The transfer of *Erodium incarnatum* to the genus *Pelargonium* (Geraniaceae)

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*Erodium incarnatum* L’Hér. was placed in the genus *Erodium* on account of its actinomorphic flowers and five fertile stamens. A study of the flower revealed atypical characters such as the presence of a staminal column and absence of nectariferous glands on the receptacle. A natural hybrid between *E. incarnatum* and *Pelargonium patulum* Jacq. was discovered. The transfer of *E. incarnatum* to *Pelargonium* by Moench in 1802 is supported and the correct name of the plant is *Pelargonium incarnatum* (L’Hér.) Moench.

*Erodium incarnatum* L’Hér. is in die genus *Erodium* geplaas op grond van sy aktinomorfie bloemme en vyf vrugbare meeldrade. ’n Studie van die blom het atipiese kenmerke soos die aanwesigheid van ’n meeldraadsuil en die afwezigheid van nektarkliere op die blombodem, aan die lig gebring. ’n Natuurlike hybride tussen *E. incarnatum* en *Pelargonium patulum* Jacq. is ondertek. Die oorplasing van *E. incarnatum* na *Pelargonium* deur Moench in 1802 word ondersteun en die korrekte naam van die plant is *PElargonium incarnatum* (L’Hér.) Moench.

**Keywords:** *Erodium incarnatum*, Geraniaceae, Pelargonium, taxonomy

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**Introduction**

The genus *Erodium* L’Hér. is characterized by five free stamens, five free staminodes and five nectary glands alternating with the bases of the petals (Guittonneau 1972). The flowers of most species are actinomorphic.

Several exotic species of *Erodium* occur as weeds in South Africa (Venter & Verhoeven 1990), *E. incarnatum* L’Hér. being the only indigenous one. This species was placed in the genus *Erodium* on account of its actinomorphic flowers and five fertile stamens. A close inspection of the flower, however, revealed certain characters atypical of *Erodium* placing its classification in doubt.

In this study more characters of *E. incarnatum* were investigated to ascertain the classification of this interesting species.

**Floral morphology**

The flower of *E. incarnatum* appears actinomorphic although two petals are often slightly smaller than the other three. The androecium consists of five fertile stamens and five staminodes, and the bases of the filaments are fused to form a staminal column. A staminal column is atypical of *Erodium* (Guittonneau 1972).

The typical nectariferous glands on the receptacle of *Erodium* are lacking in the flower of *E. incarnatum*. In some flowers, however, a shallow cavity is present opposite the posterior sepal (Figure 1). These cavities occur in flowers from different populations. No nectariferous glands or even nectariferous tissue were observed in the cavities. Similar shallow cavities are present in the flowers of some species of *Pelargonium* section *Campylia* (Sweet) DC. (van der Walt & van Zyl 1988). No information on the pollination biology of *E. incarnatum* is known, but it seems likely that it relies entirely on the decoration of the corolla to attract pollinators.

**Pollen morphology**

The pollen grains of *E. incarnatum* are more or less spherical with a polar diameter of ca. 65 μm (Figure 2A). They are tricolporate with relatively long colpi (Figure 2B). The tectum can be described as reticulate-striate. The striate appearance is due to some lirae being on a higher level, more or less parallel to each other and more prominent than others.

Verhoeven & Venter (1987) studied the pollen grains of seven *Erodium* species, including that of *E. incarnatum*. The reticulate-striate tectum of *E. incarnatum* is not typical of *Erodium*, but it resembles that of several *Pelargonium* species. The tectum of *E. incarnatum* is for example almost identical to that of *P. tricolor* Curtis (van der Walt & van Zyl 1988).

**Somatic chromosome number**

The somatic chromosome number of *E. incarnatum* has been determined by Albers (pers. comm.) as *2n = 40*. Two satellites are responsible for previous erroneous counts of *2n = 42*.

A somatic chromosome number of *2n = 40* is commonly found in *Erodium* (Guittonneau 1972), but this number was also recorded in *Pelargonium*. Van der Walt & van Zyl (1988) concluded that the basic chromosome number of *Pelargonium* section *Campylia* is *x = 10* and somatic chromosome numbers of *2n = 20, 40* were reported. *P. ocellatum* J.J.A. v.d. Walt, a newly described species in section *Campylia* (van der Walt et al. 1990b), also has a somatic chromosome number of *2n = 20*. The habit and leaves of *E. incarnatum* markedly resemble those of *P. ocellatum*.

The chromosomes of *E. incarnatum* are relatively small and comparable in size to those of section *Pelargonium* (Albers & van der Walt 1984) and section *Glaucophyllum* Harv. (van der Walt et al. 1990a).
Hybrid between *E. incarnatum* and *Pelargonium patulum*

A natural hybrid between *E. incarnatum* and *P. patulum* Jacq. was collected in Viljoens Pass near Grabouw (*van der Walt 1557a* (STEU)) where the parent species grow together. The corolla of the hybrid has the typical colour and markings of *E. incarnatum*, but the petals are grouped into two posterior and three anterior ones, giving the flower a zygomorphic appearance. The leaves of the hybrid, however, very strongly resemble those of *P. patulum* (Figure 3). *P. patulum* has a somatic chromosome number of $2n = 44$ and it belongs to the section *Glaucophyllum* Harv. The chromosome number of the hybrid has not yet been determined and it will most probably be sterile.

Intergeneric hybrids are rare (Stace 1980) and the discovery of a natural hybrid between *E. incarnatum* and *P. patulum* provided the last evidence needed to transfer *E. incarnatum* to the genus *Pelargonium*. The new name for *E. incarnatum* will be *P. incarnatum* (L’Hér. Moench and it is placed in section *Campylia*.

**Nomenclature**


*Erodium incarnatum* L’Hér.: 415 (1789), t.5 (1792); Curtis: t.261 (1794); Willd.: 637 (1800), 700 (1809); Pers.: 225 (1806);

Sweet: t.94 (1821); Steud.: 365 (1821), 579 (1841); D.C.: 648 (1824); Harv.: 258 (1860); Kunth: 232 (1912).

*Geranium incarnatum* L.f.: 306 (1781), nom. illeg. (1781); Cav.: 223 (1787); Thunb.: 112 (1794), 511 (1823); Andr.: C.ic. (1805), non L.: 1142 (1759).

*Erodium pulchrum* Salish.: 311 (1796). Type: as for *Pelargonium incarnatum*. 

Figure 1 Longitudinal section of the flower of *Erodium incarnatum* illustrating the shallow cavity opposite the posterior sepal (*van der Walt 1568* (STEU)). P, petal; S, sepal.

Figure 2 Pollen grains of *Erodium incarnatum* [Boucher 2000 (STEU)]. A, polar view; B, aperture. Scale bar = 10 μm.

Figure 3 Flowering branch of the hybrid *Erodium incarnatum X Pelargonium patulum* [van der Walt 1557a (STEU)] (× 0.6).
Figure 4  *Pelargonium incarnatum* [Ward s.n. (STEU)]. A, branch with leaves and flowers × 1; B, petals × 2; C, androecium × 4; D, gynoecium × 4.
Geranium incarnatum L.f. (1781) is a later homonym of G. incarnatum L. (1759) and therefore illegitimate. However, Article 72 (Note 1) of the Code (1988) permits the use of an epithet of an illegitimate name in 'a new position or sense', in this case another genus. Hence Erodium incarnatum L'Hérit. is treated as a new name dating from 1789 and serves as the legitimate basionym of the combination Pelargonium incarnatum (L'Hérit.) Moench (1802). The type of P. incarnatum will be the type of Geranium incarnatum L.f.

Description

Decumbent, soboliferous subshrub, up to 0.2 m high. Stems herbaceous and green to reddish when young, becoming woody and brownish with age, glabrous to sparingly hirsute and with a few glandular hairs. Leaves alternate, crowded at top of branches, green to reddish, sparsely to densely hirsute and with glandular hairs in between; lamina trilobate to trifoliolate, with the margins irregularly incised, terminal one often with a few glandular hairs. Top of branches, green to reddish, sparsely hirsute herbaceous and green to reddish when young, becoming woody and brownish with age, glabrous to sparsely hirsute. Inflorescence: flowering branches with smaller flowering branches with smaller pseudo-umbels; peduncle partially persistent; stipules subulate, fused with petiole, 8-12 mm long, sparsely to densely hirsute and with glandular hairs in between; lamina trilobate to trifoliolate, with the margins irregularly incised, terminal one often

Figure 5 Known geographical distribution of Pelargonium incarnatum.

Mericsarp:

Mericarps: bases 3-4 mm long; tails 25-40 mm long. Figure 4.

P. incarnatum flowers from late October to January and peaks during late November/early December.

P. incarnatum is endemic to the south-western Cape where it has a rather small distribution area (Figure 5). The main centre of distribution is in the Caledon district. It inhabits mountainous country and it is most often present on southern and eastern slopes. It seems to occur mostly on sandy soils but it may be present on rocky or gravelly soils as well. P. incarnatum is a component of short mountain fynbos where it may be rare, occasional or common.

Specimens studied

—3319 (Worcester): Bainskloof (CA), Rogers 29282 (GRA); Worcester (CB), Marloth 84 (PRE), Stokoe 1122 (PRE), Middelmost 2312 (NBG); Franschoek Pass (SC), Rodin 3078 (K), Galpin 12395 (K, PRE); Villiersdorp (CD), Oliver 5482 (STE), Gibby & Crompton 52 (BM, STEU); Jonaskop (DC), van der Walt 913, 974 (STEU); Robertson (DD), Barker 1143 (NBG): Onklaar (DD), Stokoe 7054 (K).

—3418 (Simonstown): Clovelly (AB), Rogers 29265 (SAM); Gordons Bay (BB), Davis SAM-66681 (SAM), Tredgold 723 (BOL); Helderberg Nature Reserve (BB), van der Walt 1322 (STEU), Venter 8640a (BLFU); Sir Lowrys Pass (BB), Schlechter 306 (PRE), 7277 (K), Drège 966 (P, PRE, Salter 9033 (BOL), Macowan 1414 (SAM, STE), Leighton 820 (BOL), Compton 16540 (NBG), Guthrie 2783 (NBG); Hottentots Holland Mountains (BB), Ecklon & Zeyher 5911 (PRE), Zeyher 2040 (K, P, PRE, SAM).

—3419 (Caledon): Palmiet River (AA), Ecklon & Zeyher 454 (P, SAM), Bolus 4111 (BOL, NBG), Elgin (AA), Rogers 28937 (K); Grabouw (AA), Adamson s.n. (BOL), Kruger 1605 (STE); Houwhoek (AA), Maguire 1233 (BOL, NBG), van der Walt 1568 (PRE, STEU), Vorster 2902 (STEU), Willems 78 (NBG); Caledon (AB), Walters 228 (NBG), Barker 168 (BOL), 3346 (NBG), Bolus 8446 (NH), 9893 (PRE, BOL, NL), PRE-41205 (P, PRE, Marloth 4253 (K), 6107 (PRE), Zeyher 14530 (SAM), Bond 1682 (NBG), Galpin 3834 (PRE, Compton 12399 (NBG); Highlands State Forest (AC), Boucher 2000 (K, STE); Botrivier (AC), Thomas annu 1963 (NBG), Taylor 3791 (NBG), 4853 (STE), Burgers 330 (K, STE); Shaws Pass (AD), Levyns 11239 (BOL), Esterhuyzen 19279 (Bol); Hartbees River (BC), Elbrecht 22137 (PRE); Arieskraal (BD), Leighton 806 (BOL), Lewis 1170 (SAM).

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