

REVISION OF *PAVONIA* CAV. (MALVACEAE) FROM PAKISTAN*

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Abstract

In the present paper, 7 taxa including 1 new form are recognized in the genus *Pavonia* Cav. from Pakistan. *Pavonia glechomaefolia* (A. Rich.) Garcke and *P. procumbens* (Wight & Arnott) Walp. usually placed under 1 taxon are considered as two distinct species. *P. coxii* Tad. & Jacob is reduced to the synonymy of *P. glechomaefolia* (A. Rich.) Garcke. *P. propinqua* Garcke and *P. ceratocarpa* Dalz. ex Mast. are reduced to the synonymy of *P. grewoides* Hochst. ex Boiss. Typification of various taxa is discussed in detail.

Introduction

The genus *Pavonia* Cav. is closely related to *Urena* from which it is differentiated in the absence of glochidia. It comprises of about 200 species. Most of the species are distributed in America and Africa, 6 species are found in Asia.

Some species (*P. muttiflora* St. Hil. and *P. spinifex* Cav.) are cultivated for ornamental purposes.

Pavonia Cav. *nom. conserv.*

Diss. 2: App. 2. 1786; Diss. 3.132. 1787; Mast. in Hook. f.,
Fl. Brit. Ind. 1.330. 1874; Borss. in Blumea 14:133. 1966;
Hutch., Gen. Fl. Pl. 2:566. 1967.

Annual or perennial herb, undershrubs or shrubs, pubescent, glabrescent. Leaves petiolate, stipulate, with or without lobes. Flowers usually axillary, solitary, or fascicled or occasionally raceme or panicle by the reduction of leaves, pedicellate; epicalyx segments 5-16, free or fused. Calyx 5-lobed or toothed. Corolla of various colour, commonly red, pink or yellow, rarely white or purple. Staminal column with many filaments. Carpels 5; styles 10; stigmas capitate. Fruit discoid to globose schizocarp; mericarps 5, indehiscent, glabrous or pubescent, with or without wings, carinate, reticulately veined, echinate, horny or smooth. Seed 1 in each mericarp, glabrous or hairy, reniform.

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Key to the species

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|----|--------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. | +Epicalyx segments 5-6, ovate to lanceolate. | 2 |
| | –Epicalyx segments 8-14, linear. | 3 |
| 2. | +Mericarps longitudinally carinate on the dorsal surface, margins with 2-3 stout, slightly curved, sharp prickles. | 1. <i>P. procumbens</i> |
| | –Mericarps echinate all over. | 2. <i>P. glechomaefolia</i> |
| 3. | +Leaves lobed or angular. | 4 |
| | –Leaves neither lobed nor angular. | 5 |
| 4. | +Mericarps winged. | 3. <i>P. zeylonica</i> |
| | –Mericarps not winged. | 6. <i>P. odorata</i> |
| 5. | +Mericarps smooth. | 4. <i>P. arabica</i> |
| | –Mericarps horny. | 5. <i>P. grewioides</i> |

Pavonia procumbens (W. & A.) Walp. and *Pavonia glechomaefolia* (A. Rich.) Garcke

These two species with *Pavonia burchellii* (DC.) Dyer (which does not occur in Pakistan) have been very confused in the past. Dyer (1932) critically studied the nomenclature and synonymy of *Pavonia burchellii* (DC.) Dyer and discussed the views of Ecklon & Zeyher (1835), Harvey (1859-60) and Ulbrich (1922). However, he did not consider the views of Chiovenda (1915) who transferred *Sida patens* Andr. to the genus *Pavonia* Cav. (*Pavonia patens* (Andr.) Chiov.) and cited those synonyms which were cited by Dyer under *Pavonia burchellii* (DC.) Dyer. The name *Pavonia patens* (Andr.) Chiov. has been usually accepted by many systematists (Andrews 1952, Cufodontis 1959, Meeuse 1961).

In Index Kewensis it is suggested that *Sida patens* Andr. probably belongs to *Abutilon* species. Borssum Waalkes (1966) also doubted whether the plate and description of *Sida patens* Andr. given by Andrews (1809) really belong to *Pavonia*. In the absence of type specimen he did not draw a final conclusion. Regarding Andrew's types, the paintings and drawings were based on living specimens and no herbarium specimens were kept (Staffeu, 1967). His plate is, therefore, considered as holotype which matches with the illustration of *Sida persica* Burm. f. as given by N.L. Burmann (1768). *Sida patens* Andr. is, therefore undoubtedly conspecific with *Abutilon persicum* (Burm. f.) Merr.

Further, it is noted that *Pavonia glechomaefolia* (A. Rich.) Garcke has been commonly considered to be conspecific with *Pavonia procumbens* (W. & A.) Walp. (Jafri 1966,

Borssum Waalkes, 1966). But both these species may be differentiated on the basis of mericarps. In the former mericarps are echinate all over while in the latter mericarps are dorsally ciliate with 2-3 stout, usually slightly curved, sharp prickles on the margins.

Tadulingam & Jacob (1926) described *Pavonia coxii* Tad. & Jacob, which is conspecific with *Pavonia glechomaefolia* (A. Rich.) Garcke. Borssum Waalkes after studying the type and plate of *Pavonia coxii* Tad. & Jacob was convinced that it is conspecific with *Pavonia procumbens* (W. & A.) Walp. But the figure of mericarp of *Pavonia procumbens* (W. & A.) Walp. given by Borssum Waalkes and that of *Pavonia coxii* Tax. & Jacob given by Tadulingam and Jacob are very different and do not belong to the same taxon.

The critical study of different type specimens suggests that *Pavonia procumbens* (W. & A.) Walp., *Pavonia glechomaefolia* (A. Rich.) Garcke and *Pavonia burchellii* (DC.) Dyer are 3 different species and may well be distinguished easily on the basis of the characters given below.

Key to the above species

1. +Stem with stellate and simple, spreading hairs. Mericarps with raised reticulations and inconspicuously echinate (Fig. 1, D-E). 1. *P. burchellii*
 - Stem stellate pubescent, simple hairs lacking. Mericarps conspicuously echinate or prickly.
2. +Branches purplish to purple. Flowers yellow with dark purple centre. Pedicel stellate pubescent. Mericarp echinate all over (flowers large). 2. *P. glechomaefolia*
 - Branches green. Flowers yellow. Pedicel stellate pubescent, mixed with weak simple, spreading, hairs. Mericarps with 3 stout prickles on the margins. (flowers comparatively smaller). 3. *P. procumbens*

1. *Pavonia procumbens* (Wall. ex W. & A.) Walp., Rep. Bot. Syst. 1:301. 1842. non Casaretto 1842; Jafri, Fl. Kar. 224. 1966; Borss., l.c. 135 (Fig. 1, A-C).

Lebretonia procumbens Wall. (Cat. n. 2688, 1831. *nom. nud.*) ex W. & A., Prodr. 47. 1834; Wight, Ic. 1: 1.4. 1838. [India, Wallich 2688 (K-W!)].

Lebretonia flava Wall., Cat. 1883. 1828. *nom. nud.* [India, Wallich 1883 (K!; K-W!)].

Lebretonia cernua Span. (in Hook., Comp. Bot. Mag. 1:344 1836. *nom. nud.*) Linnaea 15:168. 1841. Isotype: Timor, Spanoghè s.n. (K!).

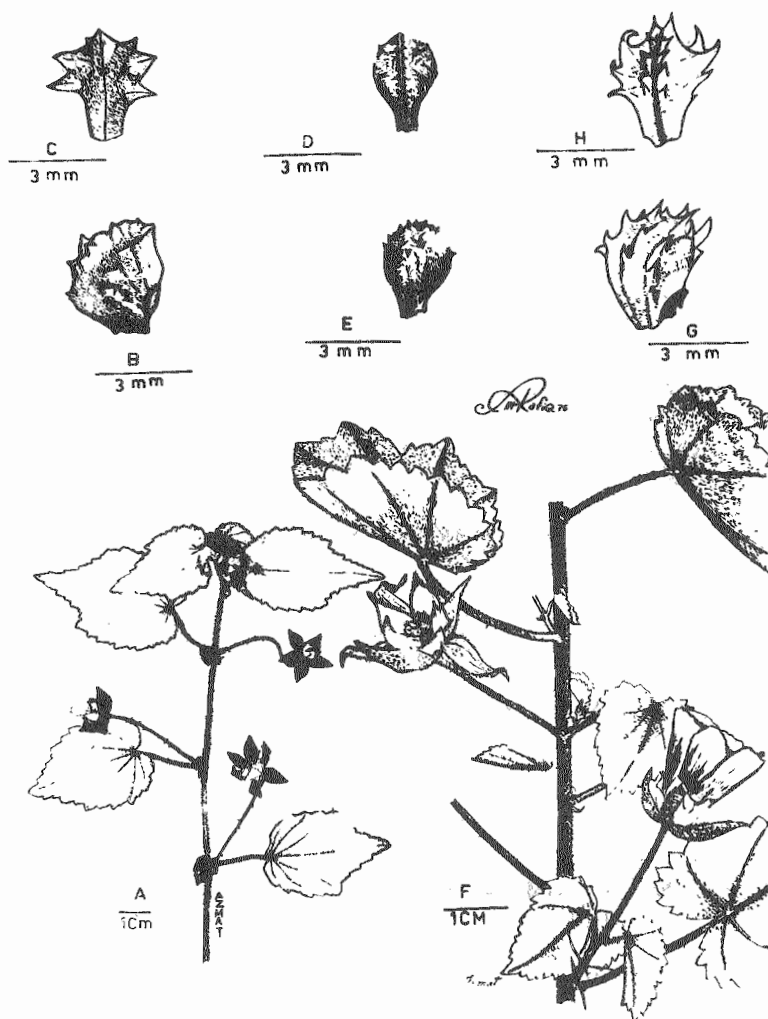


Fig. 1. *Pavonia procumbens* A, Fruiting twig; B, Lateral view of mericarp; C, Dorsal view of mericarp. *Pavonia burchellii*. D, Dorsal view of mericarp; E, Lateral view of mericarp. *Pavonia glechomaefolia* f. *glechomaefolia*: F, Flowering twig; G, Lateral view of mericarp; H, Dorsal view of mericarp.

Pavonia cernua (Span.) Walp., Rep. Bot. Syst. 2: 790. 1843.

Herb to undershrub. Branches green, stellate tomentose. Leaves usually ovate, 1.5-7.5 cm long, 1-5.5 cm broad, cordate at base, acuminate at apex, serrate-crenate, not or 3-angular near the apex, stellate tomentose on both sides, more so and velvety beneath 5-7 nerved; petiole 0.5-4.5 cm long; stipules 3-5 mm long, filiform. Flowers axillary, solitary; pedicel 1-4 cm long, in fruit up to 5 cm, jointed near the apex, geniculate, stellate pubescent, mixed with simple, spreading hairs, densely hairy above the joint; epicalyx segments 5 (-6) elliptic to ovate, almost free, 8-12 mm long, 3-7 mm broad, acuminate,

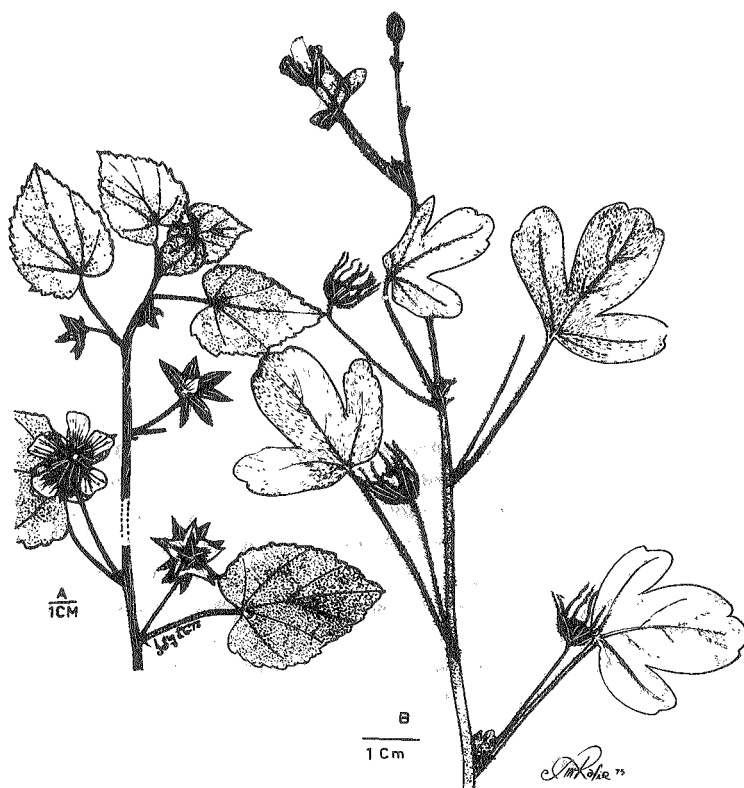


Fig. 2. *Pavonia glechomaefolia* var. *karachiensis*: A, Flowering twig. *Pavonia zeylonica* B Flowering twig.

usually 3-nerved, stellate pubescent on both sides. Calyx 5-partite, 5-8 mm long, densely stellate pubescent outside, hairy towards margin within, glabrescent, lobes c. 4 mm broad ovate or lanceolate, acute or acuminate. Corolla 5-7 mm across, not completely open, yellow or orange-yellow; petals 10-14 mm long, 8-10 mm broad, slightly exceeding the epicalyx, obovate, hairy at base. Staminal column 4-5 mm long, sparsely stellate pubescent. Fruit depressed globose, angular, 5-6 mm across, glabrescent; mericarps 5, 4-5 mm long, dorsally longitudinally carinate, 4 mm broad, radially 3 mm broad, margins with 3 stout straight or slightly curved, sharp prickles. Seeds c. 3 mm across, glabrous.

Representative specimens: Bela Dist.: 2 miles from Hub Chauki on way to Sonmiani, sand dune along dry cannal, c. 30 cm long, flowers yellow, *S. Abedin*, *S. I. Ali* & *A. Ghafoor* 1244, 1256 (KUH); 21 miles from Karachi on way to Bela, along roadside, sandy soil, 15-30 cm long, flowers yellow, closed, *S. Abedin* 3738-3740, 3754, 3755, 3757, 3760, 3765 (KUH); Karachi Dist.: Darsano Chano, 10 cm high, soil sandy loam, flowers yellow, *S. Abedin* & *A. Ghafoor* 1396 (KUH); Malir, near Jam goth 2.9. 1966.

S.M.H. Jafri S.N. (KUH); Malir river bed, flowers orange yellow, *S.M.H. Jafri* 2563 (KUH); Landhi, *Stocks* 497 (K); Sind *Stocks* 479, 497, 655 (G-Boiss).

Distribution: Tropical Africa, Arabia, South Asia, Malesia and Pakistan (Baluchistan and Sind).

2. *Pavonia glechomaefolia* (A. Rich.) Garcke in Schweinfurth, Beitr. Fl. Aethiop. 1:54. 1847; Mast. in Hook. F., l.c. 330. p.p. (Fig. 1, F-H).

Lebretonia glechomaefolia A. Rich., Tent. Fl. Abyss. 1:54. 1847. Holotype: Abyssinia, *Choha*, & *Petit* s.n. (P!).

Pavonia coxii Tad. & Jacob in Journ. Ind. Bot. Soc. 5:11. f. 1-11. 1926. Holotype: India, Coimbatore, *Cox* 5913 (K!).

Undershrub, up to 1.5 m tall. Branches purple, stellate pubescent, glabrescent. Leaves ovate to orbicular, 1.5-6 cm long, 1.5 cm broad irregularly serrate to crenate, cordate at base, acute at apex, stellate pubescent on both sides, glabrescent, not or 3 angled; petiole 1-5 cm long, stellate tomentose; stipules linear, 3-6 mm long. Flower axillary, solitary; pedicel 1-4 cm long, jointed at apex, joint sometimes inconspicuous and not visible, stellate tomentose; epicalyx segments 5-6, connate at base, segments lanceolate to ovate or elliptic, 10-15 mm long, 3-7 mm broad, 3-5 nerved, stellate pubescent on both sides. Calyx 5 partite, 7-11 mm long, stellate pubescent outside, internally hairy, towards the margin, glabrescent; lobes 4-8 mm broad, lanceolate to broad ovate, acuminate. Corolla 1-2 cm across, yellow with dark purple centre, petals 10-18 mm long, 8-12 mm broad, exceeding the epicalyx, obovate, hairy at base, 5-6 mm long. Staminal tube 5-6 mm long, purple. Fruit 5-6 mm across; mericarps 5, echinate all over, pyriform, 4 mm long, dorsally longitudinally carinate, 3 mm broad, radially 3 mm broad. Seeds 3 mm long, 2 mm broad, sparsely hairy, more so towards the base and hilum, brown, pyriform.

Representative specimens: Thatta Dist.: Jung Shahi, near Haleji Lake, among bushes of *Tamarix* sp., flowers yellow with scarlet or brown throat. Common, c. 1 m tall, *S.M.H. Jafri* 1604 (KUH; K); Karachi Dist.: Pipre, near cultivated field, growing in the clump of *Euphorbia caducifolia*, 1.5. 1968. *S.I. Ali* s.n. (KUH); Malir, Cant. area, *S.M.H. Jafri* 3612 (KUH); P.C.S.I.R. 26.3. 1968 *S.H. Abid* s.n. (KUH); P.C.S.I.R. Flowers yellow, 18.10.1967 *Khush Gul* sn. (KUH); Tharparkar Dist.: Nagarparker hill, erect shrub, branches spreading, c. 1.5 m tall, flowers yellow with dark brown centre, *M. Qaiser* & *A. Ghafoor* 4039 (KUH); c. 3 miles from Nagarparker on way to Islamkot, flowers light yellow with dark purple base, staminal tube purple, *S. Abedin*, *S.I. Ali* & *S.A. Faruqi* 4448 (KUH).

Distribution: Ethiopia, India and Pakistan (Sind).

Pavonia glechomaefolia var. *Karachensis* S. Abedin *forma nov.* (Fig. 2. A)

Holotype: Pakistan, Karachi, near P.C.S.I.R. 30-60 cm tall, lower yellow with dark centre, 18.9. 1969. *M. Ismaeel* s.n. (KUH).

Haec forma differt. f. typica (*P. glechomaefolia* (A. Rich.) Garcke f. *glechomaefolia*) ob pilos denisores ad apicem pedecellorum congressos.

It differs from the forma *glechomaefolia* in having swollen structure at the top of pedicel because of the presence of dense hairs:

Distribution: Known only from the type locality.

3. *Pavonia zeylonica* (Linn.) Cav., Diss. 3:134. t. 48. f. 2. 1787; Mast. in Hook. f., l.c. 331; Ulbr. Engl. Bot. Jahrb. 57:153. 1922; Stewart in Nasir & Ali, l.c. 482 (Fig. 2, B).

Hibiscus zeylonicus Linn.; Sp. Pl. 697. 1753. Holotype: Herb. Herm. Vol. IV. fol. 51. Linn. n. 266 (BM!).

Representative specimens: Bela Dist.: 21 miles from Karachi on way to Bela, flowers pink above, white at base, 15-40 cm tall, sandy soil, S. *Abedin* 3743, 3750, 3751, 3758, 3764 (KUH); Bela S.F. *Hassan* s.n. (KUH); Karachi Dist.: Manghopir, sandy and stony hillock, common, 26.9. 1950, S.M.H. *Jafri* s.n. (KUH); Drigh Road, flowers pink, not common, stony hillock, S.M.H. *Jafri* 2475 (KUH); Jamadar Ka Landha (Landhi) *Stocks* s.n. (K).

Distribution: Ceylon, India, Pakistan (lower Baluchistan and Sind), S.E. Arabia, Tropical Africa and Mauritius.

4. *Pavonia arabica* Hochst. & Steud. (in Steud. nom. ed. 2. 2:279. 1841 *nom. nud.*) ex Boiss., Fl. or. 1:837. 1867; Mast. in Hook. f., l.c. 331; Stewart in Nasir & Ali, l.c. 481. (Fig. 3, E-G). Lectotype: Mount Sedder in Arabia, (Wadi Fatme) *Schim-per* 889 (G!; Syntypes: K!; BM!; P!);

Hibiscus flavus Forsk., Fl. Aegypt. -Arab. 126. 1775. Holotype: Arabia, *Forskal* (C!) non *pavonia flavus* Spring ex Marlius 1837.

Hibiscus microphyllus Vahl, Symb. Bot. 50. 1790. Holotype: (C) non *Pavonia microphylla* Casar. 1842-45.

Representative specimens: Bela Dist.: c.3 miles from Hub Chauki on way to Bela, flowers pink, 10 cm long, S. *Abedin* 3734 (KUH); Dadu Dist.: Near Thana Bula Khan 5-25 cm long, flowers pink, M. *Qaiser*. A. *Raza* & A. *Husain* 448, 579, 595, 662 (KUH); Karachi Dist.: Malir, 10.11.1958. S.A. *Naqvi* s.n. (KUH); University Campus Karachi, flowers pink, 14.9. 1970. A. *Husain* s.n. (KUH); Mangopir, Karachi, common, stony hillock, flowers pink S.M.H. *Jafri* 1515 (KUH); Drigh Road, Karachi, stony hillock, S.M.H. *Jafri* s.n. (KUH); Cape Monze, Karachi, 13.3. 1968 *Khush Gul* s.n. (KUH); Sind (most probably Karachi?) *Stocks* s.n. (K), Sind, *Stocks* 681 (G-Boiss.).

Distribution: Pakistan (Sind & Baluchistan), India (Rajputana) and Ethiopia.

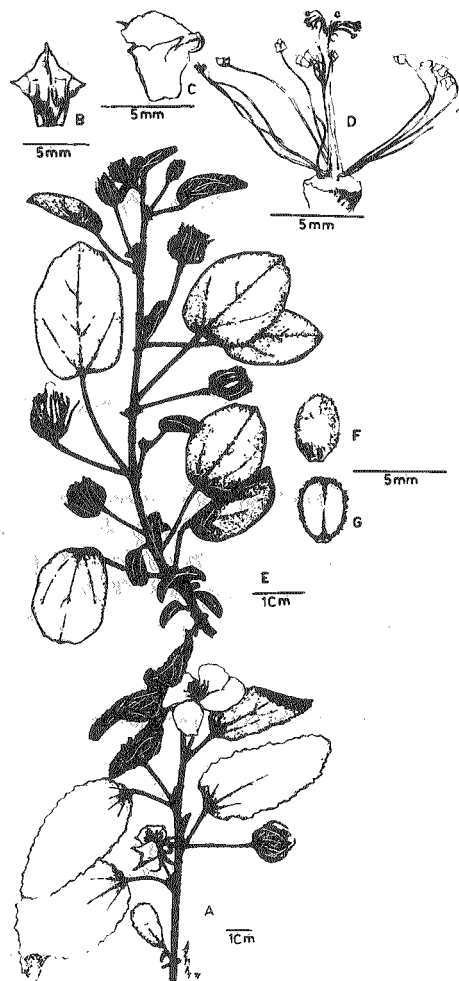


Fig. 3. *Pavonia grewioides*. A. Flowering twig; B, Dorsal view of mericarp; C, Lateral view of mericarp; D, Stamens. *Pavonia arabica*. E. Fruiting twig; F, Dorsal view of mericarp; G, Ventral view of mericarp.

5. *Pavonia grewioides* Hochst. ex Boiss. Fl. Or. 1: 837. 1867. (Fig. 3, A-D) Lectotype: Abyssinia, alt. 4000' 24. Aug. 1854. *Schimper* (K!).

Pavonia propinqua Garcke in Schweinf. Beit. fl. Aethiop. 1: 55. 1867; Mast. in Oliv. Fl. Trop. Afr. 1: 191. 1868; in Hook. f., l.c. 332; Stewart in Nasir & Ali, l.c. 482. Lectotype: Abyssinia, alt. 4000 . 24 Aug. 1854 *Schimper* K!; Isotype: W!).

Pavonia ceratocarpa Dalz. ex Mast. in Hook. f., Fl. Brit. Ind. 1:331. 1974; Cooke, l.c. 108. Lectotype: Sind, *Stocks* 483 (K!; Isotype: G-Boiss.!).

Representative specimens: Karachi Dist.: University Campus, 20-40 cm long, flowers pale yellow, 3-3.5 cm across, *S. Abedin* & *A. Husain* 3802, 5772, 5773 (KUH); *ibid*, 30 cm tall flowers yellow, 3.8. 1972 *Yasmin* s.n. (KUH); *ibid*, flowers pink, 3.2. 1968. *L. Rahman* s.n. (KUH); *ibid*, flowers pink, 10.5. 1968, *Kush Gul* s.n. (KUH); Sind, *Stocks* 483, (K;G-Boiss.).

Distribution: Ethiopia and Pakistan. It is a rare species in Pakistan. It seems to have been collected from those parts of Karachi where it is becoming extinct.

Pavonia grewioides Boiss. and *Pavonia propinqua* Garcke were published by Boissier and Garcke respectively during the year 1867. It is interesting to note that both species were based on Schimper's specimen collected in 1854 for Hochstetter from Ethiopia. Generally *Pavonia propinqua* Garcke has been adopted for the present species. *Pavonia grewioides* Boiss. has been considered to be conspecific with *Pavonia propinqua* Garcke (Masters 1868, 1874, Cooke 1901, Burkill 1909). According to Dr. Stafleu (personal correspondence) Boissier's "Flora Orientalis" volume 1 came out in April-June 1867 whereas Schweinfurth's "Beitrag Flora Aethiopens", in which Garck's work was published, appeared in July-August 1867. Boissier's work was published earlier than Garck's and therefore in the present work *Pavonia grewioides* Boiss. is adopted.

Boissier has also cited Stock's specimen but without number. This specimen was not traceable at Geneva. However, "Stocks 483" kept in the cover of *Pavonia grewioides* Boiss. was studied. It matches with Schimper's specimen.

Schimper's specimen present at Kew is considered as lectotype of *Pavonia grewioides* Boiss. The holotype of *Pavonia propinqua* Garcke expected to be present in Berlin Herbarium has been destroyed in the last World War. The isotype is present at Kew which is designated as lectotype. It is the same Schimper's specimen which is lectotype of *Pavonia grewioides* Garcke.

Masters (1974) described *Pavonia ceratocarpa* Dalz. ex Mast. based on the specimens of Dalzell and Stocks. Masters did not cite specimen number of any of the two collectors. These specimens should have been present at Kew. The author could only trace Stocks 483 which was kept in the type cover of *Pavonia ceratocarpa* Dalz. ex Mast. Stewart (1972) has also cited this specimen under *Pavonia ceratocarpa* Dalz. ex Mast. as the type. Cooke (1901) under *Pavonia ceratocarpa* noted "*Lebretonia?* Stocks MS. with description and drawing in Herb. Kew in Stocks 482; not *Pavonia ceratocarpa* Dalz. (!) MS. in Herb. Kew. which is *Pavonia arabica*". Further he cited Stocks 483. Unfortunately Stocks 482 and Dalzell's specimens were not traceable at Kew. The remark that *Pavonia ceratocarpa* Dalz. is *Pavonia arabica* Hochst. & Steud ex Boiss. is debatable. The specific epithet "ceratocarpa" given by Dalzell and adopted by Masters is self-explanatory, meaning horny carpels, a character not found in *Pavonia arabica* Hochst. & Steud. ex Boiss.

Further, the description of fruit and mericarp of *Pavonia ceratocarpa* Dalz. ex Mast. given by Master is also in quite detail and is very different from *Pavonia arabica* Hochst. & Steud. ex Boiss. Besides fruit character, both these species also differ in the size of flower and its colour as well. It is most likely that the Dalzell's specimen referred to by Cooke might not have been studied by Masters. The only authentic specimen for the typification of *Pavonia ceratocarpa* Dalz. ex Mast. is Stocks 483. This specimen present at Kew is considered as lectotype. As already mentioned above Stocks 483 matches with the type of *Pavonia grewioides* Boiss., therefore, *Pavonia ceratocarpa* Dalz. ex Mast. is reduced to the synonymy under the present species.

- 6 *Pavonia odorata* Willd., Sp. Pl. 3:837. 1800; Mast. in Hook. f., l.c. 331; Stewart in Nasir & Ali, l.c. 482; Holotype: (B-W 12829!).

Pavonia rosea Wall., Cat. n. 1887 *nom. nud.* [India, Wallich 1887 (K-W!)].

Pavonia romborua Wall. Cat. n. 2690. 1831. *nom. nud.* [India, Wallich 2690, (K-W!)] *Hibiscus oligosandrus* Buch-Ham, exs. (BM!).

Distribution: India, Pakistan?, Burma, Ceylon and East Tropical Africa.

I have not seen any specimen of this species though Edgeworth had collected from Sind (Masters 1874).

Excluded Species

Pavonia hastata Cav.: One specimen of this Brazilian species was found in Punjab University Herbarium, Lahore, but without date, locality and collector's name. This species does not occur in our area. It may, however be an introduction.

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