

## Typification of two names in the genus *Punica* L. (Lythraceae)

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### Abstract

The typification of the names *Punica nana* L. and *Punica protopunica* Balf. f. is discussed. The Linnaean name is neotypified using a modern and complete specimen kept at VAL (Herbarium of the Botanical Garden of the University of Valencia). The name *Punica protopunica* is lectotypified from an original specimen collected by Schweinfurth in Socotra and preserved at K (Kew Herbarium).

### Keywords

Linnaeus, neotype, nomenclature, pomegranate, Punicaceae, *Socotria protopunica*

### Resumen

Tipificación de dos nombres del género *Punica* L. (Lythraceae)

Se discute la tipificación de los nombres *Punica nana* L. y *Punica protopunica* Balf. f. El nombre linneano es neotipificado usando un espécimen completo conservado en VAL (Herbario del Jardí Botànic de la Universitat de València). El nombre *Punica protopunica* es lectotipificado a partir de un espécimen original recolectado por Schweinfurth en Socotra y conservado en K (Herbario de Kew).

### Palabras clave

Linneo, neotipo, nomenclatura, granado, Punicaceae, *Socotria protopunica*

The genus *Punica* L. (Lythraceae, according to APG IV, 2016) includes three species, *P. granatum* L. ( $2n = 2x = 16$ ) (Bennett & Leitch, 2005), *P. protopunica* Balf. f. ( $\equiv$  *Socotria protopunica* (Balf. f.) G.M. Levin) ( $2n = 2x = 14$ ) (Levin, 2006; Teixeira da Silva *et al.*, 2013), and the ornamental dwarf pomegranate *P. nana* L. (Melgarejo & Martínez, 1992).

*Punica granatum* is one of the oldest known edible fruits and has been used since the dawn of human civilization (Özgüven *et al.*, 2012). The plant has high adaptive capacity, as a crop, and is widely cultivated in tropical and subtropical areas (Mars, 2000; Jalikop, 2010). This species was probably originated in Iran and from there spread to the Mediterranean basin, south-eastern Asia, and several countries of North and South America (Levin, 2006; Hasnaoui *et al.*, 2012; Norouzi *et al.*, 2012; Hajjahmadi *et al.*, 2013).

The wild pomegranate grows in Transcaucasia (Georgia, Armenia and Azerbaijan) and Central Asia from Iran-Afghanistan and Turkmenistan to India (Levin, 1981; Chandra, 2010; Rana *et al.*, 2007; Narzary *et al.*, 2010). The Mediterranean basin is considered an important secondary centre of pomegranate diversification mainly in countries, including Albania,

Montenegro and Tunisia, Morocco, Spain, Turkey, Egypt (Levin, 1994, 2006). In addition, several ornamental and cultivated varieties have been recognized (e.g., var. *sativum* K. Malr, a variety with sweet seeds, see Nath & Randhawa, 1959), with a phenotypic divergence between soft- and hard-seeded pomegranate varieties (Melgarejo *et al.*, 2009; Sylvain & Thomas, 2010; Verma *et al.*, 2010; Martín-Robles *et al.*, 2017; Cappellini *et al.*, 2018; Luo *et al.*, 2020).

On the other hand, *P. protopunica* (called Socotra pomegranate) is endemic to the Yemeni island of Socotra of the Arabian Peninsula (Balfour, 1888; Guarino *et al.*, 1990; Miller & Morris, 2004), and is considered by Shilikina (1973) as an ancestral species (see also Guerrero-Solano *et al.*, 2020). This species exhibits several morphological differences compared with *P. granatum*, i.e., different foliage, larger and narrower leaves, smaller flower and fruit size, evergreen, continuous flowering, white seeds (Balfour, 1888; Al Shawish *et al.*, 2006).

Linnaeus (1753, 1762) recognized two species, corresponding broadly to the two growth forms found within the genus: *P. granatum* ("foliis lanceolatis, caule arboreo" (Linnaeus, 1762: 676); shrub or tree) (see also

Linnaeus, 1753: 472) and *P. nana* (“foliis linearibus, caule fruticoso” (Linnaeus, 1762: 676); small shrub). The lectotype of *P. granatum* was designated by Graham (in Jarvis *et al.*, 1993: 80) from a specimen preserved in the Clifford herbarium at BM (Herb. Clifford: 184, *Punica 1*, BM-000628599; image available at <https://data.nhm.ac.uk/object/3e21a8b8-f81f-447f-bfb1-20d9fd92d149>). However, the name *Punica nana* has not yet been typified (Jarvis, 2007).

*Punica nana* is a dwarf pomegranate used as an ornamental plant due to the small size of the plants, leaves, flowers and fruits. While the dwarf pomegranate fruit is edible it lacks both the size and sweet flavor offered by the standard pomegranate. However, this species withstand temperatures from extreme heat to frost and wind. These features together with its compact habit, and the interesting blooms and ornamental fruits make it a widely cultivated species (Melgarejo & Martínez, 1992; Verma *et al.*, 2010). In addition, this species is an important medical plant (El Deeb *et al.*, 2019).

### ***Punica nana***

Linnaeus (1762: 676) described *Punica nana* providing a short diagnosis “PUNICA foliis linearibus, caule fruticoso” quoted from Miller (1754), followed by a synonym “*Punica Americana nana* S. [seu] *humillima*” cited from Tournefort (1791: 636). The protologue includes the geographical locality “*Habitat in Antillis*”.

Unfortunately, Miller (1754: PU [without number]) did not validly describe this species. However, this author included in his work relevant information that was later cited by Linnaeus (1762), “5. PUNICA *Americana nana*, seu *humillima*. Tourn. The American dwarf Pomegranate. [...]. The dwarf Sort was brought into Europe from the warmest Parts of America, where the Inhabitants cultivate it in their Gardens for the Beauty of its Flowers, together with its continuing to produce Flowers and Fruit most Part of the Year: this Sort seldom grows above three Feet high. The Fruit of this Kind is rarely much larger than a Walnut, and not very pleasant to the Taste; so that 'tis rather cultivated for Shew, than for the sake of its Fruits. This Plant may be propagated by Layers in the same manner as the former Sorts; but must be planted in Pots filled with rich Earth, and preserved in a Green-house; otherwise it is too tender to endure the Cold of our Winters; and in the Summer, when the Flowers begin to appear, if the Plants are exposed to the open Air, the Buds will fall off, and never open: so that it should not be exposed to the open Air, but placed in an airy Glass-café, giving them a large Share of Air every Day: but as they will be covered at Top, so the Flowers will expand, and the Fruit will grow to the full Size”.

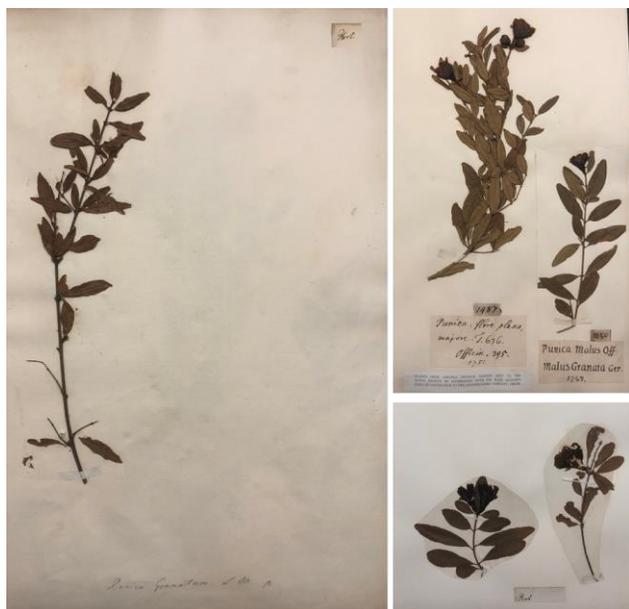
Some years later, Miller (1768: PUN [without number]) repeat part of the description as “2. PUNICA

(*Nana*) foliis linearibus, caule fruticoso. *Pomegranate with linear leaves, and shrubby stalk*. *Punica Americana, nana seu humillima*. Lig. Tourn. Inst. 636. *The American Dwarf Pomegranate*. [...]. The second sort grows naturally in the West-Indies, where the inhabitants plant it in their gardens to form hedges. It seldom rises more than five or six feet high in those countries, so may be kept within compass, and there the plants continue flowering great part of the year. The flowers of this kind are much smaller than those of the common sort; the leaves are shorter and narrower, and the fruit is not larger than a Nutmeg, and has little flavor, so it is chiefly propagated for the beauty of this flowers. This is undoubtedly a distinct species from the common sort, and is much tenderer. This plant may be propagated by layers in the same manner as the former sorts, but must be planted in pots filled with rich earth, and preserved in a greenhouse, otherwise it is too tender to endure the cold of our winters; and in the summer, when the flowers begin to appear, if the plants are exposed to the open air, the buds will fall off, and never open; so that they should not be exposed to the open air, but placed in an airy glass-café, giving them a large share of air every day in mild weather. As they will be covered at the top by the glasses, the flowers will expand, and the fruit will grow to the full size in England with this management, though they are not very desirable; but hereby the plants may be continued in flower upward of two months, and will make a fine appearance”.

In the herbarium of the Natural History Museum at BM (London) there is not anything sheet under *Punica nana* in the Miller's collection (Jacek Wajer, pers. comm.), but there are two specimens filed as *P. granatum* which are most likely from Miller's own herbarium (marked as 'Hort'), one of which is identified by Solander as '*Punica Granatum* L.M.  $\beta$ ' and might correspond to *P. nana* sensu Miller (Figure 1). There are also two specimens from the Royal Society collection which were cultivated at the Chelsea Physic Garden when Miller was in charge (mounted on one sheet, with numbers 1487 and 1050) but they correspond to the typical *P. granatum* and its double flowered form (Figure 1) as seen on Plate 113 published in the Figures of Plants (<http://bibdigital.rjb.csic.es/idviewer/13322/107>), also these last two specimens were not collected by Miller and they were never in his possession so they cannot be treated as the original material for anything he described in the Dictionary.

On the other hand, there is a really good illustration by Ehret (who was Miller's brother in law) that corresponds directly to *P. nana* sensu Miller. The plate was published in Trew's *Plantae Selectae*, with which Miller was familiar and which he listed in the references at the beginning of the *Gardeners Dictionary*. It was painted by Ehret in Monte Pessulano, which is somewhere in South of France or Northern Italy

(marked as No. III on the plate)  
 (<https://www.biodiversitylibrary.org/item/15200#page/144/mode/1up>) and here's the commentary to the plate: <https://www.biodiversitylibrary.org/item/15200#page/41/mode/1up>. Miller did not cite this plate in 1754, but he must have seen it as he owned a copy of Trew's *Platae Selectae* where this was published. However, unfortunately this plate is not original material of *P. nana*.



**Figure 1.** Specimens of *Punica* preserved in the Miller's collection at BM. Images courtesy of the herbarium BM, reproduced with permission.

**Figura 1.** Especímenes de *Punica* conservados en la colección de Miller en BM. Imágenes cortesía del herbario BM, reproducidas con permiso.

In addition, although there is a specimen of this species at LINN (LINN-HS887-2), no original specimens attributable to *P. nana* were found in the Linnaean collections, or in any of the other consulted herbaria (e.g., BM, L, P, S, SBT, UPS). As an exhaustive search for original material of *P. nana* failed to locate any extant specimen, a neotype is selected according to Art. 9.8 of the Shenzhen Code (Turland *et al.*, 2018). In addition, I have not found any well-preserved and complete herbarium specimen nor illustration to serve as a good neotype in the consulted herbaria. In conclusion, I designate as the neotype a complete and modern specimen preserved at VAL (with barcode VAL244427), made from plants cultivated in the Centre for Forestry Research and Experimentation (CIEF) of the Generalitat Valenciana (Quart de Poblet, Valencia, Spain). This collection has several duplicate specimens at GDA and MGC, and all the material matches the diagnosis included in the protologue and the current concept and use of the name *Punica nana* (Figure 2).

***Punica nana* L., Sp. Pl., ed. 2, 1: 676. 1762**

**Neotype** (designated here): Spain, Valencia, (Ex horto), Quart de Poblet, Centre for Forestry Research and Experimentation (CIEF) of the Generalitat Valenciana, 30SYJ134726, 96 m, 17-XII-2020, *P. Pablo Ferrer-Gallego s.n.* (VAL, barcode VAL244427) (Figure 2). Isonotypes: GDA, MGC.



**Figure 2.** Neotype of *Punica nana* L., VAL (barcode VAL244427). Image courtesy of the herbarium VAL, reproduced with permission.

**Figure 2.** Neotipo de *Punica nana* L., VAL (código de barras VAL244427). Imagen cortesía del herbario VAL, reproducido con permiso.

### ***Punica protopunica***

The protologue of *Punica protopunica* (Balfour, 1882) includes a description in Latin “52. PUNICA PROTOPUNICA, *Balf. fil.*: arbuscula ramis saepe spinescentibus; foliis ellipticis v. oblongis nunc obovatis nunc orbiculatibus obtusis saepe emarginatis integerrimis; bracteis subfloris oblongis obtusis; petalis obcordatis; carpellis uniseriatim verticillatis, placentis horizontalibus basalibus”, followed by the geographical locality “Socotra, species nova insignis quae abundanter per insulam crescit.” and several gatherings

“B.C.S. Nos. 263, 505”, “Schweinf. No. 506” and “Hunt. No. III”.

Among the original material used by Isaac Bayley Balfour in 1882 to describe *Punica protopunica*, in the herbarium of the Royal Botanic Garden Edinburgh at E there is a relevant specimen, with barcode E00239277. This sheet bears two branches with leaves, and an original label annotated as “*Punica protopunica* Balf. fil. / Socotra. Feb.-March, 1880. / Comm. Prof. Bayley Balfour, Aug., 1880. / 263”. This specimen is a syntype because it was mentioned in the protologue as “B.C.S. Nos. 263 [...]”. In the herbarium of the Royal Botanic Gardens of Kew at K there is a duplicate of the specimen at E, with barcode K000310566. This sheet at K bears five branches with leaves and an envelope with a flower, the sheet bears the same label that the sheet E00239277.

In addition, at K there is another relevant specimen, barcoded K000310568. This sheet bears five branches with leaves and an envelope with a flower. The sheet bears also an original label annotated as “*Punica protopunica* Balf. fil. / Socotra. Feb.-March, 1880. / Comm. Prof. Bayley Balfour, Aug., 1880. / No. 505 / 12/83”. This specimen belong to the gathering indicated in the protologue as “B.C.S. Nos. 263, 505”, and therefore is a syntype.

On the other hand, also at K there are several specimens that are part of the other gatherings mentioned in the protologue. The sheet with barcode K000310563 bears several fragments plant, with leaves, flowers and fruits, and two labels annotated as: 1) “*Punica protopunica* Balf. f. / Socotro. Dr. G. Schweinfurth / rec. 12/83”, 2) “Rihāne / Expedition Riebeck. / N. 506 *Punica protopunica* Balf. fil. / arbuscul. pedale / Kenegnig! / Insel Socotro. 250 met. / 23 April. / 1881. / Dr. G. Schweinfurth”. The sheet with barcode K000310567 bears three branches, two of these with leaves, and the third only with a flower, and an envelope with fragments of flowers. The sheet is annotated “bis” at the base of the specimen, and contains a label annotated as “*Punica protopunica* Balf. f. / Socotro. Dr. G. Schweinfurth / rec. 12/83”, the same label that the specimen K000310563. In addition, in the herbarium at MPU there is a specimen that is part of this gathering. The specimen with barcode MPU028216 bears two stems with leaves and an envelope with leaves and fragments of flowers and fruits. This sheet contains two labels: 1) “Rihane / Expedition Riebeck. / N. 506 *Punica protopunica* / Balf. fil. / aberhalb Kenegnigi / Insel Socotro. 250 meter. / 23 April. / 1881. / Dr. G. Schweinfurth”, 2) “A. Deflers. / Flora orientalis exsiccate / *Punica protopunica* Balf. fil. / Ile de Socotra”. These three specimens are duplicates and part of the same gathering mentioned by Balfour in the protologue, as “Schweinf. No. 506”, therefore can be treated as syntypes.



**Figure 3.** Lectotype of *Punica protopunica* Balf. f., K (barcode K000310563). Image courtesy of the herbarium K, reproduced with permission.

**Figure 3.** Lectotipo de *Punica protopunica* Balf. f., K (código de barras K000310563). Imagen cortesía del herbario K, reproducido con permiso.

In conclusion, among the syntypes mentioned above, the specimens at E, K and MPU, all the specimens match with the traditional concept and current use of the name. Therefore, I designate as the lectotype of *Punica protopunica* the specimen preserved at K with barcode K000310563, it is a good and well preserved specimen, with several duplicate specimens.

***Punica protopunica*** Balf. f., Proc. Roy. Soc. Edinburgh. 11: 512. 1882

**Lectotype** (designated here): Arabian Peninsula, Yemen, Socotra, 23 April 1881, G. Schweinfurth 506 (K [barcode K000310563]!) (Figure 3). Isolectotypes: K (barcode K000310567), MPU (barcode MPU028216).

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