https://doi.org/10.15407/ukrbotj77.04.249

Types and other historical specimens of Allan and Richard Cunningham's taxa of *Epilobium* and *Fuchsia* (*Onagraceae*) from New Zealand in the Turczaninow Herbarium at the National Herbarium of Ukraine (KW)

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Mosyakin S.L., de Lange P.J., Antonenko S.I., Klimovych N.B. 2020. **Types and other historical specimens of Allan and Richard Cunningham's taxa of *Epilobium* and *Fuchsia* (*Onagraceae*) from New Zealand in the Turczaninow Herbarium at the National Herbarium of Ukraine (KW).** *Ukrainian Botanical Journal*, 77(4): 249–269.

Abstract. Thirteen historical specimens (including original material, mainly syntypes and isolectotypes) of Allan and Richard Cunningham's taxa of *Epilobium* and *Fuchsia* (*Onagraceae*) from New Zealand recently discovered in the Turczaninow Herbarium (KW-TURCZ) at the National Herbarium of Ukraine (KW) are discussed in comparison with digital images of and data on other relevant specimens from several other herbaria, such as K, BM, WELT, etc. These specimens, collected in New Zealand by Allan Cunningham in 1826 and 1838 and by Richard Cunningham in 1833–1834, represent the following taxa (as outlined by A. Cunningham): *Epilobium alsinoides*, *E. atriplicifolium*, *E. confertum*, *E. hirtigerum*, *E. nerterioides*, *E. nummulariifolium*, *E. pedunculare*, *E. thymifolium*, *E. virgatum* (A.Cunn., non Lam.), and *Fuchsia procumbens*. It is demonstrated that type designations for some names in *Epilobium* mentioned above remain problematic; some names appear to be not yet typified effectively. These problems are caused by several factors, such as misplaced original labels or specimens, errors or misinterpretations in curatorial or copied labels, a complicated numbering system applied by A. Cunningham, etc. Critical re-assessment of all available original and other associated specimens of the mentioned names in *Epilobium*, especially those in K, is needed. Before such re-assessment, we refrain from any nomenclatural actions affecting type designations. The recent discovery in KW-TURCZ of important historical specimens (not only *Onagraceae* but also many other plant families) collected in New Zealand in the first half of the 19th century by Allan Cunningham, Richard Cunningham, J. Everard Home and some other early explorers is not only interesting from a historical viewpoint but also important for taxonomy, especially for proper application of names validated by A. Cunningham.

Keywords: *Epilobium*, *Fuchsia*, herbarium, New Zealand, nomenclature, *Onagraceae*, taxonomy, type specimens

Submitted 04 March 2020. Published 31 August 2020

Мосякін С.Л.[1], де Ланге П.Дж.[2], Антоненко С.І.[1], Клімович Н.Б.[1] 2020. **Типові та інші історичні зразки таксонів *Epilobium* та *Fuchsia* (*Onagraceae*), описаних Алланом та Ричардом Каннінгемами з Нової Зеландії, у гербарії М.С. Турчанінова, Національний гербарій України (KW).** *Український ботанічний журнал*, 77(4): 249–269.

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Реферат. Тринадцять історичних зразків (включно з оригінальним матеріалом, переважно синтипи та ізолектотипи) таксонів *Epilobium* та *Fuchsia* (*Onagraceae*), описаних з Нової Зеландії Алланом та Ричардом Каннінгемами, були нещодавно виявлені серед матеріалів гербарію М.С. Турчанінова (KW-TURCZ) у Національному гербарії України (KW); вони обговорюються у порівнянні з цифровими зображеннями та даними про інші відповідні зразки з кількох інших гербаріїв, зокрема K, BM, WELT та ін. Ці зразки, що були зібрані в Новій Зеландії Алланом Каннінгемом у 1826 та 1838 рр. та Ричардом Каннінгемом у 1833–1834 рр., репрезентують такі таксони (в оригінальному розумінні А. Каннінгема): *Epilobium alsinoides*, *E. atriplicifolium*, *E. confertum*, *E. hirtigerum*, *E. nerterioides*, *E. nummulariifolium*, *E. pedunculare*, *E. thymifolium*, *E. virgatum* (A.Cunn., non Lam.)

та *Fuchsia procumbens*. Показано, що позначення типів для деяких з цих назв у роді *Epilobium* лишаються проблематичними; декілька назв, очевидно, ще не були належним чином типіфіковані. Ці проблеми були викликані декількома факторами, зокрема, переплутаними оригінальними етикетками чи зразками, помилками в кураторських чи скопійованих етикетках, складною системою нумерації, застосованою А. Каннінгемом тощо. Потрібен критичний перегляд усіх наявних оригінальних та інших пов'язаних з ними зразків, що стосуються згаданих назв *Epilobium*, особливо тих, що знаходяться в гербарії K. Допоки такий перегляд не здійснено, ми утримуємось від будь-яких номенклатурних дій, що впливатимуть на позначення типу. Недавнє виявлення у KW-TURCZ важливих історичних зразків (не лише з родини *Onagraceae*, але й з багатьох інших родин), зібраних у Новій Зеландії у першій половині XIX століття Алланом Каннінгемом, Річардом Каннінгемом, Дж. Еверардом Хоумом та деякими іншими ранніми дослідниками, є не лише цікавим з історичної точки зору, але й важливим для систематики, особливо для правильного застосування назв, встановлених А. Каннінгемом.

Ключові слова: *Epilobium*, *Fuchsia*, *Onagraceae*, гербарій, Нова Зеландія, номенклатура, систематика, типові зразки

This article is dedicated to Peter H. Raven (President Emeritus, Missouri Botanical Garden, St. Louis, Missouri, USA; Member of the National Academy of Sciences of the USA, Foreign Member of the National Academy of Sciences of Ukraine, etc.) in recognition of his fundamental contributions to the taxonomy and biogeography of *Onagraceae*, especially Australasian taxa of *Epilobium*

Introduction

Allan Cunningham (1791–1839) was one of the most prominent figures in Australasian botany of the first half of the 19th century (Heward, 1842a, 1842b; McMinn, 1970; Orchard, 2014; Heenan et al., 2017, etc.). His main botanical activities were focused geographically on Australia and New Zealand, but he also collected plants in Brazil (1814–1816), Timor (1825; see Orchard, Orchard, 2013), and Mauritius (1821). Allan Cunningham visited the northern North Island of New Zealand in 1826 and 1838, basing himself in the Bay of Islands from where he collected numerous plant specimens. His brother Richard Cunningham (1793–1835) also visited New Zealand and collected plants in 1833–1834 from a much wider area of the Northland Peninsula than his brother was able to achieve (Hooker, Cunningham, 1837; McMinn, 1970, etc.). Herbarium specimens of Allan and Richard Cunningham are known to be deposited in several herbaria. The main sets of their plants are reported to be in K, BM, and OXF, while smaller collections are known in CGE, E, G, NSW, PDD, W, WELT, etc. (Stafleu, Cowan, 1976; Mabberley, 1978; Orchard, 2014, etc.; herbarium acronyms are given according to Thiers, 2008–onward).

Orchard (2014), who traced the distribution of Cunningham's specimens to various herbaria of the world, did not mention that the National Herbarium of Ukraine (KW; also known as the herbarium of the M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine, Kyiv) also holds important collections of the Cunningham brothers. Notably the KW herbarium is also not mentioned in other publications and online resources listing herbaria in which Cunningham's collections are known to be kept (e.g., Stafleu, Cowan, 1976; Thiers, 2008–onward, etc.).

The KW herbarium houses, as a separately kept collection, the Turczaninow historical herbarium. It is a large, rich and globally important collection of the 19th century, originally accumulated by Nikolai S. Turczaninow (1796–1863) and containing at least 150 000 specimens, or probably more accurately estimated at 170 000 (or even more?) specimens because often several specimens are placed on one sheet or in one folder. For information about Turczaninow and his herbarium, see Lipschitz (1964), Stafleu (1969), Myakushko (1976), Myakushko et al. (1979), Stafleu, Cowan (1986), Marchant (1990), Kamelin, Sytin (1997), Krytska, Mosyakin (2002), Shiyan (2011), Diachenko et al. (2015), Mosyakin et al., (2018, 2019), Mosyakin, de Lange (2019, 2020), and references therein.

Our preliminary inventory of selected taxa [for example, *Veronica* L. sensu lato (see Albach et al., 2018), some *Geraniaceae* (Mosyakin, de Lange, 2019), etc.] in the Turczaninow herbarium at KW demonstrated that it contains numerous specimens from New Zealand collected in the first half of the 19th century, in particular, those of Allan Cunningham, Richard Cunningham (see biographic references above), and J. Everard Home (see Godley, 2010; Gardner, 2020; Mosyakin, de Lange, 2020), including many type specimens. Most probably these Cunningham's historical specimens from New Zealand were received by Turczaninow from the Royal Botanical Gardens Kew (K) through J.D. Hooker, together with other specimens from Australasia and some other parts of the world. It is documented that Turczaninow exchanged letters and specimens with Hooker (Kamelin, Sytin, 1997; Shiyan, 2011; Mosyakin et al., 2018; Mosyakin, de Lange, 2019, 2020, etc.). Further studies are needed to make an inventory of the

New Zealand historical collections at KW, which will definitely result in identification of many other original specimens not yet known to the international botanical community (see Mosyakin, de Lange, 2020).

Here we provide the list of original and some other historical specimens of Cunningham's taxa of *Epilobium* L. and *Fuchsia* L. (*Onagraceae*) from New Zealand recently revealed in the Turczaninow historical herbarium at the National Herbarium of Ukraine (KW), with miscellaneous nomenclatural and taxonomic comments. In this publication we refrain from any nomenclatural actions (such as second-step lectotypifications or other corrected type designations) because we think that any changes to the nomenclatural *status quo* regarding the types of New Zealand names in *Epilobium* should be introduced (if indeed deemed necessary) only after a thorough additional examination of all relevant specimens available at K, BM, WELT, and other herbaria holding specimens collected in New Zealand by Allan Cunningham and Richard Cunningham.

Authorship of some names in *Onagraceae* validated by Allan Cunningham (1839)

Most of the taxa of *Onagraceae* validated by Allan Cunningham (1839) in the eleventh part of his *Precursor…* are cited with the authorship "A.Cunn." (see Schönberger et al., 2018, 2019; IPNI, 2020–onward; POWO, 2020–onward, etc.), with the exception of the name *E. nummulariifolium* (cited as authored by "R.Cunn. ex A.Cunn."), *Fuchsia procumbens* (cited with "R.Cunn."), and two species names (*E. pallidiflorum* Sol. ex A.Cunn. and *E. pendulum* Sol. ex A.Cunn.) based on manuscripts of Solander and properly cited with the authorship "Sol. ex A.Cunn.". However, in the protologue Allan Cunningham, by adding the note "(R.C. Mss.)", clearly attributed the authorship of names and descriptions of three species of *Onagraceae* to his brother, Richard Cunningham. Following Art. 46.2 and 46.3 of the ICN (Turland et al., 2018), the names *Epilobium nummulariifolium*, *E. thymifolium*, and *Fuchsia procumbens* should be cited with the following authorship: "R.Cunn." (as the author of the names and descriptions published by A. Cunningham; see Art. 46.3 of the ICN) or "R.Cunn. **in** A.Cunn." (if it is considered useful to emphasize that the names have been validated in the publication authored by A. Cunningham or if a bibliographic reference is cited, see Art. 46.2 Note 2 of the ICN).

Numbers associated with Allan Cunningham's specimens: an explanation

When citing types and other specimens of Allan Cunningham, many authors (for *Epilobium*, mainly Raven and Raven, 1976) often provided numbers after the collector names, which can be interpreted as collection numbers. However, that is not the case. The problem with the Cunningham specimen numbers and his rather confusing numbering system was specially discussed by Orchard (2014: 44–45). Here we provide his most important conclusions: "Most authors have treated these shipping numbers as equivalent to collection numbers… <…> However, a label of the kind 'Cunningham 47', as appears on many herbarium sheets, is not particularly informative. Particularly for low numbers, the same number will exist for multiple collections. <…> Cunningham did not place any enduring value on these shipping numbers, although he retained them in his own herbarium as an *aide memoire* of what he had sent to Aiton and Banks. Later in life, when despatching [sic] replicates to friends and colleagues, he renumbered specimens in each despatch. Other numbers became attached to Cunningham specimens subsequently. Herbarium specimens were 'collectables' in 19th century polite society, and were traded among dilettantes. When these private collections were later given to institutions, or sold, the private numbers went with them, and are often confused with Cunningham's shipping numbers. Other specimens may now be found with two numbers, the original shipping number, and Cunningham's secondary shipping number".

Thus, the shipping numbers or other kinds of numbers associated with Cunningham's specimens should not be treated as the unique collection numbers or unique identifiers of specimens or gatherings. The numbers listed by Raven and Raven (1976) and some other authors for types of names in *Epilobium* are mainly the original **species** numbers used by Cunningham (1839) continuously in all parts of his *Precursor…* published in 1837–1840 (see the combined facsimile edition: Cunningham, 2017).

Epilobium in New Zealand: a brief overview

The genus *Epilobium*, containing ca. 200 species, is nearly cosmopolitan in its distribution (see Raven, 1967b; Raven, 1968; Raven, Raven, 1976; Chen et al., 1992; Wagner et al., 2007, etc.). It is also well represented in Australasia (Raven, 1967a; Raven, Engelhorn, 1971;

Raven, Raven, 1976; Thompson, 1990; Du Puy, Orchard, 1993), including New Zealand (Cheeseman, 1906; Allan, 1961; Raven, 1972, 1973; Hair, 1977; Webb et al., 1988; de Lange et al., 2006; de Lange, Rolfe, 2010; Schönberger et al., 2018, 2019, etc.). In particular, Allan (1961) accepted 50 species for New Zealand, while Raven and Raven (1976) recognised there 37 native and 5 naturalized species. Webb et al. (1988) mainly relied on the treatment by Raven and Raven (1976). Some name changes have been introduced later, and an additional taxon has been described (see Connor, Edgar, 1987; Heenan, 1996). However, the comprehensive treatment by Raven and Raven (1976) remains the main foundation for the current views on taxonomy of *Epilobium* in New Zealand. The latest checklists of New Zealand plants list 43 recognized species of *Epilobium*, of which 38 are native (Schönberger et al., 2018, 2019).

Representatives of *Onagraceae* in general and *Epilobium* in particular are considered among taxa of angiosperms most interesting for studies of various aspects of plant evolution and biogeography (Raven, 1972, 1973, 1976; Seavey, Raven, 1977b; Connor, 1985; Raven, 1988; Hoch et al., 1993; Martin, 2003; Katinas et al., 2004; Wagner et al., 2007; Kumar et al., 2018, etc.). Quite naturally, taxa of *Onagraceae* inhabiting rather isolated islands of New Zealand provide intriguing cases of diversification in isolation, following long-distance dispersal events. Correct taxonomic and phylogenetic interpretations of morphological and geographical patterns observed in that group are crucial for reconstructing its patterns of evolution and historical biogeography. And, since the application of plant names is achieved by their nomenclatural types (Principle II and Art. 7.1 of the ICN: Turland et al., 2018), reliable taxonomy is impossible without linking the names to their types through proper typification.

The first fossil records of *Epilobium* pollen in New Zealand are probably dated by the (late?) Oligocene (Daghlian et al., 1984; Martin, 2003) though Mildenhall (1980) records the definite presence of *Epilobium* pollen from the Pliocene and that of *Fuchsia* from the upper Oligocene. The migration routes of *Epilobium* to New Zealand and biogeographic affinities of native New Zealand taxa of the genus remain debatable, with possibilities of both Eurasian relationships (Raven, 1988) and, for some taxa, hypothetic migrations from/to South America, either due to long-distance dispersal events or *via* the ancient Antarctic route. However, available evidence (taxonomy, karyology, etc.) overwhelmingly indicates that ancestors of Australasian taxa of *Epilobium* most probably migrated to Australia from Eurasia, and thus most of New Zealand species had their direct ancestors in Australia (Raven, 1972, 1973; Raven, Raven, 1976; West, Raven, 1976; Hair et al., 1977; Seavey, Raven, 1977b). It is noteworthy that Seavey and Raven (1977a) demonstrated that South American taxa of *Epilobium* have been derived from at least two separate introductions from North America and two from Australasia (Australia or/and New Zealand?). Unfortunately, molecular phylogenetic data on *Epilobium*, and on its Australasian taxa in particular, remain rather limited (see Baum et al., 1994; Levin et al., 2004; Lorimer, 2007, and references therein). Further details of the complicated evolution of *Epilobium* in time and space will become available after additional studies.

Several species of *Epilobium* native to New Zealand are known as introduced and naturalized in Europe, especially the British Isles and some continental European areas (Davey, 1953, 1961; Holub, 1978; Jørgensen, 1992; Stace, 2010; Pyšek et al., 2012; Kaplan et al., 2018, etc.). The taxonomic identity of several alien taxa in Europe was rather confusing in the past; some of them were known under misapplied names. Their hybrids with other species were reported as well (Kitchener, McKean, 1998; Stace, 2010), which further complicated their identification. In the recent edition of the *New Flora of the British Isles*, Stace (2010: 361) reports for the British Isles the following introduced New Zealand species: *E. brunnescens* (Cockayne) P.H.Raven & Engelhorn (*E. pedunculare* auct. non A.Cunn., *E. nerterioides* auct. non A.Cunn.), *E. pedunculare* A.Cunn. (*E. linnaeoides* Hook.f.), *E. komarovianum* H.Lév. (*E. inornatum* Melville), and several named hybrids. The latest records from Europe include *E. nummulariifolium* first reported from Italy (de Lange in Rosati et al., 2020) and *E. melanocaulon* Hook. found at the Ziller River, Mayrhofen, Austria (de Lange, unpubl. data, *P.J. de Lange OST1*, AK342661). Thus, proper typification of names will ensure the proper taxonomy and nomenclature not only for species of *Epilobium* native in New Zealand but also for introduced and potentially invasive plants occurring beyond their native ranges.

KW specimens of taxa of *Epilobium* validated by Allan Cunningham

All taxon entries below are structured as follows: (1) taxon name and standard bibliographic citation; (2) original material according to the protologue; (3) type (according to typifying authors); (4) KW specimen(s): label and

barcode; (5) current taxonomic status (accepted or not accepted), with references, and (6) notes (if needed). In label data, line breaks are indicated by the vertical bar | (also known as "pipe").

Epilobium alsinoides A.Cunn., Ann. Nat. Hist. 3(14): 32. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Between the Waimate and Keri-Keri Mission Stations, bay of Islands. – 1833, R. Cunningham".

Type (*fide* Raven, Raven, 1976: 186): "Between the Waimate and Kerikeri Mission Stations, Bay of Islands, North Auckland, New Zealand, 1833, Richard Cunningham 540 (K. Isotype, WELT)". This appears to be a direct interpretation of Allan (1961: 266) who cited the type of the name thus: "Between the Waimate and Kerikeri Mission Stations, Bay of Islands. Type: K, R. Cunningham, 1833".

KW specimen: "*Epilobium alsinoides* | C. | In the Country between | Waimaté & Keri-Keri | N. Zealand. | 1833 RC.", KW001003054. Figure 1 (upper specimen). Syntype (or isolectotype?).

Current taxonomic status: accepted species (Schönberger et al., 2018; POWO, 2020–onward). Raven and Raven (1976; see also Raven, Engelhorn, 1971) considered this taxon in a broad sense, including *E. alsinoides* subsp. *atriplicifolium* (A.Cunn.) P.H.Raven & Engelhorn (see below) and subsp. *tenuipes* (Hook.f.) P.H.Raven & Engelhorn. This broad concept, although accepted in the latest versions of the checklist of New Zealand plants (Schönberger et al., 2018, 2019), is not universally followed in New Zealand; e.g., the New Zealand Plant Conservation Network (www.nzpcn.org.nz, accessed 2 March 2020) accepts all these subspecies at the species rank.

Notes: We were unable to find any unquestionable original specimens of *E. alsinoides* in the online databases of the JSTOR Global Plants and the Royal Botanic Gardens, Kew. The two sheets at K, K000742561 and K000742562, containing plants currently identified as *E. alsinoides* subsp. *alsinoides*, are in fact considered to be original specimens of *E. thymifolium*. Both these specimens have the labels indicating their locality as "About the Waimaté Station | among ferns", and both are dated by 1834, not 1833 (see discussion below under *E. thymifolium*). Thus, judging from available data, these two specimens from K cannot be regarded as unquestionably belonging to original material of *E. alsinoides*.

Raven and Raven (1976) mentioned a specimen from WELT as an isotype (isolectotype?) of *E. alsinoides*. We were able to find online data for a specimen with the WELT Registration Number SP079421 identified as *E. alsinoides*, with its type status indicated as "uncertain" (data available from https://collections.tepapa.govt.nz/object/719249; no image was available when the online resource was accessed on 14 February and 2 March 2020). Judging from online data, this specimen was collected by Richard Cunningham in 1834 (January?), and its location was indicated as "New Zealand", with additional information in square brackets, which was most probably partly derived from the protologue: "[New Zealand, North of North Island, probably Bay of Islands, Hokianga or Whangaroa Harbour area]". Judging from the available data, this specimen does not belong to syntypes of *E. alsinoides* but may be part of original material (as defined in Art 9.4 of the ICN: Turland et al., 2018).

In order to solve the problem of the proper typification of the name *E. alsinoides*, additional searches for any physical original specimen(s) not yet available online should be performed, first of all at K and WELT. If no unquestionable original specimens corresponding to the protologue (syntypes) are available in K, the KW specimen KW001003054 will be eligible for lectotype designation because it perfectly matches the protologue and is thus a syntype. It should be noted that, according to Art. 9.12 of the ICN (Turland et al., 2018), in lectotype designation a syntype must be preferred over paratypes (if such exist) and/or the uncited specimens and cited and uncited illustrations that comprise the remaining original material (if such exist).

Epilobium atriplicifolium A.Cunn., Ann. Nat. Hist. 3(14): 32. 1839. ≡ *Epilobium alsinoides* A.Cunn. subsp. *atriplicifolium* (A.Cunn.) P.H.Raven & Engelhorn, New Zealand J. Bot. 9(2): 348. 1971.

Original material (according to the protologue): "New Zealand (Northern Island). Damp woods, near the great falls of the Keri Keri river, bay of Islands. – 1833, R. Cunningham".

Type (*fide* Raven, Raven 1976: 190): "Damp woods near Kerikeri Falls, North Auckland, New Zealand, 1833, *Allan Cunningham 542* (K)". Allan (1961: 266) included the name *E. atriplicifolium* in *E. alsinoides* sensu lato, with a question mark. Lectotype: K000742563 (image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742563 and http://specimens.kew.org/herbarium/K000742563).

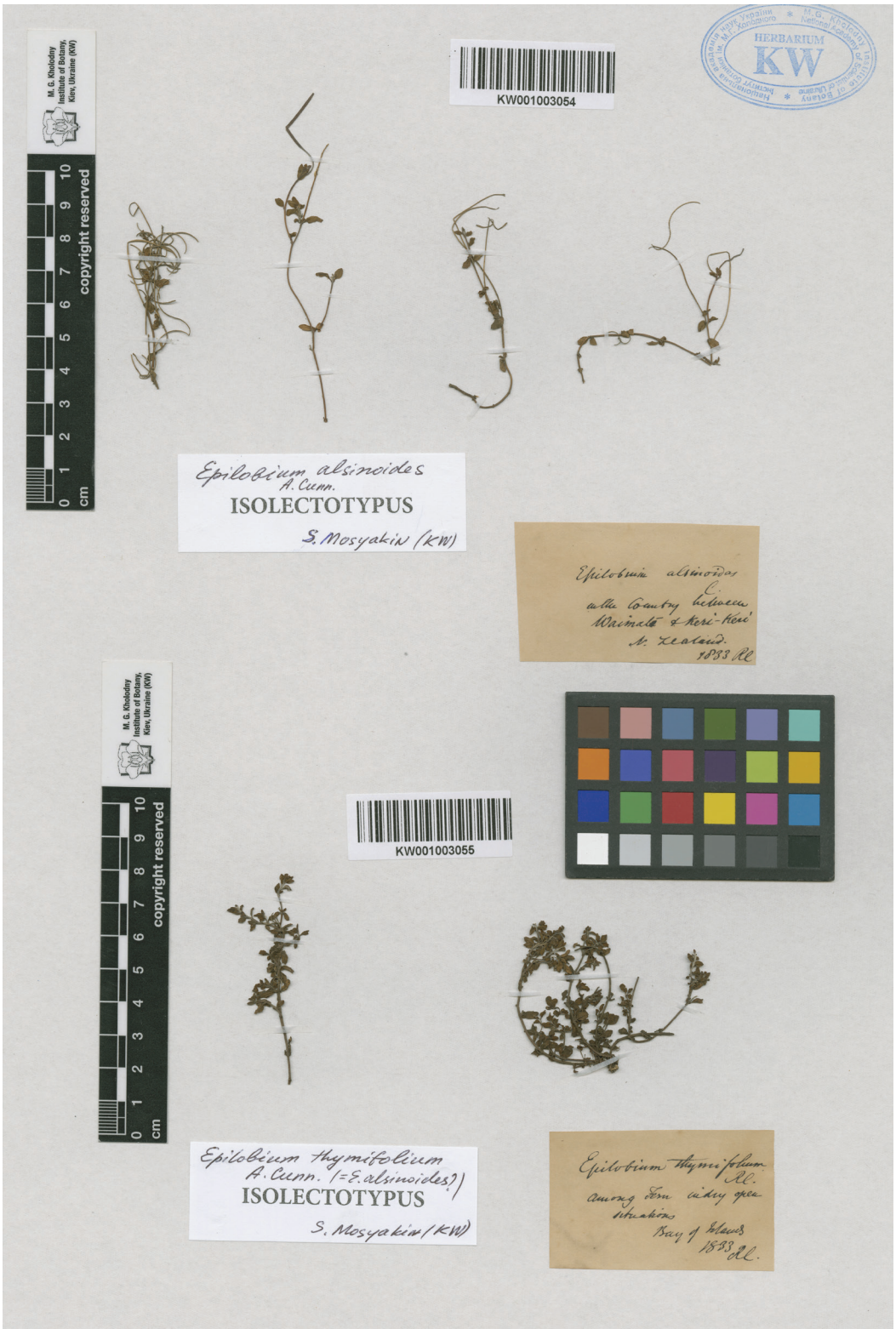

Figure 1. *Epilobium alsinoides* A.Cunn., KW001003054 (upper specimen) and *E. thymifolium* R.Cunn. in A.Cunn., KW001003055 (lower specimen)

KW specimen: "*Epilobium atriplicifolium* | C. | Woods near the great | falls of the Keri-Keri R. | Bay of Isl^{ds}. | 1833 RC.", KW001003057. Figure 2 (lower specimen). Isolectotype.

Current taxonomic status: Raven and Engelhorn (1971; see also Raven, Raven, 1976) considered this taxon as a subspecies of *E. alsinoides*. This concept is accepted by Schönberger et al. (2018, 2019) and in POWO (2020–onward), but not by the New Zealand Plant Conservation Network (www.nzpcn.org.nz, accessed 2 March 2020).

Notes: There is only one known original specimen at K (K000742563) which is annotated as *E. atriplicifolium* and labeled as the "holotype", with the following locality information on the label: "Towards the Great falls Keri Keri". We accept that specimen as the lectotype designated by Raven and Raven (1976: 190), despite some difference in label data. The original specimen at KW (KW001003057) is thus accepted as an isolectotype; however, it should be noted that the label of the KW specimen is a better match to the protologue data.

Epilobium confertum A.Cunn., Ann. Nat. Hist. 3(14): 34. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Among grass on river banks, Wangaroa. – 1826, A. Cunningham".

Type (*fide* Raven, Raven, 1976: 120): "Among grass on river banks, Whangaroa, North Auckland, New Zealand, 1826, *Allan Cunningham 549* (K. Isotypes, JE, WELT)". Allan (1961: 278) did not indicate any type material but merely stated that Hooker (1852) included *E. confertum* in a broad concept of *E. junceum* Sol.

KW specimen: "*Epilobium confertum* | C | Among grass on | river's banks | Wangaroa | N. Zealand | 1826 AC.", KW001003058. Figure 3. Syntype (or isolectotype?).

Current taxonomic status: not accepted; considered a synonym of *E. billardiereanum* DC. subsp. *cinereum* (A.Rich.) P.H.Raven & Engelhorn (1971: 349; also Raven, Raven, 1976; Schönberger et al., 2018, 2019; POWO, 2020–onward).

Note: We were unable to find online data on and images of any original specimen(s) of *E. confertum* in the JSTOR Global Plants (https://plants.jstor.org) and the Kew Herbarium Catalogue (http://apps.kew.org/herbcat/gotoHomePage.do). A search in K for any extant original specimen(s) of *E. confertum* should be attempted. If there is/are no such specimen(s) present at K (lost or destroyed?), the KW specimen (and other original specimens in JE and WELT reported by Raven and Raven in 1976?) will be available for lectotype designation to replace the presumably lost or destroyed lectotype from K designated earlier by Raven and Raven (1976).

Epilobium hirtigerum A.Cunn., Ann. Nat. Hist. 3(14): 33. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Skirts of forests round Wangaroa Harbour. – 1833, *R. Cunningham*".

Type: Allan (1961: 279) stated the following: "Type locality: Skirts of forests round W[h]angaroa Harbour. Type: *R. Cunningham* 1833". Raven and Raven (1976) refined that typification statement: "Skirts of forest on west side of Whangaroa Harbour, North Auckland, New Zealand, 1833, *Richard Cunningham 546* (K. Isotype, WELT)". In the *Flora of Australia* series the supposed type of *E. hirtigerum* (Thompson, 1990) was cited as the "holotype" deposited in K, *verbatim* following Raven and Raven (1976).

KW specimen: "*Epilob^{m} hirtigerum* | C. | Margins of woods. | Wangaroa | N. Zeal^{d}. | 1834 RC.", KW001003059. Figure 4. Probable isolectotype? See the note below.

Current taxonomic status: accepted species (Raven, Raven, 1976; Schönberger et al., 2018, 2019; POWO, 2020–onward).

Notes: The K specimen currently available from online resources of JSTOR Global Plants and the Kew Herbarium, which we consider at present to be the standing lectotype (K000742597, image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742597 and http://specimens.kew.org/herbarium/K000742597), has five labels and notes. One label indicates that it is *E. cinereum* A.Rich. and lists the number 544 corresponding to the number of that species in the *Precursor*… (Cunningham, 1839). However, R. Melville in 1959 added the following note (now mounted on the sheet in the bottom left corner): "The wording on Richard Cunningham's field label refers to A. Cunn. no. 546 in Ann. Nat. Hist 3, 33 (1839). The No. 544 label is therefore misplaced as this is part of the type material of *Epilobium hirtigerum* A. Cunn. l.c.". We were unable to find a matching specimen in the online database of WELT (https://collections.tepapa.govt.nz).

Moreover, there is definitely some confusion with the dates. The specimens K000742597 and KW001003059 bear the collection year 1834 (not 1833 cited in the protologue!). Thus, these K and KW specimens cannot be formally considered as syntypes, unless their labels were erroneously dated, or unless there was an error or typo in the protologue. However, they are most probably

Figure 2. *Epilobium nerterioides* A.Cunn., KW001003056 (upper specimen) and *E. atriplicifolium* A.Cunn., KW001003057 (lower specimen)

Figure 3. *Epilobium confertum* A.Cunn., KW001003058

Figure 4. *Epilobium hirtigerum* A.Cunn., KW001003059

parts of original material as defined by Art 9.4 of the ICN (Turland et al., 2018) and represent uncited specimens that were available to the author prior to, or at the time of, preparation of the description validating the name. Besides, the KW specimen (definitely with an original label) is much better preserved than that the small fragment from K.

To add to the confusion, the plant fragments currently mounted on sheets in Kew (K000742597) and Kyiv (KW001003059) are morphologically different and, in our opinion, may belong to two different species. Because the Kew specimen was probably mislabeled and the KW specimen still retains its original label, we think that KW001003059 better represents the original concept of the species as intended by Allan Cunningham.

This, it is concluded that the Cunningham's specimens of *E. hirtigerum* available at K and KW are not syntypes because of the labels dated by 1834, not 1833. If no syntypes dated by 1833 are available (for example, in WELT), then the type indicated by Raven and Raven (1976; we suppose it is K000742597) should be considered the standing lectotype, but only if we are sure that this specimen from Kew indeed matches the original concept of the species. We further conclude that at present the proper application of that name remains uncertain.

Epilobium nerterioides A.Cunn., Ann. Nat. Hist. 3(14): 32. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Bogs, near the Kana-Kana river, bay of Islands. – 1826, A. Cunningham".

Type: Allan (1961: 261) stated the type locality as "Bogs near the Kana Kana [Kawakawa – P.dL.] river, Bay of Islands. Type: BM. There are 3 imperfect specimens at K that very doubtfully belong here". Raven and Raven (1976: 274) typified the name using a K specimen: "Bogs near the Kana Kana [Kawakawa] River, Bay of Islands, North Auckland, New Zealand, 1826, *Allan Cunningham 541* (K)".

KW specimen: "*Epilobium nerterioides* | C. | In bogs on the banks of | the Keri-Keri R. | Bay of Islands | 1826 AC.", KW001003056. Figure 2 (upper specimen). Syntype? Type status uncertain.

Current taxonomic status: accepted species (Raven, Raven, 1976; Schönberger et al., 2018, 2019; POWO, 2019–onward).

Notes: The story of nomenclatural confusion regarding the name *E. nerterioides* and some other names applied to this and related species was presented by Melville (1960), who characterized the situation as the "chapter of errors" (l.c.: 297).

The K specimen K000742539 (image: https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742539 and http://specimens.kew.org/herbarium/K000742539) contains three plant fragments. Most probably these fragments were mentioned by Allan (1961: 261) as "3 imperfect specimens at K that very doubtfully belong here" (i.e., probably do not belong to *E. nerterioides*). However, it seems that Melville (1960: 298) had no doubts regarding the identity of these three fragments, judging from his statement that "Three fragments of Allan Cunningham's material of *E. nerterioides* are preserved at Kew".

There is one specimen in BM (BM000797681; image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000797681) mounted on the same sheet with a specimen of *E. nummulariifolium* (probable isotype; BM000797680: https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000797680) and bearing the identification label by P.H. Raven and T. Engelhorn dated by 1970 indicating that it is a probable isotype of *E. nerterioides*.

An additional comment on the type status of BM000797681 appears as an anonymous handwritten note mounted below the BM000797681 plant: "Probably the "missing" specimen mentioned by Melville in Kew Bull.: 14: 298 (1960)". This note refers to the following text in Melville (1960: 298): "When, at the start of this investigation, the collections in the Herbarium of the British Museum were consulted, a much better and more complete specimen was seen bearing Allan Cunningham's original field label. It was evident that this specimen should be regarded as the holotype and the attention of the Museum staff was drawn to this fact. The sheet was put aside with the intention of placing it in a type cover and making a minor repair. Later, when it was desired to make detailed notes and comparisons, the sheet could not be found and now, after the lapse of more than a year, it is still mislaid. At present, the only specimen available on which to base a decision is the Kew isotype". However, no "Allan Cunningham's original field label" mentioned by Melville is currently attached to the specimen.

After studying the Kew specimen (K000742539) Melville concluded that "The name *E. nerterioides* A. Cunn. therefore belongs to the species that hitherto has generally been called '*E. pedunculare*', i.e. *E. pedunculare* Hausskn., non A. Cunn." and proposed a new taxonomic and nomenclatural treatment of the group containing *E. pedunculare* A. Cunn. s. str. (incl. *E. linnaeoides*

Hook.f. and *E. caespitosum* Hausskn.), *E. nerterioides* A.Cunn. (in a restored sense, incl. *E. nummulariifolium* R.Cunn. in A.Cunn. var. *pedunculare* Hook. f. and *E. pedunculare* sensu Hausskn. et auct. nonnul.), and *E. inornatum* Melville (*E. nerterioides* sensu Hook. f., Kirk, Cheeseman et auct. nonnul., non A. Cunn.; *E. nummulariifolium* R. Cunn. ex A. Cunn. var. *nerterioides* sensu Hook. f., and *E. pedunculare* sensu Hausskn., non A. Cunn. f. *aprica* Hausskn.). Judging from our comparison of the KW specimen KW001003056 with digital images of the mentioned specimens from K and BM, the Kew specimen K000742539 is a better match. Thus, it seems to confirm the conclusion of Melville (1960) regarding the former misapplication of the name *E. nerterioides* but not regarding his new species name *E. inornatum*, which is now considered a synonym of *E. komarovianum* H.Lév. (see Schönberger et al., 2018, 2019; POWO, 2020–onward, etc.).

In our opinion, the KW specimen KW001003056 is not part of original material because its label does not match the protologue; however, considering the confusion around the application of the name *E. nerterioides* (see above), that specimen is important for fixing the identity of the species as originally understood by A. Cunningham.

The species epithet was originally published by Cunningham (l.c.) as "*nerterioides*" and that spelling was and still is followed in many publications and databases (IPNI, 2020–onward; POWO, 2020–onward); we also use the original spelling here. However, some authors think that the original spelling should be corrected to *nerteroides*, following Art. 60.10 of the ICN (Turland et al., 2018) because the species was compared to a *Nertera* Gaertn. The corrected spelling is accepted in Schönberger et al. (2018, 2019).

Epilobium nummulariifolium R.Cunn. in A.Cunn., Ann. Nat. Hist. 3(14): 31. 1839 (as "*nummularifolium*").

Original material (according to the protologue): "New Zealand (Northern Island). – 1769, *Sir Jos. Banks*. Shores of the Keri Keri river, and in dry as well as in boggy grounds. – 1834, Rich. Cunningham".

Type (*fide* Raven, Raven, 1976: 279): "Dry as well as boggy grounds, shores of the Kerikeri River, Bay of Islands, North Auckland, New Zealand, 1834, *Richard Cunningham 535* (K. Isotypes, BM, G, WELT)". Allan (1961: 259) partially typified the name thus: "Shores of the Kerikeri river, and in dry as well as in boggy grounds. Type: K, *R. Cunningham*, 1834".

KW specimens: "No. 535 | *Epilobium nummularifolium* | R.C. | North[n]. Isl[d]. | New Zealand | 1838", KW001003060, KW001003061 (two specimens with identical labels); "*Epilobium nummula* | *rifolium* A. Cunn. | Nova Zeelandia", KW001003062. All these three are historical specimens probably belonging to original material (see below); however, they are not syntypes.

Current taxonomic status: accepted species (Raven, Raven, 1976; Schönberger et al., 2018, 2019; POWO, 2020–onward).

Notes: The presumable type specimen (lectotype) at K (K000742538; images: https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742538 and http://specimens.kew.org/herbarium/K000742538) is labeled as "*Epilobium nummularifolium* RC | New Zealand | A. Cunningham 1838". A letter (note) of Richard Cunningham dated 1834 is attached to the specimen.

Another K specimen (K000742536; image: https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742536 and http://specimens.kew.org/herbarium/K000742536) is considered in the JSTOR Global Plants to be an isotype (isolectotype?), and is marked as "Type" (holotype?) in the Kew herbarium catalogue (both databases accessed 16 February 2020). The specimen was presented to K by Heward (see the label information below; also Orchard, 2014) and is mounted on the same sheet with K000742537 (not belonging to original material). The following label is attached: "535 | *Epilobium nummularifolium* RC | New Zealand | A. Cunningham 1838 | Heward 1840". This specimen, as well as the two KW specimens reported above, was collected not by Richard Cunningham, but by Allan Cunningham during his second visit to New Zealand in 1838. Thus, K000742536 is not a syntype but it most probably belongs to original material of *E. nummularifolium* because we can justly assume that it was available to A. Cunningham prior to preparation of the description validating the name.

The original specimen from K has no label corresponding to the locality information given in Allan (1961) and Raven and Raven (1976). Despite that, since the second specimen in K K000742536 does not belong to syntypes, we think that no second-step lectotypification is needed, and thus we accept the specimen K000742538 (in fact, the only one reliably known original specimen at K matching the protologue of *E. nummularifolium*) as the standing lectotype designated by Raven and Raven (1976).

There are at least two other original specimens at BM, a presumed isolectotype BM000797684 (image: https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000797684) and the syntype BM000797683 (image: https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000797683, the specimen containing three plants collected by J. Banks and D.C. Solander). The specimen collected by Banks and Solander is definitely part of original material; the second specimen, BM000797684, does not belong to syntypes. Judging from handwriting and specimen's metadata, the plants mounted on BM000797684 were collected by Allan (not Richard!) Cunningham. They are undated, but the year of collection 1838 cannot be excluded. If so, BM000797684 and the two specimens in KW are probably duplicates.

An additional (the third?) presumably original specimen of *E. nummulariifolium* is present in BM; it is annotated by P.H. Raven and T. Engelhorn as a probable isotype (BM000797680: https://plants.jstor.org/stable/10.5555/al.ap.specimen.bm000797680). The specimen is mounted on the same sheet with BM000797681 representing *E. nerterioides* (see above). The label of BM000797680 seems to be that of Allan (not Richard!) Cunningham, and the specimen is undated, so its status as part of original material is questionable.

An original specimen from WELT mentioned by Raven and Raven (1976) probably corresponds to the specimen with the WELT Registration Number SP079420 collected by Richard Cunningham in 1834 (January?) and currently identified as *E. nummulariifolium* var. *angustum* Cheeseman (data available from https://collections.tepapa.govt.nz/object/719248; no image was available online on 14 February 2020).

All three historical specimens from KW (see above) were originally held in the same Turczaninow's species folder labeled as "*Epilobium nummularifolium*". Judging from the labels (including the year 1838 and handwriting), the specimens KW001003060 and KW001003061 were collected by Allan Cunningham during his second visit to New Zealand (not by Richard Cunningham in 1834); thus they are not syntypes but anyway they belong to original material of *E. nummulariifolium* (uncited specimens that were available to the author prior to, or at the time of, preparation of the description validating the name). The label of KW001003062 is undated and it is not written by any of Cunningham brothers. Judging from similar curatorial labels associated with other New Zealand specimens in KW-TURCZ, these plants were probably collected by J. Everard Home in the 1840s, and thus the specimen KW001003062 is not part of original material.

Cunningham (1839: 31) cited "E. pendulum. *Sol. Mss. in Bibl. Banks*" in synonymy of his *E. nummulariifolium*. Consequently, the name *E. pendulum* has not been validly published (Art. 36.1(b) of the ICN: Turland et al., 2019).

Epilobium pedunculare A.Cunn., Ann. Nat. Hist. 3(14): 31. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Near the lake [Lake Omapere – P.dL.] situated between Waimaté Mission House and the great forest of Hokianga. – 1834, *Rich. Cunningham*".

Type (*fide* Raven, Raven, 1976: 169): "East of the lake between Waimate Mission Station and the great forest of Hokianga, North Auckland, New Zealand, 1834, *Richard Cunningham* (K)". Allan (1961: 260) partially typified the name thus: "Near the lake situated between Waimate Mission House and the great forest of Hokianga. Type: K, *R. Cunningham*, 1834".

KW specimen: "*Epilob. pedunculare* | RC. | Near the lake between Wai- | maté & the great forest | of Hokianga. | N. Zeal[d] | 1833 RC.", KW001003063. Figure 4. Isolectotype? Type status uncertain.

Current taxonomic status: accepted species (Raven, Raven, 1976; Schönberger et al., 2018; POWO, 2020–onward).

Notes: The two K specimens currently listed as *E. pedunculare* in the JSTOR Global Plants online database, K000742583 and K000742584 mounted on one sheet (https://plants.jstor.org/stable/viewer/10.5555/al.ap.specimen.k000742583 and https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742584, respectively; also available from Kew at http://specimens.kew.org/herbarium/K000742583 and http://specimens.kew.org/herbarium/K000742584, respectively), do not belong to original material of *E. pedunculare*. They are both dated by 1840 and properly refer to original material of the name *E. linnaeoides* Hook.f., which is now considered to be a synonym of *E. pedunculare* (see Melville, 1960).

However, K000742582 (https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742582 and http://specimens.kew.org/herbarium/K000742582) cited in JSTOR Global Plants as the type of *Epilobium caespitosum* Hausskn. (also considered a synonym of *E. pedunculare*; see Melville, 1960), seems to be the real type of *E. pedunculare*. It is dated by 1834 and was collected by Richard Cunningham "between | Waimaté | & the great forest | of Hokianga | past [east?] the lake | New Zealand", which quite closely matches the protologue. We accept this specimen as the standing lectotype that

first Allan (1961) and then Raven and Raven (1976) had in mind.

It is interesting that the KW specimen is clearly dated as 1833 (not 1834 as indicated in the protologue) and thus its type status can be questioned. Alternatively, probably there was an error in labeling. Because of that we accept here KW001003063 only as a **possible** isolectotype.

Epilobium thymifolium R.Cunn. in A.Cunn., Ann. Nat. Hist. 3(14): 32. 1839.

Original material (according to the protologue): "New Zealand (Northern Island). Among fern in dry exposed situations at the Waimaté Mission Station. – 1833, *R. Cunningham*".

Type: See discussion below.

KW specimen: "*Epilobium thymifolium* | RC. | Among Fern in dry open | situations | Bay of Islands | 1833 RC.", KW001003055. Figure 1 (lower specimen). Most probably a syntype eligible for designation of a lectotype. See discussion below.

Current taxonomic status: not accepted; considered to be a synonym of *E. alsinoides* subsp. *alsinoides* (Raven, Raven, 1976; Schönberger et al., 2018, 2018; POWO, 2020–onward). However, the KW specimens of *E. alsinoides* and *E. thymifolium* (mounted on the same sheet, see Figure 1) are morphologically quite different.

Notes: Allan (1961: 267) provided the following type information: "Type locality: Among fern in dry exposed situations at the Waimate Mission Station. Type: R. Cunningham, 1833". He also stated that "The material of R. Cunningham at K, consists of 4 poor scraps without capsules. I did not find the BM material". That statement does not constitute even a partial typification because, in our opinion, Allan simply indicated that he examined some possible syntype or syntypes at K. The "4 poor scraps without capsules" mentioned by Allan probably refer to the specimen K000742561 (see below). Raven and Raven (1976: 198) provided the following citation: "*Epilobium thymifolium* R.Cunn. ex A.Cunn., Ann. Nat. Hist. 3: 32. 1839. Type: Among fern in dry exposed conditions, Waimate Mission Station, North Auckland, New Zealand, 1833, *Richard Cunningham 539* (K. Fragment, JE)". This statement, if referable to a concrete specimen at K, constitutes a lectotypification.

However, the two known to us original or presumably original specimens from Kew listed as type specimens of *E. thymifolium*, K000742561 (listed as the "holotype" in JSTOR Global Plants; image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742561 and http://specimens.kew.org/herbarium/K000742561) and K000742562 (with a curatorial label probably reproduced from K000742561: "About the Waimaté Station, among ferns | New Zealand. | Coll. R. Cunningham, 1834"; image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742562 and http://specimens.kew.org/herbarium/K000742562), both have the labels dated as 1834, while Allan Cunningham in the protologue reported the collection year as 1833. In contrast to the K specimens mentioned above, the KW specimen (KW001003055) is dated by 1833, which matches the protologue.

There are at least two possible explanations. According to one, an incorrect date was cited either in the protologue (1833 instead of 1834?) or on the labels of the two Kew specimens (1834 instead of 1833?). However, we now know that the specimen with the collection year matching the year indicated in the protologue does exist, and it is KW001003055. Because of that we may assume that Richard Cunningham probably collected *E. thymifolium* both in 1833 and 1834. In that case the specimens collected in 1834 are not syntypes but they are still parts of original material (uncited specimens most probably available to the validating author before his publication of the name and description). If it is indeed the case, then the lectotypification by Raven and Raven (1976: 198) may be superseded because in lectotype designation a syntype should take precedence over uncited original specimens (Art. 9.12 of the ICN: Turland et al., 2018). If that viewpoint is accepted, it might be suitable to designate the specimen KW001003055 as the lectotype of the name *E. thymifolium* because that specimen matches the collection year (1833) and other data indicated in the protologue and is thus a syntype. However, we refrain from that nomenclatural action because of the reasons stated above in the Introduction, in particular, because of the need of a thorough re-examination of original specimens of *Epilobium* at K, BM, WELT and other herbaria where New Zealand specimens of Allan Cunningham and Richard Cunningham are or may be present.

It is also important to emphasize that plant fragments currently mounted on the Kew specimen K000742561 seem to be morphologically non-uniform. As far as we can judge from studying the high-resolution digital image of K000742561 (see the links above) and physical specimens in Kyiv (KW001003054 and KW001003055, see Figure 1), only the uppermost fragment on K000742561 (mounted directly below the barcode) matches morphologically the two plant fragments available on KW001003055 (*E. thymifolium*). All other

fragments on K000742561 seem to be corresponding morphologically to KW001003054 (*E. alsinoides* s. str.). Thus, it is quite possible that the sheet K000742561 either represents a mixed collection or contains incorrectly mounted specimens in fact corresponding to two species, *E. thymifolium* and *E. alsinoides*, as originally understood by A. Cunningham.

Epilobium virgatum A.Cunn., Ann. Nat. Hist. 3(14): 33. 1839, nom. illeg. (non Lam., Encycl. 2(1): 375. 1786).

Original material (according to the protologue): "New Zealand (Northern Island). In woods near the falls of the Keri-Keri river, at the head of the Kana-Kana river, &c., Bay of Islands.—1834. *R. Cunningham*".

Type (*fide* Raven, Raven, 1976: 120): "Margins of woods, near the falls [Haruru Falls – P.dL.] of the Waitangi River, North Auckland, New Zealand, 1834, *Richard Cunningham 545* (K. Isotype. WELT)".

KW specimen: "*Epilobium virgatum* RC. | In woods near the falls of the Keri-Keri R. | Bay of Isl[ds] | N. Zeal[d] | 1834 RC.", KW001003065. Syntype. It should be noted that the label of the KW specimen better matches the protologue than the label of the lectotype from K, as reported by Raven and Raven (1976: 120).

Current taxonomic status: illegitimate name (later homonym); now considered to be a synonym of *E. billardiereanum* DC. subsp. *cinereum* (A.Rich.) P.H.Raven & Engelhorn (1971: 349; see Schönberger et al., 2018, 2019).

Original specimens of *Epilobium haloragifolium* A.Cunn. (Ann. Nat. Hist. 3(14): 34. 1839), *E. incanum* A.Cunn. (l.c.: 33), and *E. pallidiflorum* Sol. ex A.Cunn. (l.c.: 34) are absent in KW.

There is also a KW specimen collected by Richard Cunningham and identified as *E. pubens* A.Rich. (Voy. Astrolabe 1: 329, t. 36. 1832): "Banks of Hokianga R. | N. Isl[d]. | 1833 RC.", KW001003064; however, it is not part of original material.

In our opinion, any future researchers engaged in further taxonomic and phylogenetic studies of New Zealand taxa of *Epilobium* should start with critical re-assessment of all available types and other original and historical specimens of Allan and Richard Cunningham (as well as other prominent collectors), in particular, those deposited in K, BM, WELT, and now also in KW. The specimens from KW-TURCZ are especially important in that respect because they preserve the original labels, which have not been replaced by curatorial ones, and which are reliably associated with their corresponding specimens (not misplaced and mislabeled, as it was reported for some specimens at K, see above).

The KW specimen of *Fuchsia procumbens*

Fuchsia procumbens R.Cunn. in A.Cunn., Ann. Nat. Hist. 3(14): 31. 1839.

Original material (according to the protologue): "*Totera* indigenis. New Zealand (Northern Island). Around the village of Matauri on the east coast opposite the Cavallos Isles, inhabiting the sands immediately above the range of the tide, where it was found in flower in March.—1834, *R. Cunningham*".

Type: K000742311, see label data below (digital image available from https://plants.jstor.org/stable/10.5555/al.ap.specimen.k000742311 and http://specimens.kew.org/herbarium/K000742311). Reported as the "type" by Allan (1961: 281) and as the "holotype" by Godley and Berry (1995: 502); here corrected to the **lectotype** (Art. 9.10 of the ICN: Turland et al., 2018).

KW specimen: "*Fuchsia procumbens* | Ric[d]. C. | On the sea shore near | the large village of | Matauri, opposite the | Cavallos Isles [one word or abbreviation illegible, probably "in"? – S.M.] the Bay of Isl[ds]. Totera incol. [*incolarum* – Genitive plural of Latin *incola*; meaning *Totera of natives* – S.M.] March 1834", KW001003053. Figure 5. Isolectotype.

Current taxonomic status: accepted species (Godley, Berry, 1995; Schönberger et al., 2018, 2019; POWO, 2020–onward).

This, an uncommon coastal species (de Lange et al., 2018), is known only from small populations along the far northern coast of the North Island (Northland and Coromandel Peninsulas), and from Aotea (Great Barrier Island) of New Zealand. The species is currently placed in the monotypic *Fuchsia* sect. *Procumbentes* E.J.Godley & P.E.Berry (Godley, Berry, 1995; Godley, Reynolds, 1998). It belongs to the well-outlined South Pacific clade (sections *Skinnera* (J.R.Forst. & G.Forst.) DC. and *Procumbentes*) confined almost exclusively to New Zealand and adjacent islands (with only one species endemic to Tahiti, Society Islands) and containing the following currently accepted species: *F. excorticata* (J.R.Forst. & G.Forst.) L.f., *F.* ×*colensoi* Hook.f, *F. perscandens* Cockayne & Allan, *F. cytrandroides* J.W.Moore (Tahiti) of sect. *Skinnera*, and *F. procumbens* of sect. *Procumbentes* (Crisci, Berry, 1990; Berry et al., 2004).

Martin (2003) analyzed the fossil record (mainly pollen) of *Onagraceae* in Australia and partly New Zealand and concluded that New Zealand representatives

Figure 5. *Fuchsia procumbens* R.Cunn. in A.Cunn. KW001003053, isolectotype

of *Fuchsia* may have been derived from some now extinct Australian taxa of the genus. The first fossil records of *Fuchsia* in New Zealand are dated by the late Oligocene (Mildenhall, 1980). A new fossil species, *Fuchsia antiqua* D.E.Lee, Conran, Bannister, U.Kaulfuss & Mildenh., was described recently based on material from a drill hole north of Invercargill, Southland (*Murihiku* in Te Reo Māori), South Island of New Zealand. That species is dated by the Early Miocene and is associated with *Fuchsia* sect. *Skinnera* (Lee et al., 2013).

Godley and Berry (1995: 502) cited the type of *F. procumbens* as follows: "TYPE: New Zealand. North Island: around the village of Matauri, on the E coast opposite the Cavallos Isles, inhabiting the sands immediately above the range of the tide, Mar. 1834, (female), Richard Cunningham (holotype, K)". However, in view of the existence of the second original specimen recently found at KW (see above), the mention of the original specimen from K as the type by Allan (1961: 281), who cited the type locality from the protologue and added "Type: K, R. Cunningham. There are 5 small pieces with ♀", constitutes effective lectotypification. Thus, the K specimen should be corrected to lectotype, following Art. 9.10 of the ICN (Turland et al., 2018). The KW specimen is thus an isolectotype. We were unable to find other original specimens of that species in online databases of other herbaria, which emphasizes the importance of the well-preserved original specimen from KW.

Concluding remarks

Here we report and discuss 12 original and some other historical specimens (mainly syntypes, some isolectotypes) of nine species-rank names in *Epilobium* and one original specimen (isolectotype) of one species of *Fuchsia*, all taxa published by described by Allan Cunningham and Richard Cunningham from New Zealand.

The fundamental taxonomic treatment of Australasian *Epilobium* by Raven and Raven (1976) still remains the most important and comprehensive foundation for our understanding of the taxonomy, biogeography and evolution of the genus in New Zealand. However, despite much research and the published taxonomic and floristic treatments available, there are still problems with the proper designation of types for names of several New Zealand taxa of *Epilobium*, and the type status of some specimens has to be clarified, for which critical re-assessment of all available original and other associated specimens, especially those in K, is needed. Before such re-assessment, we refrain from any nomenclatural actions affecting the existing (or even *de facto* missing) type designations.

The recent discovery of important historical specimens at KW (in the Turczaninow historical herbarium, KW-TURCZ) collected in New Zealand in the first half of the 19th century by Allan Cunningham, Richard Cunningham, J. Everard Home (see the references above), and also by some other early explorers, is not only interesting from a historical viewpoint but is also important for taxonomy, especially for proper matching of names validated by Allan Cunningham and their corresponding original specimens. The problems with typification of some Cunningham's names in *Epilobium* mentioned above (and also some other names of other taxa described by that author) are caused by several factors, such as lost of misplaced original labels, errors or misinterpretations in curatorial or secondary (copied) labels, a complicated and potentially confusing numbering system applied by Allan Cunningham, etc. (see further details in Orchard, 2014).

It has been also demonstrated that the printed text of *Florae Insularum Novae Zelandiae Precursor* "contains a large number of errors, which can be corrected using an autograph manuscript that is still extant" (Earp, 2016: 366). Thus, if some typographical or other errors are suspected in the protologues of taxa of *Epilobium* (for example, collection years or toponyms not matching the relevant data from the labels of available specimens, see above), it would be advisable to consult the manuscript still held by the Royal Botanic Gardens Archives, Kew, or its microfilmed copies (Earp, 2016: 368–369).

As far as we can judge from available data concerning not only *Onagraceae* but also some other selected families checked at KW, the KW-TURCZ specimens collected by Allan Cunningham and Richard Cunningham in New Zealand usually have original labels (not the curatorial or copied ones). Also, in some cases the KW material is more abundant and better preserved as compared to other known specimens of the Cunningham brothers available in other herbaria.

Special projects aimed at search, identification and digitization of historical specimen in the Turczaninow herbarium would be important, either based on a taxonomic approach (such as revisions of particular taxonomic groups) or on geographical regions. Both approaches were applied in the course of the three projects at KW supported by The Andrew W. Mellon Foundation during 2007–2016 within the framework of the African Plants Initiative, Latin American Plants Initiative, and

the Global Plants Initiative. Data and images that resulted from these projects are available through the JSTOR Global Plants online resources (https://plants.jstor.org), but they still represent only a part of the vast number of types and other historical specimens held in KW-TURCZ. An international collaborative project aimed at searches for and revision of New Zealand (or all Australasian?) specimens in the Turczaninow memorial collection at KW would be very desirable.

Acknowledgments

We are grateful to Natalia M. Shiyan (Head Curator of KW) and Alisa V. Shumilova (both from the M.G. Kholodny Institute of Botany of the National Academy of Sciences of Ukraine, Kyiv, Ukraine) for their help with herbarium specimens at KW. Special thanks are due to Peter H. Raven and Peter C. Hoch (MO, Missouri Botanical Garden, St. Louis, Missouri, USA) for their comments and for providing some literature. In particular, Peter Raven provided his insightful general comments as well as valuable advice on some specific issues of taxonomy of *Epilobium*. Various nomenclatural issues related to type designation were discussed by the first author, Sergei Mosyakin, with John McNeill (Royal Botanic Garden, Edinburgh, Scotland, U.K. & Royal Ontario Museum, Toronto, Ontario, Canada), and his useful advice and expert opinions are greatly valued. We express our gratitude to Karol Marhold (Plant Science and Biodiversity Centre, Institute of Botany, Slovak Academy of Sciences, Bratislava, Slovak Republic & Department of Botany, Faculty of Science, Charles University, Prague, Czech Republic), who provided several corrections and useful advice on the manuscript, and to two anonymous reviewers for their valuable comments and suggestions.

The generous support of The Andrew W. Mellon Foundation provided in 2007–2016 for digitization of type specimens and capacity building at KW is greatly appreciated.

This submission to the *Ukrainian Botanical Journal* had a rather complicated history. Since the experts who originally reviewed the manuscript had somewhat different opinions on this research and provided different recommendations (for example, expanding *versus* abridging the text, etc.), the third review was requested. In addition, two internationally recognized experts from the Editorial Board of the *Ukrainian Botanical Journal* provided their independent recommendations regarding the present contribution. The authors and the editorial team of the *Ukrainian Botanical Journal* are grateful to all colleagues involved in the assessment of the manuscript and the editorial process.

References

Albach D.C., Mosyakin S., Antonenko S. 2018. Type specimens of *Veronica* (*Plantaginaceae*) in the Turczaninow historical herbarium at the National Herbarium of Ukraine (KW): a preliminary assessment. *Visnyk of Lviv University. Biological series* [*Вісник Львівського університету. Серія біологічна*], 78: 37–44. Available at: http://prima.lnu.edu.ua/faculty/biologh/wis/78/0/8/8.pdf

Allan H.H. 1961. *Flora of New Zealand*, vol. 1. Wellington, New Zealand: P.D. Hasselberg, Government Printer, liv + 1083 pp.

Baum D.A., Sytsma K.J., Hoch P.C. 1994. A phylogenetic analysis of *Epilobium* (*Onagraceae*) based on nuclear ribosomal DNA sequences. *Systematic Botany*, 19(3): 363–388.

Berry P.E., Hahn W.J., Sytsma K.J., Hall J.C., Mast A. 2004. Phylogenetic relationships and biogeography of *Fuchsia* (*Onagraceae*) based on noncoding nuclear and chloroplast DNA data. *American Journal of Botany*, 91(4): 601–614. Available at: https://www.jstor.org/stable/4123689

Cheeseman T.F. 1906. *Manual of the New Zealand flora*. Wellington: Government Printer, xxxvi + 1199 pp. https://doi.org/10.5962/bhl.title.12003

Chen C.J., Hoch P.C., Raven P.H. 1992. Systematics of *Epilobium* (*Onagraceae*) in China. *Systematic Botany Monographs*, 34: 1–209. Available at: https://www.jstor.org/stable/25027806

Connor H.E. 1985. Biosystematics of higher plants in New Zealand 1965–1984. *New Zealand Journal of Botany*, 23(4): 613–643. http://dx.doi.org/10.1080/002882 5X.1985.10434233

Connor H.E., Edgar E. 1987. Name changes in the indigenous New Zealand flora, 1960–1986 and Nomina Nova IV, 1983–1986. *New Zealand Journal of Botany*, 25(1): 115–171. http://dx.doi.org/10.1080/0028825X.1987.10409961

Crisci J.V., Berry P.E. 1990. Phylogenetic reevaluation of the Old World species of *Fuchsia* (*Onagraceae*). *Annals of the Missouri Botanical Garden*, 77(3): 517–522. Available at: https://www.jstor.org/stable/2399515

Cunningham A. 1839. Florae Insularum Novae Zelandiae Precursor; or a Specimen of the Botany of the Islands of New Zealand [Part 11]. *Annals of Natural History*, 3(14): 29–34.

Cunningham A. 2017. *Florae Insularum Novae Zelandiae Precursor; or a Specimen of the Botany of the Islands of New Zealand* [1837–1840]. Facsimile compiled by P.B. Heenan, B .P.J. Molloy & J.R. Rolfe. Wellington: New Zealand Plant Conservation Network Inc., xiv + 179 pp.

Daghlian C.P., Skvarla J.J., Pocknall D.T., Raven P.H. 1984. *Epilobium* pollen from Oligocene sediments in New Zealand. *New Zealand Journal of Botany*, 22(2): 285–294. https://doi.org/10.1080/0028825X.1984.10425256

Davey A.J. 1953. *Epilobium pedunculare* in Britain. In: *The changing flora of Britain*. Ed. J.E. Lousley. Arbroath: Botanical Society of the British Isles (B.S.B.I.), pp. 164–167.

Davey A.J. 1961. Biological flora of the British Isles: *Epilobium nerterioides* A.Cunn. *Journal of Ecology*, 49: 753–759.

de Lange P.J., Rolfe J.R. 2010. *New Zealand Indigenous Vascular Plant Checklist*. Wellington: New Zealand Plant Conservation Network, iv + 131 pp.

de Lange P.J., Sawyer J.W.D., Rolfe J.R. 2006. *New Zealand Indigenous Vascular Plant Checklist*. Wellington: New Zealand Plant Conservation Network, iv + 94 pp.

de Lange P.J., Rolfe J.R., Barkla J.W., Courtney S.P., Champion P.D., Perrie L.R., Beadel S.M., Ford K.A., Breitwieser I., Schönberger I., Hindmarsh-Walls R., Heenan P.B., Ladley K. 2018. *Conservation status of New Zealand indigenous vascular plants, 2017* [New Zealand Threat Classification Series 22]. Wellington: New Zealand Department of Conservation, 82 pp. Available at: https://www.doc.govt.nz/Documents/science-and-technical/nztcs22entire.pdf

Diachenko I.I., Shumilova A.V., Shiyan N.M. 2015. The Catalogue of the herbarium collection of M.S. Turczaninow as a unique scientific and historical manuscript. In: *Contribution of amateur naturalists into biological diversity studies. International Scientific Conference devoted to the 200th anniversary of Lajos Vágner's birthday*. Beregovo & Uzhgorod: Ferenc Rákóczi II Transcarpathian Hungarian Institute, pp. 274–279. [Дяченко І.І., Шумілова А.В., Шиян Н.М. 2015. Каталог гербарної колекції М.С. Турчанінова – унікальна рукописна науково-історична пам'ятка. *Внесок натуралістів-аматорів у вивчення біологічного різноманіття. Міжнародна наукова конференція, присвячена 200-річчю від дня народження Людвіга Вагнера*. Берегове; Ужгород: Закарпатський угорський інститут ім. Ференца Ракоці II, pp. 274–279].

Du Puy D.J., Orchard A.E. 1993. *Onagraceae*. In: *Flora of Australia*, vol. 50: Oceanic Islands [part] 2. Eds. George A.S., Orchard A.E., Thompson H.S. Canberra: Australian Government Publishing Service, pp. 240–242.

Earp C. 2016. Cunningham's *Florae Insularum Novae Zelandiae Precursor* and the correct author of the fern genus *Loxsoma* nom. cons. *New Zealand Journal of Botany*, 54(3): 366–376. https://doi.org/10.1080/0028825X.2016.1198408

Gardner R. 2020. Plants from "New Zealand" named by N.S. Turczaninov, and a note on collector W. Stephenson. *New Zealand Botanical Society Newsletter*, 139: 10–13.

Godley E.J. 2010. Biographical Notes (76). Captain Sir James Everard Home (1798–1853). *New Zealand Botanical Society Newsletter*, 100: 16–19.

Godley E.J., Berry P.E. 1995. The biology and systematics of *Fuchsia* in the South Pacific. *Annals of the Missouri Botanical Garden*, 82(4): 473–516. Available at: https://www.jstor.org/stable/2399832

Godley E.J., Reynolds K. 1998. The natural populations of *Fuchsia procumbens*. In: Ecosystems, entomology and plants. Proceedings of a symposium held at Lincoln University to mark the retirement of Bryony Macmillan, John Dugdale and Brian Molloy. *The Royal Society of New Zealand Miscellaneous Series*, 48: 127–143.

Hair J.B. 1977. Contributions to a chromosome atlas of the New Zealand flora – 18. *Epilobium* (*Onagraceae*). *New Zealand Journal of Botany*, 15(1): 5–15. https://doi.org/10.1080/0028825X.1977.10429614

Hair J.D., Raven P.H., Seavey S.R. 1977. Cytological affinities of the Australasian species of *Epilobium* (*Onagraceae*). *New Zealand Journal of Botany*, 15(1): 1–4. https://doi.org/10.1080/0028825X.1977.10429613

Heenan P.B. 1996. *Epilobium petraeum* (*Onagraceae*), a new species of alpine willow-herb from New Zealand. *New Zealand Journal of Botany*, 34(1): 41–45. https://doi.org/10.1080/0028825X.1996.10412690

Heenan P.B., Molloy B.P.J., Rolfe J.R. 2017. Preface. In: A. Cunningham. *Florae Insularum Novae Zelandiae Precursor; or a Specimen of the Botany of the Islands of New Zealand* [1837–1840]. Facsimile compiled by P.B. Heenan, B .P.J. Molloy & J.R. Rolfe. Wellington: New Zealand Plant Conservation Network Inc., pp. viii–xi.

Heward R. 1842a. Biographical sketch of the late Allan Cunningham. *Hooker's Journal of Botany*, 4: 231–320.

Heward R. 1842b. Biographical sketch of the late Allan Cunningham. *London Journal of Botany*, 1: 107–128, 263–292.

Hoch P.C., Crisci J.V., Tobe H., Berry P.E. 1993. A cladistic analysis of the plant family *Onagraceae*. *Systematic Botany*, 18(1), 31–47.

Holub J. 1978. *Epilobium komarovianum* Léveillé v Československu [*Epilobium komarovianum* Léveillé in Czechoslovakia]. *Zprávy České botanické společnosti*, 13: 77–85.

Hooker J.D. 1852 [*Flora Novae-Zelandiae*, published in issues 1852–1855]. *The botany of the Antarctic voyage of H.M. discovery ships Erebus and Terror, in the years 1839–1843, under the command of Captain Sir James Clark Ross*. Part II: *Flora Novae-Zelandiae*, vol. 1: Flowering plants [fascicle 1, pp. 1–80, published June 1852]. Lowell Reeve, London, xxxix + 312 pp. + LXX [70] tab. https://doi.org/10.5962/bhl.title.16029

Hooker W.J. [and Cunningham A.]. 1837. A brief biographical sketch of the late Richard Cunningham, colonial botanist in New South Wales. *Companion to the Botanical Magazine*, 2: 210–221.

IPNI. 2020–onward. *International Plant Names Index*. Available at: https://www.ipni.org (Accessed 17 February and 2 March 2020).

Jørgensen P.M. 1992. Forvillete krypende mjølker i Norge [New Zealand willowherbs in Norway]. *Blyttia*, 50: 21–22.

Kamelin R.V., Sytin A.K. 1997. Nikolai Stepanovich Turchaninov (200th Anniversary) *Botanicheskiy Zhurnal*, 82(9): 123–137 [Камелин Р.В., Сытин А.К. 1997. Николай Степанович Турчанинов (к 200-летию со дня рождения). *Ботанический журнал*, 82(9): 123–137].

Kaplan Z., Danihelka J., Chrtek J. Jr., Prančl J., Ducháček M., Ekrt L., Kirschner J., Brabec J., Zázvorka J., Trávníček B., Dřevojan P., Šumberová K., Kocián P., Wild J., Petřík P. 2018. Distributions of vascular plants in the Czech Republic. Part 7. *Preslia*, 90: 425–531.

Katinas L., Crisci C.V., Wagner W.L., Hoch P.C. 2004. Geographical diversification of tribes *Epilobieae*,

Gongylocarpeae, and *Onagreae* (*Onagraceae*) in North America, based on parsimony analysis of endemicity and track compatibility analysis. *Annals of the Missouri Botanical Garden*, 91: 159–185.

Kitchener J.D., McKean D.R. 1998. Hybrids of *Epilobium brunnescens* (Cockayne) Raven & Englehorn (*Onagraceae*) and their occurrence in the British Isles. *Watsonia*, 22: 49–60. Available at: http://archive.bsbi.org.uk/Wats22p49.pdf

Krytska L.I., Mosyakin S.L. (eds.). 2002. *Herbarium of the Institute of Botany, NAS of Ukraine, KW*. Kyiv, 142 pp. [Крицька Л.І., Мосякін С.Л. (ред.) 2002. *Гербарій Інституту ботаніки НАН України, KW*. Київ, 142 с.].

Kumar P., Singh H., Singhal V.K. 2018. A synopsis of cytology and cytogeography of tribe *Epilobieae* Endl. (*Onagraceae*). *Cytologia*, 83(2): 175–180. https://doi.org/10.1508/cytologia.83.175

Lee D.E., Conran J.G., Bannister J.M., Kaulfuss U., Mildenhall D.C. 2013. A fossil *Fuchsia* (*Onagraceae*) flower and an anther mass with in situ pollen from the early Miocene of New Zealand. *American Journal of Botany*, 100(10): 2052–2065.

Levin R.A., Wagner W.L., Hoch P.C., Hahn W.J., Rodriguez A., Baum D.A., Katinas L., Zimmer E.A., Sytsma K.J. 2004. Paraphyly in tribe *Onagreae*: insights into phylogenetic relationships of *Onagraceae* based on nuclear and chloroplast sequence data. *Systematic Botany*, 29(1): 147–164.

Lipschitz S.Yu. 1964. Life and works of the outstanding Russian botanist and plant taxonomist N.S. Turczaninow (1796–1863). A report delivered at the General Session of the All-Union Botanical Society on 18 December 1963. *Botanicheskii Zhurnal*, 49(5): 752–766. [Липшиц С.Ю. 1964. Жизнь и творчество замечательного русского ботаника-систематика Н.С. Турчанинова (1796–1863). Доклад, прочитанный на общем собрании Всесоюзного Ботанического общества 18.XII.1963 г. *Ботанический журнал*, 49(5): 752–766].

Lorimer N.G. 2007. Phylogenetic reconstruction and gene tree incongruence in New Zealand *Epilobium* L. (*Onagraceae*). Thesis for Master of Science. Auckland: University of Auckland, xvi + 193 pp. https://doi.org/10.13140/RG.2.2.35179.44328

Mabberley D.J. 1978. Herbaria of Allan Cunningham, Robert Heward and others at the Chelsea Physic Garden, London. *Taxon*, 27(5/6): 489–491. Available at: http://www.jstor.org/stable/1219901

Marchant N.G. 1990. The contribution of the Russian botanist Turczaninov to Australian plant taxonomy. In: *History of Systematic Botany in Australasia. Proceedings of a symposium held at the University of Melbourne 25–27 May 1988*. Ed. P.S. Short. Canberra: ASBS, pp. 121–130.

Martin H.A. 2003. The history of the family *Onagraceae* in Australia and its relevance to biogeography. *Australian Journal of Botany*, 51: 585–598.

McMinn W.G. 1970. *Allan Cunningham, botanist and explorer*. Carlton, Victoria: Melbourne University Press, vii + 148 pp.

Melville R. 1960. *Epilobium pedunculare* A. Cunn. and its allies. *Kew Bulletin*, 14(2): 296–300. Available at: http://www.jstor.org/stable/4114818

Mildenhall D.C. 1980. New Zealand Late Cretaceous and Cenozoic plant biogeography: a contribution. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 31: 197–233. https://doi.org/10.1016/0031-0182(80)90019-X

Mosyakin S.L., de Lange P.J. 2019. Notes on typification and nomenclature of four taxa of *Geraniaceae* described by Turczaninow from New Zealand and Australia. *Phytotaxa*, 419(2): 169–181. http://dx.doi.org/10.11646/phytotaxa.419.2.3

Mosyakin S.L., de Lange P.J. 2020. The earliest collection of an elusive alien? Evidence of early introduction of *Chenopodium ficifolium* (*Chenopodiaceae*) in New Zealand. *Ukrainian Botanical Journal* [*Український ботанічний журнал*], 77(2): 81–89. https://doi.org/10.15407/ukrbotj77.02.081

Mosyakin S.L., Esser H.-J., Freitag H. 2018. The holotype of *Chenopodium baryosmon* (*Chenopodiaceae*) rediscovered: just one of many type specimens from the private herbarium of Schultes, now in the Turczaninow herbarium at KW. *Phytotaxa*, 334(1): 49–54. https://doi.org/10.11646/phytotaxa.334.1.7

Mosyakin S.L., McNeill J., Boiko G.V. 2019a. Comments on proper type designation for names of taxa validated by Turczaninow in his *Animadversiones*, with case studies. *Ukrainian Botanical Journal* [*Український ботанічний журнал*], 76(5): 379–389. https://doi.org/10.15407/ukrbotj76.05.379

Myakushko T.Ya. 1976. The scientific heritage of M.S. Turchaninov. *Ukrainian Botanical Journal*, 33(6): 647–651. [М'якушко Т.Я. 1976. Наукова спадщина М.С. Турчанінова. *Український ботанічний журнал*, 33(6): 647–651].

Myakushko T.Ya., Glagoleva N.G., Mel'nyk S.K. 1979. M.S. Turchaninov's herbarium collection of type specimens of new species. *Ukrayins'kyi Botanichnyi Zhurnal,* 36(1): 85–90 [М'якушко Т.Я., Глаголева Н.Г., Мельник С.К. 1979. Гербарна колекція типових зразків нових видів М.С. Турчанінова. *Український ботанічний журнал*, 36(1): 85–90].

Orchard A.E. 2014. The dispersal of Allan Cunningham's botanical (and other) collections. *Telopea*, 17: 43–86. http://dx.doi.org/10.7751/telopea20147421

Orchard A.E., Orchard T.A. 2013. Allan Cunningham's Timor collections. *Nuytsia*, 23: 63–88.

POWO. 2020–onward. *Plants of the World Online*. Facilitated by the Royal Botanic Gardens, Kew. Available at: http://www.plantsoftheworldonline.org (Accessed 17 February 2020).

Pyšek P., Danihelka J., Sádlo J., Chrtek J. Jr., Chytrý M., Jarošík V., Kaplan Z., Krahulec F., Moravcová L., Pergl J., Štajerová K., Tichý L. 2012. Catalogue of alien plants of the Czech Republic (2nd edition): checklist update, taxonomic diversity and invasion patterns. *Preslia*, 84: 155–255.

Raven P.H. 1967a. The genus *Epilobium* in Malesia (*Onagraceae*). *Blumea*, 15(2): 269–282.

Raven P.H. 1967b. A revision of the African species of *Epilobium* (*Onagraceae*). *Bothalia*, 9(2): 309–333. https://doi.org/10.4102/abc.v9i2.1599

Raven P.H. 1968. *Epilobium*. In: Tutin T.G., Heywood V.H., Burges N.A., Moore D.M., Valentine D.H., Walters S.M., Webb D.A. (eds.), *Flora Europaea*, vol. 2: *Rosaceae* to *Umbelliferae*. Cambridge: Cambridge University Press, pp. 308–311.

Raven P.H. 1972. Evolution and endemism in the New Zealand species of *Epilobium*. In: Valentine D.H. (ed.). *Taxonomy, phytogeography and evolution*. London; New York: Academic Press, pp. 259–274.

Raven P.H. 1973. Evolution of subalpine and alpine plant groups in New Zealand. *New Zealand Journal of Botany*, 11(2): 177–200. https://doi.org/10.1080/002882 5X.1973.10430272

Raven P.H. 1976. Generic and sectional delimitation in *Onagraceae*, tribe *Epilobieae*. *Annals of the Missouri Botanical Garden*, 63(2): 326–340.

Raven P.H. 1988. *Onagraceae* as a model of plant evolution. In: Gottlieb L.D., Jain S.K. (eds.). *Plant Evolutionary Biology*. Dordrecht: Springer, pp. 85–107. https://doi.org/10.1007/978-94-009-1207-6_4

Raven P.H., Engelhorn T. 1971. New taxa and new combinations in Australasian *Epilobium* (*Onagraceae*). *New Zealand Journal of Botany*, 9(2): 345–350. https://doi.org/10.1080/0028825X.1971.10429146

Raven P.H., Raven T.E. 1976. The genus *Epilobium* in Australasia: A systematic and evolutionary study. *New Zealand Department of Scientific and Industrial Research Bulletin* [Wellington: Government Printer], 216: 1–321.

Rosati L., Fascetti S., Romano V.A., Potenza G., Lapenna M.R., Capano A., Nicoletti P., Farris E., de Lange P.J., Del Vico E., Facioni L., Fanfarillo E., Lattanzi E., Cano-Ortiz A., Marignani M., Fogu M.C., Bazzato E., Lallai E., Laface V.L.A., Musarella C.M., Spampinato G., Mei G., Misano G., Salerno G., Esposito A., Stinca A. 2020. New chorological data for the Italian vascular flora. *Diversity*, 12(1) 22 (29 pp.). https://doi.org/10.3390/d12010022

Schönberger I., Wilton A.D., Boardman K.F., Breitwieser I., Cochrane M., de Lange P.J., de Pauw B., Fife A.J., Ford K.A., Gibb E.S., Glenny D.S., Korver M.A., Mosyakin S.L., Novis P.M., Prebble J.M., Redmond D.N., Smissen R.D., Tawiri K. 2018. *Checklist of the New Zealand Flora – Seed Plants 2018*. Lincoln (New Zealand): Manaaki Whenua – Landcare Research, 397 pp. http://dx.doi.org/10.7931/P1D33B

Schönberger I., Wilton A.D., Boardman K.F., Breitwieser I., Cochrane M., de Lange P.J., de Pauw B., Fife A.J., Ford K.A., Gibb E.S., Glenny D.S., Korver M.A., Novis P.M., Prebble J.M., Redmond D.N., Smissen R.D., Tawiri K. 2019. *Checklist of the New Zealand Flora – Seed Plants 2019*. Lincoln (New Zealand): Manaaki Whenua – Landcare Research, 399 pp. http://dx.doi.org/10.26065/s3gg-v336

Seavey S.R., Raven P.H. 1977a. Chromosomal differentiation and the sources of the South American species of *Epilobium* (*Onagraceae*). *Journal of Biogeography*, 4(1): 55–59.

Seavey S.R., Raven P.H. 1977b. Chromosomal evolution in *Epilobium* sect. *Epilobium* (*Onagraceae*). *Plant Systematics and Evolution*, 127: 107–119. https://doi.org/10.1007/BF00984145

Shiyan N.M. (ed.) 2011. *Herbaria of Ukraine. Index Herbariorum Ucrainicum*. Kyiv: Alterpress. 442 pp. [Шиян Н.М. (ред.) 2011. *Гербарії України. Index Herbariorum Ucrainicum*. Київ: Альтерпрес, 442 с.].

Stace C. 2010. *New flora of the British Isles*. Ed. 3. Cambridge: Cambridge University Press, xxxiv + 1234 pp. [*Onagraceae*: pp. 354–366].

Stafleu F.A. 1969. Turczaninow's *Flora Baicalensi-Dahurica*. *Taxon*, 8(5): 563–565. Available at: https://www.jstor.org/stable/1218386

Stafleu F.A., Cowan R.S. 1976. *Taxonomic literature. A selective guide to botanical publications and collections with dates, commentaries and types*, vol. 1: A–G. Ed. 2. Utrecht: Bohn, Scheltema & Holkema, xl + 1136 pp.

Stafleu F.A., Cowan R.S. 1986. *Taxonomic literature: A selective guide to botanical publications and collections with dates, commentaries and types*, vol. 6: Sti–Vuy. Ed. 2. Utrecht; Antwerpen: Bohn, Scheltema & Holkema / The Hague; Boston: dr. W. Junk b.v., Publishers, 926 pp.

Thiers B. 2008–onward. *Index Herbariorum*. *A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. Available at: http://sweetgum.nybg.org/science/ih (Accessed 18 March and 25 June 2020).

Thompson J. 1990. *Onagraceae*. In: George A.S. (ed.). *Flora of Australia*, vol. 18: *Podostemaceae* to *Combretaceae*. Canberra: Australian Government Publishing Service, pp. 215–243.

Turland N.J., Wiersema J.H., Barrie F.R., Greuter W., Hawksworth D.L., Herendeen P.S., Knapp S., Kusber W.-H., Li D.-Z., Marhold K., May T.W., McNeill J., Monro A.M., Prado J., Price M.J., Smith G.F. 2018. *International Code of Nomenclature for algae, fungi, and plants* (*Shenzhen Code*) *adopted by the Nineteenth International Botanical Congress, Shenzhen, China, July 2017.* [*Regnum Vegetabile*, vol. 159]. Glashütten: Koeltz Botanical Books, xxxviii + 254 pp. https://doi.org/10.12705/Code.2018

Wagner W.L., Hoch P.C., Raven P.H. 2007. Revised classification of the *Onagraceae*. *Systematic Botany Monographs*, 83: 1–240.

Webb C.J., Sykes W.R., Garnock-Jones P.J. 1988. *Flora of New Zealand*, vol. 4. Christchurch: Botany Division, Department of Scientific and Industrial Research (DSIR), lxviii + 1365 pp.

West K.R., Raven P.H. 1976. Novelties in Australian *Epilobium* (*Onagraceae*). *New Zealand Journal of Botany*, 15(2): 503–509. https://doi.org/10.1080/002882 5X.1977.10432557

Recommended for publication by K. Marhold