. Haluakoi, N side Kepuhi Bay. 19.i.1991. *D. H. Lorence* 6686 (MO); Ka Lae o Ka Loou. vi. 1912. *C. N. Forbes* 64 (MO).

Central and South America. MEXICO. BAJA CALIFORNIA: *Anthony* 133 (F, MO). CHIHUAHUA: x. 1885. *Pringle* 591 (NY). SAN LUIS POTOSÍ. xi. 1910. *Purpus* 4915 (F). SINALOA: *Brandege* s.n. (UC). SONORA: 15.xii.1939. *Drouet & Richards* 4015 (F, MO). Revillagigedo Islands: Clarion Island. *Anthony* 409 (F, MO). ECUADOR. GUAYAS: 17.iii.1937. *Holm-Nielsen et al.* 2053 (MO, NY). PERU. AREQUIPA: Prov. Camana. xi. 1947. *R. Ferreyra* 2552 (F). CAJAMARCA: xi. 1961. *Woytkowski* 7051 (F). TRUJILLO: Dtto. La Libertad. viii. 1972. *Sagastegui* 7630 (F, MO, NY). w/o loc. *Wilkes* expedition 1838–42 (MO). CHILE. ATACAMA: Dtto. Copiapo. xi. 1924. *Werdermann* 466 (F, MO, NY, UC). ARGENTINA. BUENOS AIRES: Dtto. Coronel Dorego. xii. 1938. *Eyerdam* 23739 (MO, NY). CHUBUT: Dtto. Rawson. xii. 1938. *Eyerdam et al.* 23752 (MO, UC). CÓRDOBA: vii. 1942. *Burkart* 12917 (UC). CORRIENTES: Dttp. Santa Lucia. xi. 1978. *Schinini & Ahumada* 15936 (MO). MENDOZA: xi. 1944. *Semper* 166 (NY). NENQUEN: Dtto. Confluencia. xii. 1944. *O'Donnell* 1946 (NY). RÍO NEGRO: Dtto. San Antonio. *Fischer* 239 (MO, NY). SANTIAGO DEL ESTERO: Dtto. Rivadavia. xi. 1974. *Burkart et al.* 30561 (F, MO, UC).

EXCLUDED SPECIES

Cressa latifolia (Hochst. & Steud.) T. Anderson, Proceedings Linnean Society 5 (suppl. 1):25. 1860. = *Seddera latifolia* Hochst. & Steud. (cf. Verdcourt, 1963; Myint & Ward, 1968).

Cressa sericea Willd. in Roem. & Schult., Syst. Veg. 6:207. 1829. Type: "Habitat in America meridionali". *Humboldt* 3080 (B-W 05421, n.v., photo FAU). = *Evolvulus argyreus* Choisy. This specimen was annotated by H. Hallier with this name on 11. vi. 1897. I agree with his determination; the pedunculate and pedicellate flower is distinctive.

ACKNOWLEDGEMENTS

I wish to thank R. K. Brummitt (K), Rosemary Davies (K), John Edmondson (LIV), John Flanagan (K), Ib Friis and O. Rydberg (C), Rod Henderson (BRI), Fernand Jacquemoud (G), John Marsden (LINN), Linda Oestry (MO), Kent Perkins (FLAS), Franz Schuhwerk (M), Lajos Somlyay (BP), James Solomon (MO), Gerard Thijssse (L), Roy Vickery (BM), Kaj Vollesen (K), Mark Watson (EDINB), and Jan Wilson (Australian National Botanic Gardens) for help with types and literature. Among these, Rod Henderson went out of his way to help locate the R. Brown sites and instruct me in the complexities of that voyage. P. Hiepko (B) has advised me with the Willdenow herbarium notations and labels. I thank the curators, some of whom are duplicated above, at AMES, BM, BRI, C, EDINB, F, FLAS, GOET, K, L, LINN, LIV, M, MO, MSC, NY, PDA, UC, UNM, US who allowed me to study specimens or sent loans. This study was supported by the Florida Atlantic

University Foundation. The artwork was done by Mardie Banks and Adrien Spano (Visual Communications Department, FAU).

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