

Typification of names of plants described by Carlos Pau from Morocco (1908-1922)  
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**Abstract** The vascular plant names proposed by Carlos Pau from Morocco between 1908 and 1922 were studied and, when necessary and possible, typified. Ten lectotypes have been designated; most of them preserved in MA and BC herbaria (isolectotypes at BCN, G, LD, and P).

**Keywords** Carlos Pau; Morocco flora; N-Africa; nomenclature.

## INTRODUCTION

Carlos Pau (1857-1937) was one of the first Spanish botanists to study the flora of Northern Morocco (see González-Bueno & Gomis, 2005). His research began in 1908, when he examined some plants that he had received from other naturalists such as Benito Vicioso. During the next 28 years, and until his death, he proposed about 400 new taxa from this area, including species, subspecies, varieties and forms (90% validly published). Although Carrasco (1975) published an exhaustive list of taxa described by Pau, it is not complete and, moreover, most of Pau's names are still untypified.

As part of a general study of all the Moroccan taxa proposed by Pau, we present a revision of the nomenclatural novelties (46 new Moroccan taxa) proposed during the period 1908-1922, mainly based on plants provided by Benito Vicioso, Francisco Pérez Camarero, Antonio Xiberta, Arturo Caballero, Angel Aterido and Manuel Vidal (Pau,

1908, 1911, 1918, 1921, 1922; Font Quer, 1914, 1916; Caballero, 1917; Vidal, 1921, 1922). The aim of this paper is the typification of these names in order to stabilize their interpretation and to evaluate their synonymy.

## **MATERIAL AND METHODS**

This work is based on the analysis of relevant literature (including protologues), and examination of herbarium specimens. The main source of original material for the names proposed by Pau is the herbarium of the Royal Botanic Gardens of Madrid (MA), where his collection (about 100,000 specimens) was deposited a few years after his death (see Mateo, 1995). Other original material can be found at the herbarium of the Botanical Institute of Barcelona (BC) owing to the relationship between Pau and Pius Font Quer (curator of the herbarium at that time) and with Fr. Sennen (see Mateo, 1995). Duplicates of Pau's collection were found at BCN, G, LD, MPU, and P (herbaria acronyms according to Thiers, 2017). Wherever possible, we have chosen to typify material of the Pau collection deposited in MA; whenever there was more than one specimen, we chose the most complete and well preserved, in accordance with the description given in the protologue. To evaluate the synonymy of these names, we have compared the original material with the type specimens of the accepted names, revised the original description of these accepted names and checked recent North African floras. Names typified here are listed chronologically. In some cases (Art. 9.19 of ICN; McNeill & al., 2012), we have proposed that some previously designated types be superseded because they are based on specimens from the *exsiccata* "ITER MAROCCANUM" (1927–1932) that were collected after the names had been published.

## TYPIFICATIONS

Based on our examination of literature, only eight out of the 46 names given by Pau in the period 1908–1922 have been correctly typified (see Prado & al., 2015): *Campanula vincaeflora* Pau in Vidal (1921: 278) by Cano-Maqueda & Talavera (2011: 36), *Chrysanthemum holophyllum* Pau in Vidal (1922: 59) by Vogt (1996: 302), *Convolvulus vidalii* Pau in Vidal (1921: 279) by Sa'ad (1967: 239), *Daucus minusculus* Pau in Font Quer (1914: 428) by Sáenz de Rivas (1974: 194), *Eryngium triquetrum* var. *xauensis* Pau in Vidal (1921: 277) by Breton (1962: 56), *Hypericum tomentosum* var. *viridulum* Pau in Vidal (1922: 57) by Robson (1996: 182), *Scabiosa ateridoi* Pau (1918) by Devesa (1984: 175), and *Thymus ciliatus* var. *fumanifolius* Pau in Font Quer (1916: 286) by Morales (1994: 217).

In 24 taxa we have found only a single specimen and therefore it should be considered as the holotype (see McNeill, 2014): *Acanthus mollis* var. *viciosoi* Pau (1908: 71, MA barcode MA115539!), *Andryala gracilis* Pau (1918: 130, BC barcode BC-36093!), *Avena hirsuta* var. *sallentiana* Pau (1918: 133, BC barcode BC-68088!), *Biscutella apula* f. *reticulata* Pau in Vidal (1922: 56, MA barcode MA44491!), *Bryonia dioica* var. *lavifrons* Pau in Vidal (1921: 277, MA barcode MA120808!), *Centaurea pungens* f. *alobyphylla* Pau (1921: 201, MA No. 136040 [photo!]), *Centaureum minus* var. *bifrons* Pau in Vidal (1922: 60, MA barcode MA92759!), *Convolvulus suffruticosus* var. *melillensis*, as *melillense* Pau (1911: 99, MA No. 94101!), *Dianthus siculus* var. *lanceolatus* Pau (1927: 22, MA No. 33506!), *Echium rifeum* Pau (1917: 27, MA No. 97395!), *Fumaria muralis* var. *curta* Pau (1908: 69, MA No. 43421!), *Hedysarum zeluanum* Pau (1911: 99, MA No. 68840!), *Helianthemum apenninum* var. *riffeum* Pau (1911: 97, MA No. 80650!), *Lavatera vidalii* Pau in Vidal (1922: 58, MA barcode MA77180!), *Linaria riffea* Pau (1911: 99, MA No. 110310!), *Linaria spuria* f.

*minoripes* Pau (1921: 202, MA No. 109083 [photo!]), *Linum moroderorum* Pau (1911: 98, MA barcode MA72779!), *Onobrychis ligulifera* Pau (1911: 99, MA No. 68933 [photo!]), *Ononis tetuanensis* Pau in Vidal (1921: 276, MA No. 61602!), *Phlomis caballeroi* Pau (1918: 132, MA barcode MA242065!), *Ranunculus repentifolius* Pau in Vidal (1922: 56, MA barcode MA40942!), *Verbena supina* f. *erecta* Pau (1911: 98, MA No. 97523!), *Veronica beccabunga* var. *xauenensis* Pau in Vidal (1922: 60, MA barcode MA112408!), *Vicia disperma* var. *subuniflora* Pau in Caballero (1917: 18, MA No. 69961!).

Among the remaining names, nine are lectotypified here, and four remain without designated types pending further research [*Centranthus calcitrapa* f. *puberula* Pau in Vidal (1921: 277), *Epilobium caballeroi* Pau in Vidal (1922: 59, pro hybr.), *Linaria supina* var. *ajmasiana* Pau in Vidal (1922: 59) and *Linum tenue* var. *xauense* Pau in Vidal (1921: 275); for which neither original material (for lectotypification purposes) nor other useful material (for neotypification purposes) has been found]. Finally, one is considered *nomen nudum*: *Glaucium corniculatum* f. *foeniceum* Pau in Vidal (1921: 275) due to its not having any description or diagnosis in the original publication, and not having found any other information in any subsequent publication (Art. 38.1(a) of ICN; McNeill & al., 2012).

**Pau (1911): Una visita botánica al Riff (Abril, Mayo 1910):** This is a paper about Pau's first trip to Morocco in 1910, when he visited Melilla, Selouane, Puntilla and Corazón del Toro (Bugenzen). Eight new taxa for the Moroccan flora were described and one is typified here.

#### ***Convolvulus suffruticosus* var. *melliflorus***

Pau (1911) described this variety of *Convolvulus suffruticosus* Desf. characterised by its hairy stems, ovate-oblong leaves, long peduncles, densely sericeous sepals and yellowish corolla. In the protologue Pau indicated that this plant was a morphological

intermediate between *C. supinus* Coss. & Kralik (with similar flowers) and *C. suffruticosus* (with similar leaves). Also the exact locality is mentioned (“Zeluan”).

Carine & Robba (2010) reported a “holotype” for this taxon cited as “*Convolvulus valentinus* var. *melliflorus* Pau”, but there are two sheets at MA collected by Pau in Selouane that are syntypes (Art. 9.5), while Carine & Robba (2010) did not mention any particular sheet. MA No. 94100 has two original handwritten labels by Pau, one with the information about the gathering and another reporting the diagnosis. MA No. 94102 is labelled as “*B. et C. Vicioso Herbarium Mauritanicum*” but the gathering information is the same. The specimen here chosen as lectotype is the one labelled by Pau that bears a better and more complete plant.

Dobignard & Chatelain (2010-2013) included this variety in *Convolvulus valentinus* subsp. *suffruticosus* (Desf.) Maire, and the MA specimens were re-determined as *C. valentinus* Cav. by Menemen in 1994-95. However, the molecular and morphological study by Carine & Robba (2010) of this complex supports the treatment of the variety under *C. supinus*.

*Convolvulus suffruticosus* var. *melliflorus* Pau in Ann. Sci. Acad. Polytecn. Porto 6: 99. 1911 ≡ *Convolvulus valentinus* var. *melliflorus* (Pau) Jahand. & Maire, Cat. Pl. Maroc 3: 588. 1934 ≡ ***Convolvulus supinus*** var. ***melliflorus*** (Pau) Carine & Robba in Phytotaxa 14: 16. 2010 – **Lectotype (designated here)**: [MOROCCO] Zeluan, 2 May 1910, *C. Pau s.n.* (MA No. 94100!; isolectotype: MA No 94102!).

**Font Quer (1914): Plantas de Larache:** Font Quer (1914) published a list of plants collected by F. Pérez Camarero around Larache in 1914, as he stated in the introduction: “*alrededores de Larache por mi distinguido compañero el farmacéutico militar Sr. Pérez Camarero, durante la primavera pasada*”. Font Quer sent some of these plants to Pau for their determination because at that time he did not have African specimens for comparison (see González-Bueno & Gomis, 2007). In this paper all plants are numbered. Five new taxa are described, of which four are here typified.

#### ***Malcolmia patula* var. *longifolia***

Number 23 is a new variety of *Malcolmia patula* Lag. ex DC. with the diagnosis “*Folia siliqui et rostra longiores*” made by Pau. Al-Shehbaz & al. (2014) mentioned a BC specimen as holotype (BC barcode BC-77766), and a MPU specimen as isotype, both collected in Larache in 1930 and included in the *exsiccata* “ITER MAROCCANUM, 1930”; thus they were collected 16 years after the description of the taxon in 1914. According to Art. 9.19 of ICN (McNeill & al., 2012) this typification has to be superseded because original material exists: the plants collected by Pérez Camarero in 1914. There are three sheets of this gathering, one at MA and two at BC,

one conserved in the general collection and the other in the personal collection of Sennen. The BC specimens are labelled as “HERBARIO DE P. FONT QUER” with an indication of the taxon name and the protologue handwritten by Font Quer. The MA specimen has an original label also handwritten by Font Quer with the locality, collector, date and number, but the taxon name is “*Malcolmia patula* (Lag.) DC.?” The three sheets bear complete plants and we select as the lectotype that preserved at MA where the main collection of Pau is conserved.

All three specimens have a revision label by Nogueira in 1989 who re-determined them as *Malcolmia lacera* (L.) DC. López González (1986) demonstrated that the designated type of this taxon is a specimen of *Raphanus* L. and not *Malcolmia* L.; so, this is a misapplied name and, according to Al-Shehbaz & al. (2014), all the records of *M. lacera* from the Iberian Peninsula and north-western Africa have to be attributed to *M. triloba* (L.) Spreng.

*Malcolmia patula* var. *longifolia* Pau in Font Quer in Bol. Soc. Esp. Hist. Nat. 14: 427.

1914 ≡ *Malcolmia broussonetii* var. *longifolia* (Pau) Maire in Bull. Soc. Hist. Nat. Afrique N. 20: 12. 1929 – **Lectotype (designated here)**: [MOROCCO] Larache, 1914, *F. Pérez Camarero 23* (MA No. 49783!; isolectotypes: BC barcode BC-3377!, BC-Sennen barcode BC-802252!).

= ***Malcolmia triloba*** (L.) Spreng., Syst. Veg. 2: 899. 1825 ≡ *Cheiranthus trilobus* L., Sp. Pl. 662. 1753 – Lectotype (designated by López González in Anales Jard. Bot. Madrid 42: 319. 1986): Herb. Linn. No. 839.24 (LINN [digital image!]).

### ***Nonea perezii***

Number 34 is a new *Nonea* species. Pau (see Font Quer, 1914) provided a detailed description and two comparisons: (1) with the genus *Elizaldia* Willk., similar in its solitary nutlets (sometimes geminated) and (2) with *N. phanerantha* Viv. [= *N. calycina* (Roem. & Schult.) Selvi, Bigazzi, Hilger & Papini], a very different species. There are two sheets preserved at BC and labelled as *N. perezii*, both bearing the herbarium collection label of Font Quer. One sheet is conserved in the general collection and it also includes another label with the indication handwritten by Font Quer “*Nonnea phanerantha* Viv.? No conozco la descripción de esta especie. Sin escamas en el tubo”. The other is conserved in the Sennen collection (BC). In both of these sheets, the gathering information reported, as well as the plant, match the protologue. The specimen chosen as lectotype is the more complete plant.

The current concept of *Nonea* L. differs among authors. In Morocco, Valdés (2002), Fennane (2007) and El Oualidi & al. (2012) accept the genus *Elizaldia* Willk. as different from *Nonea*, according to the inclusion/exclusion of the stamens. However, molecular studies (Selvi & al., 2006) support the inclusion of *Elizaldia* within *Nonea*.

On the other hand, all these authors recognize two species on the basis of the stamens length: *N. calycina* and *N. heterostemon* Murb. (a Moroccan endemism). Contrarily, Valdés (2011) and Valdés & Talavera (2012) only accept *N. calycina* due to its heterostyly. Pau (1914) did not mention the stamens length in his description of *N. perezii*, but examining the type specimens, we have observed that one stamen is much longer than the others. Murbeck (1898) had just included this character in the description of *N. heterostemon* and, thereafter, Pau's species should be synonymized with *Nonea heterostemon*.

*Nonea perezii* Pau in Font Quer in Bol. Soc. Esp. Hist. Nat. 14: 428. 1914, as *Nonnea* –  
**Lectotype (designated here):** [MOROCCO] Larache (Afr. bor), 1914, *F. Pérez Camarero 34* (BC barcode BC-42193!, isolectotype: BC-Sennen barcode BC-990170!).

= *Nonea heterostemon* Murb. in Acta Univ. Lund. 34: 7. 1898 – Type: not designated.

#### ***Ononis maweana* var. *fontqueri***

Number 15 is a new variety of *Ononis maweana* Ball that, according to Pau (see Font Quer, 2014), would differ from the nominal variety by the leaves and calyx. We have found two sheets collected by F. Pérez Camarero in Larache in 1914. The BC specimen is labelled as “HERBARIO DE P. FONT QUER” with an indication of the variety handwritten by Pau. The MA specimen contains only one identification at species level but is numbered 15 as reported in the protologue. As a consequence, we have chosen this second sheet as the lectotype. On the basis of the examination of these sheets and following Dobignard & Chatelain (2010–2013), this variety should be included in *Ononis maweana* Ball.

*Ononis maweana* var. *fontqueri* Pau in Font Quer in Bol. Soc. Esp. Hist. Nat. 14: 427. 1914 – **Lectotype (designated here):** [MOROCCO] Larache, 1914, *F. Pérez Camarero 15* (MA No. 61795!; isolectotype: BC barcode BC-14553!).

= *Ononis maweana* Ball in J. Bot. 11: 304. 1873 – Syntypes: [MOROCCO] prope Tanger, 18 April 1871, *G. Maw s.n.* (G barcode G00022418 [digital image!]; K barcode K000226846 [digital image!]).

#### ***Triglochin barrelieri* var. *maura***

Number 5 is a new variety of *Triglochin barrelieri* Loisel. Although the name is cited as “var. nov. *maurum* Pau in litt.”, the description of this taxon was made by Font Quer, who indicated that it differs from the nominal variety by its longer and almost straight pedicels and larger fruits (“*Difieren del tipo por los pedúnculos mayores y casi*

*rectos, con frutos doble mayores*”). Since the description was made by Font Quer, the authorship of this variety should be “Pau ex Font Quer”.

Köcke & al. (2010: 363) lectotypified this taxon on the basis of a specimen collected by Font Quer in “Rincón de Medik” from the *exsiccata* “ITER MAROCCANUM, 1930” conserved in Maire’s collection (MPU barcode 006791). However, we have found original material with the same collector (“Pérez Camarero”), date (“Primavera de 1914”) and locality (“Larache”) indicated in Font Quer’s publication in MA and BC herbaria (although they are labelled only as “*Triglochin barrelieri*”). Being that the specimen proposed by Köcke & al. (2010) was collected 16 years after the taxon was published and original material exists, this lectotypification is not correct. It should be added that the BC specimen has another label handwritten by Pau, indicating “*var. nova maura*” and a diagnosis: “*Frutos mayores, pedúnculos patentes no arqueados y más largos*”. However, we selected the MA specimen as lectotype because it includes a better preserved and complete plant.

The BC specimen also has a revision label by von Mering who re-determined it as *Triglochin barrelieri* Loisel. According to Köcke & al. (2010), this species is very variable in overall size and fruit and pedicel length, and includes also plants with long pedicels and big fruits, the distinctive characters of *T. barrelieri* var. *maura*.

*Triglochin barrelieri* var. *maura* Pau ex Font Quer in Bol. Soc. Esp. Hist. Nat. 14: 425.

1914, as *maurum* ≡ *Triglochin bulbosa* var. *maura* (Pau ex Font Quer) Maire in Jahandiez & Maire, Cat. Pl. Maroc 4: 922. 1941 – **Lectotype (designated here)**: [MOROCCO] Larache, 1914, *F. Pérez Camarero* 5 (MA barcode MA3496!, isolectotype: BC barcode BC-59660!).

= ***Triglochin barrelieri*** Loisel., Fl. Gall. ed. 1: 725. 1807 – Holotype: [FRANCE] Arelatem [Arles] ad Rhodanii, *s.d.*, *J.M. Artaud s.n.* (AV [digital image!]).

**Caballero (1917): Excursión botánica a Melilla en 1915:** Caballero (1917) published a list of plants collected by himself on a trip to Melilla in 1915, as he explains in the introduction of this paper: “*El día 24 de Mayo de 1915 desembarcamos en el puerto de Melilla con el fin de realizar algunas exploraciones botánicas*”. On the sixth page he acknowledged Pau for his help in solving taxonomical problems (“*nuestro sincero agradecimiento al sabio botánico español D. Carlos Pau, que ... ha resuelto todas las dudas que nos hemos permitido comunicarle.*”). This help resulted in the proposal of four new taxa, one typified here.

***Genista caballeroi***



According to Pau (Caballero, 2017: 19), *Genista caballeroi* is similar to *G. tricuspidata* Desf. but without stipulary appendices. The locality indicated in the protologue is “*Habitat copiosissima infra Hardú in latere septentrionale Montis Gurugú. Fl. Junio*”. There are two sheets in MA herbarium collected in Gurugú in June 1915 by Caballero. One (MA No. 58809) bears two original labels handwritten by Pau with the gathering information and the taxon name, whereas the other (MA No. 58812) is labelled “B. et C. Vicioso Herbarium Mauritanicum” and lacks information on the day of collecting. Both specimens bear complete plants and we have chosen as the lectotype the one labelled by Pau.

*Genista caballeroi* has been accepted by Talavera (2002) as an endemic taxon from N-Morocco and NW-Algeria, based on the absence of stipulary appendices to most of the leaves, the number of ribs on the stems and the size of the hairs on both stem and legume. However, neither Fennane (2007) nor Dobignard & Chatelain (2010-2013) accept it as a good species, and they synonymize it with *G. tricuspidata*, a species considered very variable from the morphological point of view. Desfontaines (1798), in the description of *G. tricuspidata*, did not mention the presence or absence of stipulary appendices, the character that Pau used to describe *G. caballeroi*. Neither the number of ribs nor the hairs’ size—characters used by Talavera (2002)—are included in this description. Therefore, although we have not seen the original material of *G. tricuspidata*, according to our criteria, *G. caballeroi* cannot be considered a different taxon.

*Genista caballeroi* Pau in Caball. in Trab. Mus. Nac. Ci. Nat., ser. bot. 11: 19. 1917 ≡ *Genista tricuspidata* subsp. *caballeroi* (Pau) Maire in Bull. Soc. Hist. Nat. Afrique N. 22: 38. 1931 ≡ *Genista tricuspidata* var. *caballeroi* (Pau) Raynaud in Naturalia Monspel., sér. bot. 28: 28. 1979 – **Lectotype (designated here)**: [MOROCCO] Gurugú, 12 June 1915, A. Caballero s.n. (MA No. 58809!; isolectotype: MA No. 58812!).

= *Genista tricuspidata* Desf., Fl. Atlant. 2: 138. 1798 – Type: not designated.

**Pau (1918): Plantas de Melilla:** This paper includes a list of plants with seven new taxa (five from Melilla and two from the Iberian Peninsula), of which one is here typified. The main collector (Angel Aterido) and the collection details are indicated in the introduction, where the locality and date are annotated “*Tifasor; y fueron recogidas desde el día 10 al 30 de Julio del año 1915*”. It should be noted that Pau reviewed almost all the specimens mentioned in the paper when he was in Barcelona as he stated in the introduction “*D. Ángel Aterido ... recogió algunas plantas que he podido revisar durante mi corta estancia en la capital del Principado Catalán este año pasado*”.

### ***Bupleurum melillense***

Pau (1918) provided a description for this new species specifying that it differs from *B. balansae* Boiss. & Reut. by its shorter leaves, more distant veins, shortly pedunculated umbels, shorter and wider involucral bracts, widened fruits and sharper ridges. Four herbarium sheets are indicated as possible types on the website of the MPU herbarium (<https://collections.umontpellier.fr/herbier-mpu-presentation/base-de-donnees-botanique-herbier-mpu>); however, none of them constitutes original material of this taxon, and therefore they are not eligible as lectotypes according to Arts. 9.1 and 9.2 of ICN (McNeill & al., 2012). In fact, these plants were collected by Sennen in 1930 and 1931, some time later than the publication of the species in 1918. Moreover, they came from a different locality (Tizi-Assa) than that mentioned in the protologue (Tifasor). The appropriate original material is that from Tifasor collected by Aterido in July 1915, as indicated in the protologue. There are two sheets of this gathering in MA and BC herbaria. We select the one in MA as the lectotype because it has a note handwritten by Pau indicating “*mi tipo*” and the plant is more complete than the one in BC.

Although Pau considered the distinguishing characters of *Bupleurum melillense* as being enough to propose a new species, on the basis of the examination of the two types and attending to the revision label by Neves in 1998 in the BC specimen, this taxon should be synonymized to *B. balansae*, characterized by its slender rays and linear leaves (Fennane, 2007). We have designed the lectotype of *B. balansae* according to the PhD thesis of Neves (2000: 261).

*Bupleurum melillense* Pau in Bol. Soc. Aragonesa Ci. Nat. 17: 129. 1918 – **Lectotype (designated here)**: [MOROCCO] Tifasor (Melilla), 15 July 1915, *A. Aterido s.n.* (MA barcode MA86591!; isolectotype: BC barcode BC-26034!).

= ***Bupleurum balansae*** Boiss. & Reut. in Diagn. Pl. Orient. Ser. 2, 3(2): 83. 1856 – Lectotype (**designated here**): [ALGERIE] coteaux avoisinant la Batterie Espagnole, 30 June 1852, *B. Balansa* 482 (G barcode G00023190 [digital image!]).

**Pau (1922): Nueva contribución al estudio de la flora de Granada**: This paper is about plants of Granada (a Spanish province) but Pau described two varieties from Morocco by comparing African with Iberian samples, both typified here.

### ***Celsia barnadesii* var. *mauritanica***

This taxon was first mentioned by Pau (1922: 59), where he compared the Moroccan and Spanish specimens (“*difieren ligeramente del tipo español ... por sus cápsulas menores y oblongas*”), and mentioned the locality of this variety as “*en*

*abundancia en las cercanías de Zeluán*". Some years later, Pau (1929) subsequently proposed it as a species and indicated that the collection date was May 2, 1910. In the latter publication, Pau (1929) cited *Celsia battandieri* Murb. as a synonym since Murbeck included the original material of Selouane collected by Pau in the publication of this new species (Murbeck, 1925).

We have found three sheets at MA, all of them with a printed label of the Sennen *exsiccata* "1929 - PLANTES D'ESPAGNE – SENNEN N° 6982" (Pau donated this material to Sennen for its distribution). The determination indicated on this printed label is *Celsia mauritanica* Pau. Among these three sheets, we propose the MA barcode MA108921 as the lectotype because it includes (1) an original label by Pau as *C. barnadesii* var. *mauritanica*, and (2) a large number of capsules whose size and shape are diagnostic for this variety, according to the protologue. Sennen distributed this *exsiccata* to different herbaria as evidenced by the isoelectotypes found in BCN and P.

The specimen cited by Murbeck (1925) is conserved in LD herbarium. Although it is cited as "*Tetuan, leg. Carlos Pau, 9/5 1910*", Pau (1929) indicated that Murbeck had wrongly transcribed Pau's original handwritten label with the real locality ("*Zeluan*") and real date ("*2.5.1910*"). The name indicated by Pau in the label, *Celsia barnadesii*, is crossed out by Murbeck, who determined it as *C. battandieri*. Even though it is not labelled as var. *mauritanica*, the plant and the information of the gathering match that of Pau's publication and can be considered as an isoelectotype.

There is also a specimen preserved in G herbarium [Charles Joseph-Marie Pitard's collection, who was a French correspondent of Pau (see Mateo, 1995)] collected by Pau from Selouane on May 2. Although the year is not indicated on the G specimen, we know that Pau only visited Selouane in 1910 (Mateo, l.c.). Instead of the printed Sennen label, it bears a label of "*Plantas Españolas*" (the first labels used by Pau), and it is only identified as *Celsia barnadesii* (without indicating variety); it seems that Pau donated this specimen before the description of the variety published in 1922 and used a label of his Spanish herbarium. However, the plant and the information on the locality, date and collector match the protologue and can be considered also as an isoelectotype.

Dobignard & Chatelain (2010–2013) included this variety in *Verbascum battandieri* (Murb.) Hub.-Mor. The G, P and BCN sheets (designated here as isoelectotypes) have a revision label by Benedí in 2002 who re-determined them as *V. battandieri*. Moreover, Murbeck (1925), in his description of *Celsia battandieri*, cited the LD sheet as syntype of this species, so he considered that the characters of Pau's variety are included in the variability of this species.

*Celsia barnadesii* var. *mauritanica* Pa in Mem. Mus. Ci. Nat. Barcelona, Ser. Bot. 1(1): 59. 1922 ≡ *Celsia mauritanica* (Pau) Pau, Monde Pl. 30(181): 1. 1929 –  
**Lectotype (designated here):** Maroc: Riff oriental aux alentours de Zeluan, 2

May 1910, *C. Pau s.n.* (MA barcode MA108921!; isolectotypes: BCN No 52463 [photo!], G barcode G00414977 [photo!], LD barcode 1967555 [photo!], MA barcode MA108919!, MA barcode MA108920!, P barcode P03425530 [digital image!]).

= *Verbascum battandieri* (Murb.) Hub.-Mor. in *Bauhinia* 5(1): 10. 1973 ≡ *Celsia battandieri* Murb., *Monogr. Celsia*: 209. 1925 – Type: not designated.

### ***Centaurea fragilis* var. *zeluana***

Pau (1922: 52) mentioned this variety by indicating that in his herbarium there were some curious forms close to *Centaurea malacitana* Boiss. with pinnatifid basal leaves and entire upper leaves (“*Forma intermedia inter genuinam et malacitanam; folia sup. integra ut in hispanica, basilaria pinnatifida*”). Although there is no indication of locality in the protologue, the variety name “*zeluana*” should be referred to Selouane (= *Zeluan*).

There are two sheets labelled as *Centaurea fragilis* var. *zeluana* and collected by Pau in Selouane, one in MA herbarium and another in BC herbarium. Besides, the BC specimen bears the indication “*var. nova*” handwritten by Pau. We select the one conserved in MA herbarium as the lectotype, since this herbarium includes the main collection of Pau. According to our examination of this MA specimen and also the revision label in the BC specimen added by Garcia-Jacas & Susanna in 2005, the features characterizing this variety are included in the variability of *C. fragilis* Durieu, an endemism from Morocco (El Oualidi & al., 2012). Although no original material of *C. fragilis* has been seen, according to the description made by Durieu (1847), this species includes plants with pinnatipartid basal leaves and entire upper leaves, the characters of Pau’s variety.

*Centaurea fragilis* var. *zeluana* Pau in *Mem. Mus. Ci. Nat. Barcelona, Ser. Bot.* 1(1): 52.

1922. – **Lectotype (designated here)**: [MOROCCO] Zeluan, Riff, *C. Pau s.n.* (MA No. 136438 [photo!]; isolectotypes: BC barcode BC-35333!).

= *Centaurea fragilis* Durieu in *Rev. Bot. Recueil Mens.* 2: 429. 1847 – Type: not designated.

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## LITERATURE CITED

- Al-Shehbaz, I., German, D., Mummenhoff, K. & Moazzeni, H.** 2014. Systematics, tribal placements, and synopses of the *Malcolmia* s.l. segregates (Brassicaceae). *Harvard Pap. Bot.* 19(1): 53–71. <http://doi.org/10.3100/hpib.v19iss1.2014.n4>
- Breton, A.** 1962. Révision des *Eryngium* d'Afrique du Nord. *Mém. Soc. Sci. Nat. Phys. Maroc Bot.* 2: 1–86.
- Caballero, A.** 1917. Excursión botánica a Melilla en 1915. *Trab. Mus. Nac. Ci. Nat., Ser. Bot.* 11: 1–39.
- Cano-Maqueda, J. & Talavera, S.** 2011. A taxonomic revision of the *Campanula lusitanica* complex (Campanulaceae) in the Western Mediterranean region. *Anales Jard. Bot. Madrid* 68(1): 15–47. <http://dx.doi.org/10.3989/ajbm.2274>
- Carine, M. & Robba, L.** 2010. Taxonomy and evolution of the *Convolvulus sabatius* complex (Convolvulaceae). *Phytotaxa* 14: 1–21. <http://doi.org/10.11646/phytotaxa.14.1.1>
- Carrasco, M.A.** 1975. Contribución a la obra taxonómica de Carlos Pau. *Trab. Dept. Bot. Univ. Complut. Madrid* 8: 1–330.
- Desfontaines, R.L.** 1798. *Flora Atlantica, sive historia plantarum, quae in Atlante, agro tunetano et algeriensi crescunt. Tomus secundus.* Apud editorem L. G. Desgranges, Paris.

- Devesa, J.A.** 1984. Revisión del género *Scabiosa* en la Península Ibérica e Islas Baleares. *Lagasalia* 12: 143–212.
- Dobignard, A. & Chatelain, C.** 2010-2013. *Index synonymique de la flore d'Afrique du Nord*, 5 vols. Éditions des Conservatoire et Jardin Botaniques, Genève.
- Durieu, M.** 1847. Espèces nouvelles de l'Algérie: 2e suite. *Rev. Bot. Recueil Mens.* 2: 424–439.
- El Oualidi, J., Khamar, H., Fennane, M., Ibn Tattou, M., Chauvet, S. & Sghir Taleb, M.** 2012. Checklist des endémiques et spécimens types de la flore vasculaire de l'Afrique du Nord. *Doc. Inst. Sci. Univ. Mohammed V* 25: 1–189.
- Fennane, M., Ibn Tattou, M., Ouyahya, A. & El Oualidi, J. (eds.)** 2007. Flore Pratique du Maroc, volume 2. Angiospermae (Leguminosae – Lentibulariaceae). *Trav. Inst. Sci., Sér. Bot.* 38 : 1–636.
- Font Quer, P.** 1914. Plantas de Larache. *Bol. Soc. Esp. Hist. Nat.* 14: 424–429.
- Font Quer, P.** 1916. Sobre la flora de Melilla. *Bol. Soc. Esp. Hist. Nat.* 16: 285–287.
- González-Bueno, A. & Gomis, A.** 2005. Spanish naturalists and natural history societies in the process of colonisation in Morocco (1859–1912). *Arch. Nat. Hist.* 32(1): 80–91. <http://dx.doi.org/10.3366/anh.2005.32.1.80>
- González-Bueno, A. & Gomis, A.** 2007. *Los territorios olvidados. Estudio histórico y diccionario de los naturalistas españoles en el África hispana (1860-1936)*. Consejería de Agricultura y Pesca, Junta de Andalucía, Col. El Arado y la Red, Ed. Doce Calles, Madrid.
- Köcke, A.V., von Mering, S., Mucina, L. & Kadereit, J.W.** 2010. Revision of the Mediterranean and Southern African *Triglochin bulbosa* complex (Juncaginaceae). *Edinburgh J. Bot.* 67(3): 353–398. <http://doi.org/10.1017/S0960428610000041>

- López González, G.** 1986. *De Linnaei plantis Hispanicis novitates nonnullae II. Anales Jard. Bot. Madrid* 42: 319–324
- Mateo, G.** 1995. Carlos Pau Español. La botànica extraacadèmica. Pp 730–760 in Camarasa, J.M. & Roca, A. (eds.), *Ciència i tècnica als Països Catalans: una aproximació biogràfica*. Fundació Catalana per a la Recerca, Barcelona.
- McNeill, J.** 2014. Holotype specimens and type citations: General issues. *Taxon* 63(5): 1112–1113. <http://doi.org/10.12705/635.7>
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. & Turland, N.J.** 2012. *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code). Adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011*. [Regnum Vegetabile 154]. Koeltz Scientific Books, Königstein.
- Morales, R.** 1994. El género *Thymus* L. (Labiatae) en África. *Anales Jard. Bot. Madrid* 51(2): 205–236.
- Murbeck, S.** 1898. Contributions à la Connaissance des Primulacées-Labiées de la Flore du Nord-Ouest de l'Afrique et Plus Spécialment de la Tunisie. *Acta Univ. Lund.* 34: 1–41.
- Murbeck, S.** 1925. *Monographie der gattung Celsia*. Lunds Universitets Arsskrift. N. F., Lund.
- Neves, S.S.** 2000. *Taxonomy and evolution in Bupleurum L. (Umbelliferae) in the W. Mediterranean and Macaronesia*. PhD thesis, University of Edinburgh, Edinburgh.
- Pau, C.** 1908. Un puñado de plantas marroquíes. *Bol. Soc. Aragonesa Ci. Nat.* 7: 69–71.

- Pau, C.** 1911. Una visita botánica al Riff (Abril, Mayo 1910). *Ann. Sci. Acad. Polytechn. Porto* 6: 96–99.
- Pau, C.** 1918. Plantas de Melilla. *Bol. Soc. Aragonesa Ci. Nat.* 17: 123–133.
- Pau, C.** 1921. Una centuria de plantas del Rif oriental. *Bol. Real Soc. Esp. Hist. Nat.* 21: 198–204.
- Pau, C.** 1922. Nueva contribución al estudio de la flora de Granada. *Mem. Mus. Ci. Nat. Barcelona, Ser. Bot.* 1(1): 1–74.
- Pau, C.** 1929. Quelques plantes intéressantes du Maroc. *Monde Pl.* 30(181): 1.
- Prado, J., Hirai, R.Y., & Moran, R.C.** 2015. (046–048) Proposals concerning inadvertent lectotypifications (and neotypifications). *Taxon* 64(3): 651. <http://doi.org/http://dx.doi.org/10.12705/643.29>
- Robson, N.** 1996. Studies in the genus *Hypericum* L. (Guttiferae) 6. Sections 20. *Myriandra* to 28. *Elodes*. *Bull. Nat. Hist. Mus. Lond.* 26(2): 75–217.
- Sa'ad, F.** 1967. The *Convolvulus* species of the Canary Isles, the Mediterranean region, and the Near and Middle East. *Meded. Bot. Mus. Herb. Rijks Univ. Utrecht* 281: 1–288.
- Sáenz de Rivas, C.** 1974. Datos sobre el género *Pseudorlaya* (Murb.) Murb. (Umbelliferae). *Anales Inst. Bot. Cavanilles* 31(11): 191–204.
- Selvi, F., Bigazzi, M., Hilger, H.H., & Papini, A.** 2006. Molecular phylogeny, morphology and taxonomic re-circumscription of the generic complex *Nonea/Elizaldia/Pulmonaria/Paraskevia* (Boraginaceae-Boragineae). *Taxon* 55: 907–918. <http://doi.org/10.2307/25065685>
- Talavera, S.** 2002. *Genista* L. Pp. 385–390 in Valdés, B., Rejdali, M., Achhal El Kadmiri, A., Jury, J.L. & Montserrat, J.M. (eds.), *Catalogue des plantes*



*vasculaires du nord du Maroc, incluant des clés d'identification*, vol. 1.  
Biblioteca de Ciencias, CSIC, Madrid.

**Thiers, B.** 2017 [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/> (accessed 24 October 2016).

**Valdés, B.** 2002. Boraginaceae Pp. 493–508 in Valdés, B., Rejdali, M., Achhal El Kadmiri, A., Jury, J.L. & Montserrat, J.M. (eds.), *Catalogue des plantes vasculaires du nord du Maroc, incluant des clés d'identification*, vol. 1. Biblioteca de Ciencias, CSIC, Madrid.

**Valdés, B.** 2011. Boraginaceae. – In: Euro+Med Plantbase - the information resource for Euro-Mediterranean plant diversity. <http://ww2.bgbm.org/EuroPlusMed> (accessed 12 November 2017).

**Valdés, B. & Talavera, S.** 2012. *Nonea* Medik. Pp. 337–345 in Talavera, S., Andrés, C., Arista, M., Fernández Piedra, M.P., Gallego, M.J., Ortiz, P.L., Romero Zarco, C., Salgueiro, F.J., Silvestre, S. & Quintanar, A. (eds.) *Flora Iberica XI*. Real Jardín Botánico, CSIC, Madrid.

**Vidal, M.** 1921. Materiales para la flora marroquí. *Bol. Real Soc. Esp. Hist. Nat.* 21: 274–281.

**Vidal, M.** 1922. Materiales para la flora marroquí - 2ª nota. *Bol. Real Soc. Esp. Hist. Nat.* 22: 54–60.

**Vogt, R.** 1996. Notes on Asteraceae from N Morocco. *Lagascalia* 18(2): 301–305.