



Typification of the Linnaean names of the genus *Cardamine* (Cruciferae)

KAROL MARHOLD F.L.S.

Institute of Botany, Slovak Academy of Sciences, Dúbravská cesta 14, SK-842 23 Bratislava, Slovak Republic

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Lectotypification of the following Linnaean names of the genus *Cardamine* L. (Cruciferae) is presented: *Cardamine asarifolia*, *C. graeca*, *C. petraea* (= *Cardaminopsis petraea*), *C. resedifolia* (including designation of an epitype), *C. trifolia* and *C. virginica*. The lectotypes of the previously typified names of this genus and the protologues of these names are discussed. The probable typotype for the lectotype of *C. africana* is identified and the need for the conservation of the type of *C. chelidonia* is noted.

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INTRODUCTION

For the revision of the genus *Cardamine* in the Central European area carried out by the present author, it was necessary to consider the typification of some of the Linnaean names of this genus. During this work attention was also paid to the remaining Linnaean species names of the genus requiring typification, and some interesting facts about the other previously typified names were revealed.

THE TYPIFICATIONS AND DISCUSSION OF THE PROTOLOGUES

Cardamine africana L., *Species plantarum*: 655, 1753 - LT (designated by Sjöstedt, 1975: 9): Hermann, P., *Paradisus batavus*, 1698, the plate belonging to p. 202.

The protologue (Linnaeus, 1753: 655) has the following elements:

6. CARDAMINE foliis ternatis acuminatis, caule ramosissimo.
 Nasturtium africanum, foliis ternis, facie christophoriana.
Herm. par. 202, t. 202.
 Nasturtium africanum, floribus albis spicatis, foliis ternis christophoriana facie. *Pluk. alm. 152. t. 101. f. 5. Raj. Suppl. 414.*
Habitat in Africa.

The first element of the protologue, the diagnostic phrase name (*nomen specificum legitimum*), appears to be Linnaeus's own, but there are no specimens of this taxon in any of the herbaria known to have been consulted by him.

The first who collected *Cardamine africana* was Paul Hermann, during his short visit to the Cape of Good Hope on his way to Ceylon in 1672 (Linnaeus, 1747a: 11–16; Karsten, 1967). He probably sent seeds of this plant, among others, to his Dutch friends (cf. Karsten, 1967: 125) and consequently mentioned this taxon as “NASTURTIUM Africanum floribus spicatis & foliis ternis Christophoriana facie” in his work *Paradisi batavi prodromus sive plantarum exoticarum in batavorum hortis observatarum*, published in 1689 as a second part of *Schola botanica* (Hermann, 1689). Later, a slightly changed phrase name was published in *Paradisus batavus* (Hermann, 1698), together with the description and a very fine illustration. It should be noted that most of the entry for this taxon in this work was most probably written by William Sherard according to an early draft of part of the *Paradisus batavus*, deposited in the Library of the Department of Plant Sciences of the University of Oxford (MS Sherard no. 181/2, p. 133). It is known that Sherard posthumously edited Hermann's *Paradisus batavus* (1698) for the benefit of Hermann's widow (Paul Hermann died in 1695) (Clokie, 1964: 20, 182). “NASTURTIUM Africanum, floribus spicatis, foliis ternis, Christophoriana facie” is mentioned with reference to the *Paradisi batavi prodromus* also by Burmann in his *Thesaurus zeylanicus* (1737) in the chapter entitled *Catalogus Plantarum Africanum Quas Paulus Hermannus Botanices Professor, ad Caput Bonae Spei olim observavit*.

There is a specimen in OXF (Herbarium Sherard, no. 746) bearing, apart from Sherard's label, Hermann's inscription “Nasturtium Africanum foliis ternis Christophoriana”. The specimen may have some connection with Hermann's notes in the notebook known as *Manuale Hermanni* (MS Sherard no. 184, Library of the Department of Plant Sciences of the University of Oxford), namely in its first part, *Hortus fagelianus*, on p. 27, entitled “Nasturtium Africanum flores et foliis ternis Christophoriana” and on p. 103 entitled “Nasturtium s. Cardamine Africana”. The specimen in OXF appears to be the only extant specimen of *Cardamine africana*, collected by Hermann, as there seems to be no specimen in the Sloane herbarium in BM, where other specimens collected by Hermann at the Cape of Good Hope are deposited (Dandy, 1958: 137–138). There is a weak similarity between the specimen and the illustration in *Paradisus batavus* (lectotype of *C. africana*, selected by Sjöstedt, 1975: 9) and it may be the type.

The third element of the protologue is the phrase name “Nasturtium Africanum floribus albis spicatis, & foliis ternis Christophoriana facie” from Plukenet's *Phytographia* (1691) and *Almagestum botanicum* (1696) [correct page is 262, not 152 as cited in the protologue]. The phrase name is accompanied in both works by

reference to Hermann's *Paradisi batavi prodromus* ("P. B. P."), by the note "*Hort. Reg. Hampton[iens.]. collegimus*" and by the illustration in *Phytographia*. There is a specimen in the Sloane herbarium in BM (97:19, left-hand plant) upon which the illustration is most probably based. Ray in his *Supplementum* (1704) refers to Hermann's *Paradisi batavi prodromus* (1689) and *Paradisus batavus* (1698) as well as to Plukenet's *Phytographia* (1691) and *Almagestum botanicum* (1696). Furthermore he repeats verbatim the whole written entry from Hermann's *Paradisus batavus* (1698: 202).

Cardamine amara L., *Species plantarum*. 656, 1753. - LT (designated by Khatri, 1989: 92): LINN 835.17

The protologue (Linnaeus, 1753: 656) has the following elements:

12. CARDAMINE foliis pinnatis, axillis stoloniferis. *It.*

W:goth. 76.*

Cardamine foliis pinnatis, foliolis subrotundis angulosis. Hall.

helv. 558, *Fl. suec.* 560. *Dalib. paris.* 199.

Nasturtium aquaticum majus & amarum. Bauh. pin. 104.

Habitat in Europae septentrionalioris nemoribus. ♀

The diagnostic phrase name is referred directly to Linnaeus's *Wästgöta-Resa* [tour in West Gothland] (1747b). Linnaeus considered the description (or descriptions) in this work as particularly good since he marked the reference with an asterisk (cf. Stearn, 1957: 162). The references to this taxon in *Wästgöta-Resa*, are indicated by the abbreviation from the first edition of Linnaeus's *Flora suecica* (1745) "*Flor.* 560". During his tour in West Gothland Linnaeus apparently found this taxon in two places, namely Kinnekulle (mentioned on the p. 26 as "CARDAMINE *Nasturtium amarum dicta*" and "CARDAMINE foliis pinnatis ex summis alis stolonibus reptans"), and Mosseberg (mentioned on p. 76 as "CARDAMINE foliis pinnatis: foliolis subrotundo angulosis"). In connection with the occurrence in Kinnekulle, Linnaeus provided rather detailed information written in Swedish. The specimen in the Linnaean herbarium in London (LINN), no. 835.17, selected by Khatri (1989) as a lectotype of this name, is the only known one with the epithet "*amara*" written in Linnaeus's hand. This inscription at the bottom of the sheet is accompanied by the number "12", which is the species number from *Species plantarum*. This is usually considered to be a strong indication that the specimen was in Linnaeus's possession by 1753 (Jarvis, 1992: 506) and there is a high probability that this specimen was collected at one of the localities referred to in either *Wästgöta-Resa* (1747b) or *Flora suecica* (1745). Indeed, the populations occurring in northern Europe are diploid and are considered to belong to the typical subspecies of *C. amara*.

It is interesting that there is another fragmentary specimen, although not original material of *Cardamine amara*, but taxonomically referable to this name, bearing inscriptions "*7 chelidonia*" (probably by Linnaeus filius) at the bottom of the sheet and "Finlandia" (by Linnaeus) on the reverse in the Linnaean herbarium in Stockholm (S) (see below).

The polynomial "CARDAMINE foliis pinnatis pinnis subrotundis angulosis" in Haller's *Enumeratio methodica stirpium Helvetiae* (1742) is accompanied by reference to five localities in Switzerland, namely Berna [Bern], Tigurum [Zürich], Neocomum [Neuchâtel], Lenz, and Brienz. The identification of this element is less straightforward, because of the occurrence of tetraploid populations of *C. amara* in this area, which might represent a new, as yet undescribed taxon (Marhold, 1992, 1995a; Jalas

& Suominen, 1994: 155). The morphological differences between diploids and tetraploids of *C. amara* are rather minute and there is no way of ascertaining ploidy level from Haller's description.

Dalibard in *Florae parisiensis prodromus* (1749) referred to "CARDAMINE foliis pinnatis, foliolis subrotundo-angulosis" of Haller and Linnaeus as well as to "Cardamine pratensis, flore majore elatior" of Tournefort (1719: 224) [correctly "Cardamine flore majore, elatior"] which was considered by Linnaeus to be a synonym of *C. amara*, according to his inscription in his own copy of *Institutiones rei herbariae* (Tournefort, 1719), deposited in the Library of the Linnean Society in London.

Bauhin in *Pinax* (1623) referred only to "Sisymbrium alterum" (as "Sisymbrij alterius species secunda" in Bauhin) of Thalius in *Sylva hercynica* published in Camerarius's *Hortus medicus et philosophicus* (1588). The corresponding specimen in Burser's herbarium, which might be important for Linnaeus's interpretation of Bauhin's polynomial (cf. Savage, 1937; Stearn, 1957: 116), was originally in volume V of *Hortus siccus*, which was destroyed by fire in 1702 (Juel, 1936: 30) and thus was not studied by Linnaeus.

Cardamine asarifolia L., *Species plantarum*. 654, 1753. - LT (designated here): Hermann, P., *Paradisus batavus*, 1698, the first plate belonging to p. 203, entitled "NASTURTIUM Montanum Assari folio".

The protologue (Linnaeus, 1753: 654) has the following elements:

2. CARDAMINE foliis simplicibus subcordatis.

Nasturtium montanum, asari folio. *Bocc. sic.* 5. t. 3. *Herm. par.*

203. t. 203. *Raj. hist.* 816.

Nasturtium alpinum palustre rotundifolium, radice repente.

Moris. hist. 2. p. 224.

Nasturtium alpinum, bellidis folio, majus. *Bauh. pin.* 105.

prodr. 46?

Habitat in Alpibus Italicis.

The phrase name "2. CARDAMINE foliis simplicibus subcordatis" is slightly modified from one which appeared in *Hortus cliffortianus* (Linnaeus, 1738: 336): "5. CARDAMINE foliis simplicibus reniformibus". The latter is supported by a specimen in Clifford's herbarium in BM, which is clearly *C. asarifolia* sensu Linnaeus in *Species plantarum*, but Linnaeus did not cite the entry for *Hortus cliffortianus* in the protologue. He had either some doubts as to its determination or omitted it by accident. In any case the specimen in BM cannot be considered as part of the original material of *C. asarifolia* L.

There is a specimen in the Linnaean herbarium in London (LINN), no. 835.3, with "*C. asarifolia*" written in Linnaeus's hand at the bottom of the sheet. In addition, this specimen bears Linnaeus's inscription "Allion" just below the plant indicating, Allioni as the collector. This is good evidence that the specimen was added to Linnaeus's herbarium in 1757, as a specimen of *C. asarifolia* was among those of which receipt was acknowledged by Linnaeus in his letter to Allioni of 2 July 1757 (Savage, 1945: 113).

The first phrase name, cited in the protologue, appeared for the first time in Boccone's *Icones et descriptiones rariorum plantarum Siciliae ...* (1674: 5) as "Nasturtium montanum Asari foliis", accompanied by the illustration cited by Linnaeus in the

protologue, and by a description and reference to a locality: “Circa fontes & rivulorum margines montis *Bargae* in *Hetruria* [Tuscany] crebro nascitur”. In spite of the poor quality of the illustration, the plant depicted there undoubtedly belongs to *C. asarifolia* as used in the current literature (e.g. Jones, 1964a: 286; Jones & Akeroyd, 1993: 348). Attempts to trace a specimen connected with this illustration in the herbaria where Boccone’s specimens are deposited (BOLO, GE, IBF, LY, P, OXF, and in the Austrian National Library, Vienna - cf. Lanjouw & Stafleu, 1954: 80; Stafleu & Cowan, 1976: 243) were not successful.

In Hermann’s *Paradisus batavus* (1698) the polynomial “NASTURTIUM montanum Assari folio” is cited with direct reference to Boccone (1674) and with reference to “Sisembro Alpino palustre di foglia rotonda” (as “Nasturtii Alpini palustris rotundifolii” in Hermann) of Zanoni in *Istoria botanica* (1675). The entry is completed by a short description and a very accurate illustration, cited by Linnaeus in the protologue, exhibiting all the characters diagnostic of this taxon. It is important to note that according to an early draft of part of the *Paradisus batavus* (MS Sherard no. 181/2, p. 129, see above), the whole entry for “Nasturtium montanum Assari folio” in *Paradisus batavus* was most probably written by William Sherard. Thus the undated specimen of *C. asarifolia* in Sherard’s herbarium (OXF, no. 3795) with Sherard’s reference to “Nasturtium montanum Asari folio Bocc. rar. pl. 5. Par. Bat. 120 [sic!]” on the label might be conceptually linked to the entry in the *Paradisus batavus*. The specimen indeed perfectly agrees with the current concept of *C. asarifolia*.

Ray in *Historia plantarum* (1686) referred to Zanoni’s detailed entry for his “Sisembro Alpino palustre di foglia rotonda” (as “Nasturtium Alpinum palustre rotundifolium” in Ray) (Zanoni, 1675) and Boccone’s entry for “Nasturtium montanum Asari folio” (Boccone, 1674).

Morison in *Plantarum historiae universalis oxoniensis* (1680) introduced his own phrase name “Nasturtium Alpinum palustre rotundifolium radice serpente”, which slightly differs from Linnaeus’s citation in the protologue. The polynomial is accompanied by a detailed description, a reference to Zanoni’s aforementioned phrase name and by the location already mentioned in Zanoni’s work “Reperitur in loco aperto, ubi pascuntur pecora, in territorio Modenensi, prope fontem jugem aquae limpidae & frigidissimae, qui ab indigenis pastoribus *Baccara* appellatur”.

The last cited polynomial in the protologue is that of Bauhin “Nasturtium alpinum bellidis folio majus” from *Pinax* (Bauhin, 1623) and *Prodromus* (Bauhin, 1620) with a question mark appended, since Linnaeus apparently had some doubts about this synonym. This is confirmed by the fact that in his own copy of *Pinax* (Bauhin, 1671), deposited in the Library of the Linnean Society, London, he deleted his original inscription “*Cardam. asarifolia*” near this polynomial and wrote instead the generic name “*Arabis*”. Bauhin in *Pinax* (1623: 105) referred directly to the entry in *Prodromus* (1620: 46), where he wrote a short description and cited the specimen collected by Burserus “Circa Fabarias Thermas [Pfäfers, E. Switzerland]”. The relevant specimen (or its duplicate) was originally in volume V of Burser’s herbarium (*Hortus siccus*), which was destroyed by fire in 1702. However, it belonged to *Arabis soyeri* Reuter & Huet (syn.: *Arabis bellidifolia* Jacq. non Crantz) (Juel, 1923: 48; 1936: 30).

After considering all of the elements from the protologue, the illustration in Hermann’s *Paradisus batavus* is designated here as the lectotype of *Cardamine asarifolia* L.

Cardamine bellidifolia L., *Species plantarum*: 654, 1753. - LT (designated by Khatri 1990a: 442): LINN 835.1.

The protologue (Linnaeus, 1753: 654) has the following elements:

1. CARDAMINE foliis simplicibus ovatis integerrimis: petiolis longis. *Fl. lapp.* 206. *t.9.f.2. Fl. suec.* 564. *Hall. helv.* 566.

Nasturtium alpinum, bellidis folio, minus. Bauh. pin. 105.

Plantula cardamines aemula. Clus. hist. 2. p. 129.

Habitat in Alpibus Lapponiae, Helvetiae, Britanniae. 2

The first element of the protologue, the phrase name “CARDAMINE foliis simplicibus ovatis integerrimis: petiolis longis” is directly referred to and slightly modified from Linnaeus’s *Flora lapponica* (1737: 214, no. 260 [cited as “206 in the protologue”]). It is also cited via his *Flora suecica* (1745) and Haller’s *Enumeratio methodica stirpium Helvetiae* (1742). Apart from the illustration by Abraham Burmann provided by Linnaeus in *Flora lapponica* (1737), there is a specimen directly connected with this work, deposited in the Library of the Institut de France, Paris (Alston, 1957; Fries, 1861; colour slides by Dr Jarvis, BM). The other extant Linnaean specimen (a sheet with three plants), selected by Khatri (1990a) as lectotype, is in the Linnaean herbarium in London (LINN), no. 835.1. This specimen bears the inscription “1 *bellidifolia*” in Linnaeus’s hand at the bottom of the sheet and “*Cardamine ... Lapponia*” on the reverse. The number “1”, the species number from *Species plantarum*, strongly indicates that the specimen was in Linnaeus’s possession before 1753. Both aforementioned specimens are remarkably similar to the illustration in *Flora lapponica* and there can be no doubt that they represent the same taxon; indeed, they agree well with the current concept of *C. bellidifolia* subsp. *bellidifolia* (Jones, 1964a: 288; 1964b: 57–59; Jones & Akeroyd, 1993: 350).

As shown in his habitat statement, Linnaeus considered *C. bellidifolia* to occur in “alpibus Lapponiae, Helvetiae, Britanniae”. The most recent taxonomic treatments of *C. bellidifolia* (Jones, 1964b: 57–59; Jones & Akeroyd, 1993: 350) consider this taxon to comprise two subspecies, with *C. bellidifolia* subsp. *bellidifolia* in arctic and subarctic Europe and *C. bellidifolia* subsp. *alpina* (Willd.) B.M.G. Jones in the Alps and Pyrenees. The phrase names of Haller (1742), connected with localities in the Swiss Alps, Clusius (1601), and Bauhin (1623), mentioning in the synonymy Clusius’s “*Plantula cardamines (alterius) aemula*” from *Rariorum aliquot stirpium, per Pannoniam, Austriam ... observatarum historia* (1583) and *Rarium plantarum historia* (1601), should be referred entirely to *C. bellidifolia* subsp. *alpina*. Jones (1964b: 58) considered Linnaeus’s inclusion of Britain in his habitat statement to be an error. I have not been able to trace the basis of Linnaeus’s information.

It is probably worth mentioning here that the name *Cardamine bellifolia*, published by Linnaeus in *Flora anglica* (1754), is considered to be a mere orthographic variant of the name *C. bellidifolia* (Greuter, 1989: 562).

Cardamine chelidonia L. *Species plantarum*: 655, 1753. - Conserved type to be proposed.

The protologue (Linnaeus, 1753: 655) has the following elements:

7. CARDAMINE foliis pinnatis: foliolis quinque incisis.

Cardamine glabra, chelidonii folio. T. Barr. ic. 156.

Nasturtium pyrenaeorum aquaticum latifolium, purpurascens flore. *Herm. par.* 203. *t.* 204.
Habitat in Sibiria, Italia.

There is a specimen at LINN (no. 835.8), bearing Linnaeus's inscription "7 *chelidonia*" at the bottom of the sheet and "Sisymbrium foliis pinnatis, pinnis ovatis serratis Gmel." written probably by J.G. Gmelin on the reverse. The latter inscription refers to the Gmelin's polynomial and illustration in his *Flora sibirica* (Gmelin, 1768: 269) which indicates that the specimen was collected by Gmelin in Siberia. The plant depicted by Gmelin was described later by Willdenow (1800: 484–485) as *C. macrophylla* and already de Candolle (1821: 263) had pointed out that the specimen in the Linnaean herbarium belongs to the same species. *C. macrophylla* in the sense of Willdenow is considered at present to be a group of closely related species (Khatri, 1990b) and belongs to the section *Macrophyllum* O.E. Schulz of the genus *Cardamine*, very different from what is considered at present to be *C. chelidonia* L. Thus the *C. chelidonia* of Siberia mentioned by Linnaeus and some later authors (e.g. Pallas, 1776: 54) refers to the *C. macrophylla* group. There are no data on the occurrence of *C. chelidonia* in Siberia in any Flora of the area of the former Soviet Union (cf. Busch, 1939; Czerepanov, 1981).

Another specimen bearing the inscription "7 *chelidonia*" at the bottom of the sheet is deposited in the Linnaean herbarium in Stockholm (S, no. 270–7). However, at least the word "*chelidonia*" in this inscription is written by Linnaeus filius. Moreover, there is the inscription "Finlandia" on the verso of the sheet written by Linnaeus. The plant on the sheet belongs beyond any doubt to *Cardamine amara* L. subsp. *amara*.

There is no specimen in any Linnaean herbarium which would document the occurrence of this species in Italy.

The illustration from Hermann's *Paradisus batavus* (Hermann, 1698), accompanied by the polynomial "NASTURTIIUM Pyrenaicum aquaticum", and cited by Linnaeus in the protologue, depicts the plant later described by Pourrett (1788: 310) as *Cardamine raphanifolia* and by Vahl (1791) as *C. latifolia* (which is the later homonym of *C. latifolia* Lej.). The first of these names is considered now to be the correct name for the populations occurring in the Pyrenees, very distinct from the present interpretation of the name *C. chelidonia*. Linnaeus's uncertainty concerning the taxonomic classification of the plant depicted by Hermann (1698) is documented by his own inscription "*Cardamine amara*" at the bottom of the illustration is his own copy of Hermann's *Paradisus batavus* (deposited in the Library of the Linnean Society, London).

The only item in the protologue which roughly corresponds to what is considered at present to be a *C. chelidonia* (Jones & Akeroyd, 1993; Verlaque, Contandriopoulos & Aboucaya, 1993; Jalas & Suominen, 1994: 172–173) is the illustration by Barrelier. Barrelier's work consists of two volumes, namely *Plantae per Galliam, Hispaniam et Italiam observatae* (Barrelier, 1714a) and *Icones plantarum per Galliam, Hispaniam et Italiam observatar* (Barrelier, 1714b). The polynomial "Cardamine glabra, Chelidonii folio" cited by Linnaeus and taken from Tournefort (1719) could be found only in the first volume (Barrelier, 1714a: 44), where it is accompanied by reference to the polynomial "Sisymbrium monanum, latifolium, flore purpureo *Barr. Icon.* 156". Number 156 refers to the illustration in the second volume (Barrelier, 1714b) which is accompanied by the latter polynomial, and not by the polynomial cited by

Linnaeus. The illustration roughly corresponds to *C. chelidonia* in the current sense, but it lacks auriculate bases to the petioles, an important distinguishing character. No herbarium specimen upon which the illustration is (or might be) based could be traced.

Cardamine chelidonia as used in recent literature (Jones & Akeroyd, 1993; Verlaque *et al.*, 1993; Jalas & Suominen, 1994) is native to Italy, Corsica and Croatia. Apart from the morphological variability reflected in two varieties described within this species (var. *brutia* Porta from Calabria and var. *kitaibeli* Borbás from Croatia), there is variation in chromosome numbers ($2n = 16$ by Manton (1932) from the material from the botanical garden, $2n = 32$ from the Czech Republic (where it is introduced) by Hrouda (1992: 110) and recently $2n = c.64$ by Verlaque *et al.* (1993) from N. Corse). Therefore it is desirable to select a lectotype which can be critically identified for the purpose of the precise application of the name. The only illustration corresponding to the present use of the name *C. chelidonia* (e.g. Barrelier's one) could not be so identified and, moreover, its selection as a lectotype might be precluded by the Art. 8.3 of the ICBN, which, in some interpretations, does not permit the selection of the illustration as a lectotype in the case when any relevant herbarium specimen is available. Therefore, in order to avoid undesirable name change, a new conserved type will be proposed to preserve the current use of the name.

Cardamine graeca L., *Species plantarum*. 655, 1753. - LT (designated here): L - herbarium van Royen, no. 901.220–60, restricted to the flowering plant in the lower part of the sheet (Fig. 1).

The protologue (Linnaeus, 1753: 655) has the following elements:

9. CARDAMINE foliis pinnatis: foliolis palmatis aequalibus petiolatis. *Roy. lugdb.* 345. *Hort. ups.* 188.
 Nasturtium montanum nanum, rotundo thalictri folio, cyrenaicum. *Bocc. mus.* 2. p. 171. t. 166.
 Sio minimo prosperi alpini affinis, siliculis latis. *Bocc. sic.* 84, t. 44. f. 2.
Habitat in Sicilia, Corsica, insulis Graeciae. ☉

The diagnostic phrase-name is referred directly to van Royen's *Florae leydensis prodromus* (1740) and to Linnaeus's *Hortus upsaliensis* (1748), where it appears in a slightly different form.

The specimen in the Linnaean herbarium in London (LINN), no. 835.12 with Linnaeus's inscription "*Cardamine graeca*" does not bear the number from *Species plantarum* and thus it was most probably added to Linnaeus's herbarium after 1753 (cf. Jarvis, 1992: 506).

There is another specimen of *C. graeca* in the van Royen herbarium in Leiden (L, no. 901.220–60), bearing the full reference to the *Prodromus*. Stearn (1957: 105) considered the herbarium of Adriaan van Royen as "indirectly relevant to Linnaeus's work". However, Wijnands (1983) is of the opinion that the specimens with reference to Adriaan van Royen's *Prodromus* are in many cases relevant for the typification of Linnaean names. According to him there is every reason to assume that Linnaeus contributed substantially to the *Prodromus* and that van Royen's herbarium was at his disposal. Following that argument the above mentioned specimen of *C. graeca* seems to be fully eligible as a lectotype of this name.

The second phrase name, cited in the protologue, is cited from Boccone's *Museo*

di piante rare... (1697). The illustration cited by Linnaeus (on Table 116, not Table 166) is of rather poor quality. The polynomial “*Nasturtium Montanum, nanum, rotundo Thalictri folio, Cyrnaeum*” is accompanied here by the short description and reference to the occurrence in Corsica.

The third phrase name cited is from Boccone’s *Icones & descriptiones rariorum*

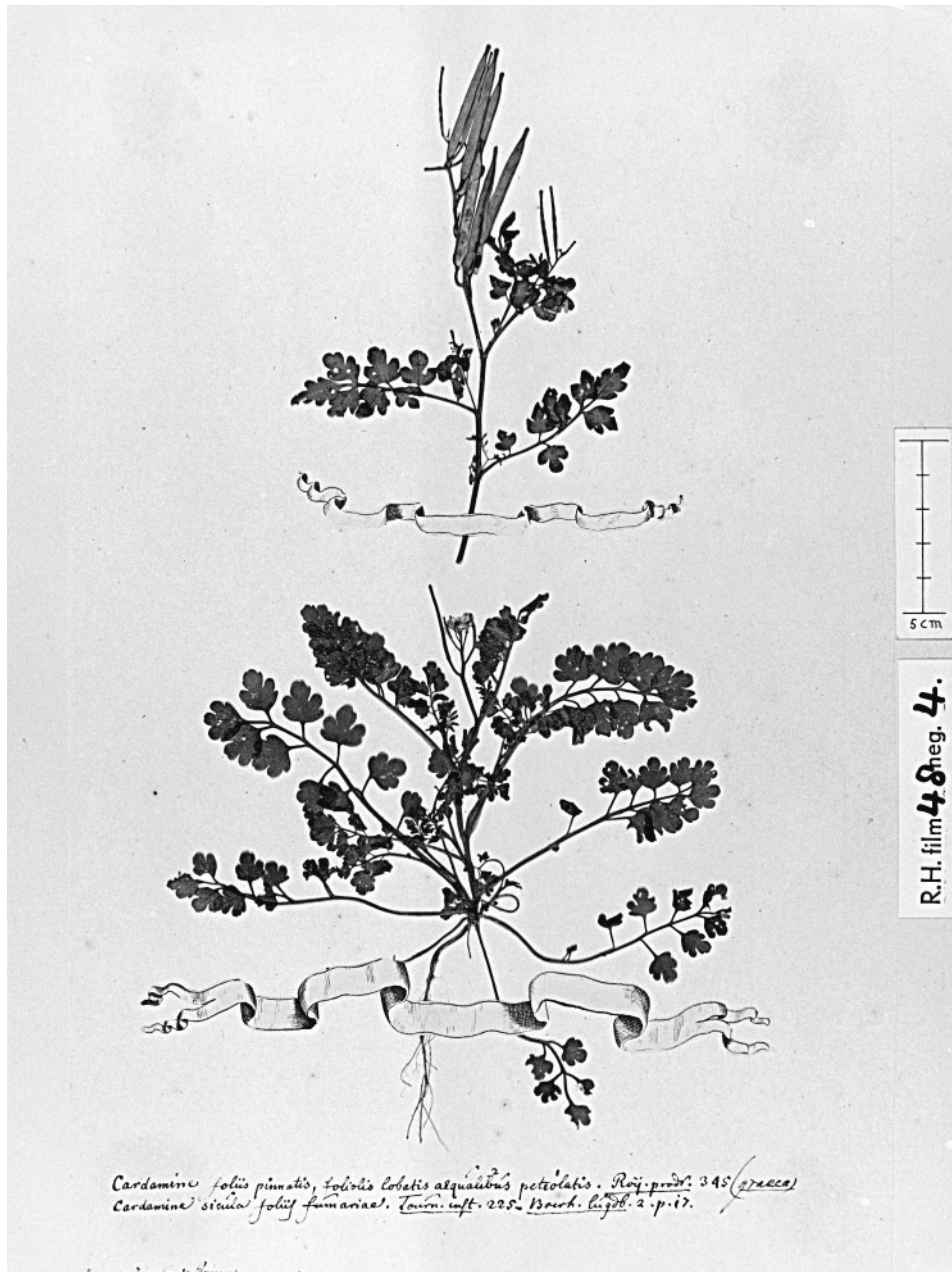


Figure 1. The lectotype of *Cardamine graeca* L., L - herbarium van Royen, no. 901.220-60 (Photograph by courtesy of the Rijksherbarium Leiden).

plantarum Siciliae ... (1674), where it appears as “Sio minimo Prosp. Alpin. affinis, siliquis latis”, accompanied by two illustrations, namely fig. N on Table 44 (p. 83) and fig. II on Table 45 (p. 84); probably the latter is cited by Linnaeus with the wrong tabula number. Both plants depicted correspond well to the current use of the name *C. graeca*; Boccone reports the occurrence of this species as “Nascitur in *Madonia* monte in *Sicilia* veteribus *Nebrode* dicto”.

After considering all the elements from the protologue the specimen no. 901.220–60 from the van Royen herbarium (L) is selected here as the lectotype of *C. graeca* L.

Cardamine hirsuta L., *Species plantarum*. 655, 1753. - LT (designated by Fawcett & Rendle, 1914: 239): LINN 835.13.

The protologue (Linnaeus, 1753: 655) has the following elements:

10. CARDAMINE foliis pinnatis, floribus tetrandris. *Hort. cliff.* 336. *Fl. suec.* 562. *Roy. lugdb.* 345.
 Nasturtium aquaticum minus. *Bauh. pin.* 104.
 Sisymbrium aquaticum alterum. *Cam. epit.* 270.
Habitat in Europae areis, hortis, arvis.

The diagnostic phrase name, directly cited from the *Hortus cliffortianus* (Linnaeus, 1738: 336), correctly pinpoints the most important distinguishing character of this species, namely the number of anthers. This phrase name is exactly repeated in *Flora suecica* (1745) and van Royen's *Florae leydenis prodromus* (1740). However, there is no relevant specimen in the Clifford herbarium (BM).

Fawcett & Rendle (1914: 239) correctly designated as lectotype of this name a specimen in the Linnaean herbarium in London using the words “Type in Herb. Linn.” This seems to be acceptable as effective lectotypification as there is only one specimen at LINN bearing the Linnaeus's inscription “10 *hirsuta*” (specimen no. 835.13). The same specimen was mentioned much later as a type of *C. hirsuta* by Jafri (1973: 171), using the words “Type: ... Herb. Linn. no. 835.13”. Juel (1931: 14) mentioned the occurrence of another specimen of *C. hirsuta* with Linnaeus's handwriting in the Thunberg herbarium (UPS), but no such specimen has been traced by the present author in the IDC edition of this herbarium.

The polynomial cited from Bauhin's *Pinax* (Bauhin, 1623: 104) seems to correspond to current use of the name *C. hirsuta* as well as the illustration captured “*Sisymbrium aquaticum alterum*” in Camerarius's *De plantis epitome utilisima* (Camerarius, 1586: 270). The latter, however, depicts a plant with a hairy stem, while *C. hirsuta* has at least the main stem completely glabrous. This seems to be an error on the part of the illustrator.

Cardamine impatiens L., *Species plantarum*. 655, 1753. - LT (designated by Jafri, 1973: 169): LINN 835.9.

The protologue (Linnaeus, 1753: 655) has the following elements:

8. CARDAMINE foliis pinnatis, floribus apetalis. *lt. Wgoth.* 26.
 Cardamine foliis pinnatis: pinnis laciniatis. *Hort. cliff.* 336. *Fl. suec.* 561. *Roy lugdb.* 345. *Hall. helv.* 557. *Sauv. monsp.* 255.
 Sisymbrii cardamines species quaedam insipida. *Bauh. hist.* 2. p. 886.

Habitat in Europae nemoribus ad radices montium. cf. p. 8.

The diagnostic phrase name is referred directly to Linnaeus's *Wästgöta-Resa* (1774b), where this species appears under name "CARDAMINE apetala" together with reference to "CARDAMINE foliis pinnatis, pinnis laciniatis" from *Flora suecica* (1745). Indeed this species sometimes has flowers without petals.

There are two specimens in the Linnaean herbaria bearing the inscription "8 *impatiens*" written in Linnaeus's hand at the bottom of the sheets. The first of them, correctly designated as a lectotype of this species by Jafri (1973) is deposited in LINN (no. 835.9), while the other one is in Stockholm (S, IDC no. 270–11). Both specimens correspond very well to what is considered today as *C. impatiens*. They might be connected either with the work *Wästgöta-Resa* (1747b) or *Flora suecica* (1745) by Linnaeus.

The polynomial in *Flora suecica* (1745) is taken from *Hortus cliffortianus* (Linnaeus, 1738) and is repeated exactly or only slightly changed by van Royen (1740), Haller (1742) and Sauvages (1751).

The phrase name "Sisymbrii cardamines species quaedam insipida" in Bauhin, Cherler and Chabrey's *Historia plantarum* (1651) is accompanied by an illustration which almost perfectly matches *C. impatiens* especially in the shape of the leaflets and the auriculate bases of the leaves.

Cardamine lunaria L., *Species plantarum*: 656, 1753. - LT (designated by Burttt in Jarvis *et al.*, 1993: 82): LINN 833.1 [excluding fruiting material].
[≡ *Ricotia lunaria* (L.) DC.]

The protologue (Linnaeus, 1753: 655) has the following elements:

15. CARDAMINE foliis supradecompositis, siliquis unilocularibus pendulis.

Habitat in Aegypto. D.B. Jussiaeus.

Folia supradecomposita. Siliquae latae, membranaceo-compressae, fere Lunariae. Semina orbiculata, emarginata.

Cardamine lunaria L. is now broadly accepted as the type species of the genus *Ricotia* L. (see Burttt, 1952) and this name was recently correctly lectotypified by Burttt (Jarvis *et al.*, 1993: 82). In the absence of any other relevant original elements the herbarium specimen Burttt chose (LINN, no. 833.1) seems to be the only possible choice of lectotype.

There are two plants on the sheet no. 833.1. The lectotype was restricted by Burttt to the flowering specimen, which is accompanied by the abbreviation "HU" indicating that the plant was cultivated in the Hortus at Uppsala. The apparent discrepancy between this provenance and the reference to Egypt and Bernard de Jussieu in the protologue might be explained in that Linnaeus raised plants from seeds sent by Jussieu (cf. Stearn, 1957: 108). The other (fruiting) plant on the sheet was most probably sent to Linnaeus by Jacquin (according to the note by J.E. Smith on the sheet).

Cardamine nudicaulis L., *Species plantarum*: 654, 1753. - LT (designated by Botschantzev, 1972: 671): LINN 835.4.

[≡ *Neurolooma nudicaule* (L.) DC., *Parrya nudicaulis* (L.) Regel]

The protologue (Linnaeus, 1753: 654) is rather short:

3. CARDAMINE foliis simplicibus lanceolatis sinuatodentatis, caulibus nudis.

Habitat in Sibiria. D. Gmelin.

This species has been recently assigned to two genera, namely *Parrya* R. Br. and *Neurolooma* Andrz. The latter concept seems to be more broadly accepted.

Linnaeus's diagnostic phrase name seems to be based on a single element, namely a specimen sent to him by J.G. Gmelin. This specimen, deposited in LINN (no. 835.4) bears Linnaeus's inscription "3 *nudicaulis*" at the bottom of the sheet and the phrase name "Cardamine foliis ex lineari-lanceolatis sinuatodentatis, caulibus nudis siliquis compressis inter semina strictis Gmel." written in Gmelin's hand on the reverse. Since the binomial seems to be based on a single element, the relevant specimen at LINN might be considered to be the holotype (cf. Stearn, 1957: 126). However, in view of the possibility that there could have been a duplicate of this specimen, it would be better to consider it as a syntype. Botschantzev (1972: 671) lectotypified this name on the specimen in LINN using words "Tip [type]: In Sibiria, fr. J. Gmelin (LINN). Ne videl [Have not seen] [originally in Russian, translation in brackets]". As he had not seen the specimen, some doubts concerning the validity of this typification might be raised. Another possible place of the correct typification is in Jafri (1973: 211), who stated in the account of *Parrya nudicaulis* (L.) Regel "Type: Siberia, fr. J. Gmelin (LINN)".

Cardamine parviflora L., *Systema naturae*, ed. 10: 1131, 1759. - LT (designated by Jonsell, 1982: 43): LINN 835.10 [Fig. 2].

The protologue (Linnaeus, 1759: 1131) is very short:

parviflor. A.C. foliis pinnatis extipulatis, foliolis lanceolatis obtusis, floribus corollatis. *Fl. suec. 2. p.* 464.

The name *Cardamine parviflora* was published with reference to Linnaeus's earlier work, *Flora suecica*, ed. 2 (1755: 464), where this plant was described, with reference to the specimen "misit Joh. Ad. Torneros Nycopiae lectam", and said to be distinct from and similar to *C. impatiens* but no trivial name was provided.

The fact that Linnaeus recognized this species as distinct from *C. impatiens* only after 1753 is confirmed also by the extensive note written by Linnaeus in his own copy of *Species plantarum*, deposited in the Library of the Linnean Society of London. This note is a draft of the entry for *C. parviflora* in the second edition of *Species plantarum* (1763: 914–915).

There are two specimens relevant to the protologue of *C. parviflora*, in the Linnaean herbarium at LINN (no. 835.10) [three stems which might belong to the same plant] and at S (IDC no. 270–13) [two plants]. The specimen at LINN that Jonsell (1982: 43) chose as the lectotype bears Linnaeus's annotation "*parviflora*" at the bottom of the plant and it seems that Jonsell's choice was correct. The specimen at S was originally identified by Linnaeus as *C. impatiens* which suggests that his original inscription "*impatiens*" at the bottom of the sheet was later corrected by him to "*parviflora*". This corresponds with his note in *Flora suecica*, ed. 2 (1755: 464) and may confirm that he considered this plant to be *C. impatiens* originally and only later recognized it as distinct.

Cardamine petraea L., *Species plantarum*: 654, 1753. - LT (designated here): LINN 835.5. [≡ *Cardaminopsis petraea* (L.) Hiitonen]

The protologue (Linnaeus, 1753: 654) has the following elements:

4. *CARDAMINE* foliis simplicibus oblongis dentatis.

Cardamine petraea cambrica, nasturtii facie. *Dill. elth.* 70. t. 61. f. 71.

Nasturtium petraeum. *Pluk. alm.* 261. t. 101. f. 3. *Pet. herb.* 50. f. 3.

Habitat in Angliae, Arvoniae, Merviniae, Sueciae rupibus excelsis.

Linnaeus's phrase name is his own and there is also corresponding specimen in the Linnaean herbarium in London (LINN), no. 835.5. There are several inscriptions written by Linnaeus on this sheet: "4 *petraea*" at the bottom, strongly suggesting that the specimen was in the Linnaeus's possession before 1753; "Hernösand [on Gulf of Bothnia] (Savage, 1945: 113)" at the bottom of the plant, indicating the place of origin and the synonym "*Nasturtium petraeum*" on the reverse of the sheet. The plant itself corresponds well to the current use of the name, which is now broadly accepted as belonging in the genus *Cardaminopsis* as *C. petraea* (L.) Hiitonen in Hyl., *Fört. Skand. Växt.*, ed. 3: 62, 1941.

The second phrase name in the protologue is that from Dillenius's *Hortus*

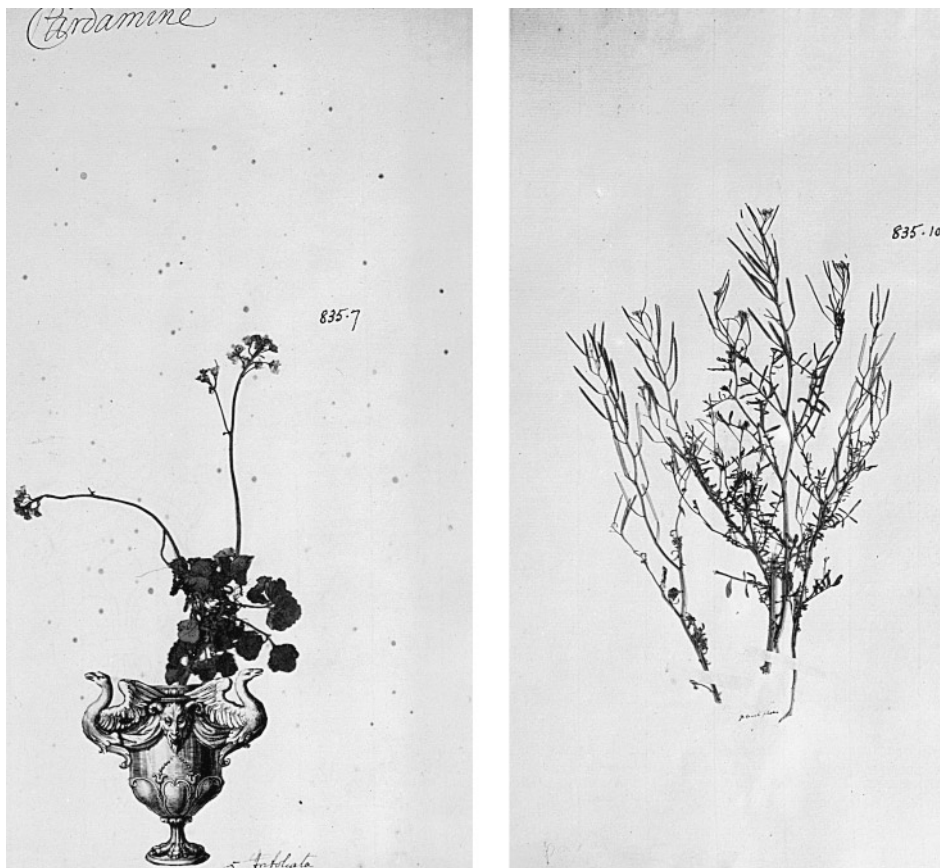


Figure 2. Left, the lectotype of *Cardamine trifolia* L., LINN, no. 835.7; Right, the lectotype of *Cardamine parviflora* L., LINN, no. 835.10 (Both photographs by courtesy of The Linnean Society of London).

elthamensis (1732), where it appears together with an illustration. This illustration corresponds with the current use of the name. Nevertheless it is not very accurate, since the basal leaves of the plant are too deeply dissected and the flowers are out of proportion. Dillenius further provided a rather detailed description and referred to the several British localities for this taxon already mentioned by Plukenet (1696: 261) and to Plukenet's and Petiver's illustrations which he considered inadequate "dederunt, sed valde quam imperfectas".

The third phrase name cited is that from Plukenet's *Phytographia* and *Almagestum botanicum* (1691, 1696). The illustration cited (Plukenet, 1696: Table 101, Fig. 3) is beyond any doubt based on the specimen deposited at BM (Herbarium Sloane 97: 102, lower right-hand specimen). However, the illustration is rather simplified although it definitely depicts what is currently known as *C. petraea*. The typotype specimen in the Sloane herbarium was almost certainly not studied by Linnaeus (cf. Stearn, 1957: 105) and thus is not eligible as the lectotype.

After consideration of all elements from the protologue the specimen from the Linnaean herbarium in London (LINN, no. 835.5) is designated here as the lectotype of the name *Cardamine petraea* L.

Cardamine pratensis L., *Species plantarum*. 656, 1753. - LT (designated by Khatri, 1989: 92): LINN 835.15.

The protologue (Linnaeus, 1753: 656) has the following elements:

11. CARDAMINE foliis pinnatis: foliolis radicalibus subrotundis; caulinis lanceolatis.

Cardamine foliis pinnatis: foliolis subrotundis integris. *Fl. suec.* 559. *Dalib. paris.* 198.

Cardamine foliis pinnatis, caule erecto. *Fl. lapp.* 258. *Hort. cliff.* 336. *Roy. lugdb.* 345.

Nasturtium pratense, magno flore. *Bauh. pin.* 104.

Flos cuculi. *Dod. pempt.* 592.

β. Nasturtium pratense, folio-rotundiore, flore majore. *Bauh. pin.* 104.

Habitat in Europae pascuis aquosis. 2

The first phrase name cited by Linnaeus is that from his *Flora suecica* (Linnaeus, 1745), which is cited also by Dalibard (1749). This phrase name might be connected with the specimen in the Linnaean herbarium, London (LINN no. 835.15), which was selected by Khatri as the lectotype of the name *Cardamine pratensis*. The origin of this specimen is not known, but we might expect it to be somewhere in northern Europe. The probability that it represents the cytotype $2n = 30$ (widespread in this part of Europe) was suggested by Marhold (1994).

The second phrase name is cited from *Flora lapponica* (Linnaeus, 1737), and is cited also via *Hortus cliffortianus* (Linnaeus, 1738) and *Florae leydensis prodromus* (van Royen, 1740). There are three specimens in the Clifford herbarium (BM) which, like the aforementioned specimen from LINN, as far as it is possible to ascertain, correspond with the current use of the name *C. pratensis* [e.g. by Marhold, 1993 as *C. pratensis* L. subsp. *pratensis* or by Lövkvist, 1956; Jones, 1964a; Marhold, 1994 as *C. pratensis* L. (s. str.)] and which might be connected with the phrase-name in the *Hortus cliffortianus*.

Two other phrase names are cited by Linnaeus from Bauhin's *Pinax* (1623: 104;

1671: 104). There is no relevant specimen in the Burser herbarium (UPS) which might help to understand Linnaeus's interpretation of these names, however the number of synonyms cited by Bauhin (1623: 104, 1671: 104) under these phrase names suggests that he had in mind a broad spectrum of variability for this taxon.

The illustration accompanying the last cited phrase name — Dodoens's "Flos cuculi" (Dodoens, 1616: 592) — is rather simplified and cannot be properly identified.

Cardamine pratensis in the sense of Linnaeus is currently treated as a group of species, or alternatively as one species with several subspecific taxa (e.g. Urbanska-Worytkiewicz & Landolt, 1974; Landolt, 1984; Marhold, 1993, 1994). While some of the taxa within this group are well-defined, e.g. *C. crassifolia* Pourr., *C. dentata* Schult. [= *C. pratensis* subsp. *paludosa* (Knaf) Čelak.], *C. granulosa* All., *C. matthioli* Moretti, *C. rivularis* Schur, *C. nymanii* Gand., the application of some of other names published for the populations of this group, e.g. *C. udicola* Jord. and *C. nemorosa* Lej., is still confusing and their delimitation against *C. pratensis* L. (s. str.) or *C. pratensis* L. subsp. *pratensis* (as used in *Flora Europaea*, ed. 2, Marhold, 1993) is not completely clear.

The lectotype of *C. pratensis* selected by Khatri (1989) has badly damaged flowers and does not possess rosette leaves and thus its identification with the cytotype $2n = 30$ or otherwise cannot be reliably verified. Therefore the selection of an epitype which would fix the exact application of the name seems to be inevitable.

Cardamine resedifolia L., *Species plantarum*. 656, 1753. - LT (designated here): illustration in Bauhin's *Prodromus theatri botanici* (Bauhin, 1620: 45) captioned "Nasturtium alpinum minus Resedae foliis". Epitype (designated here): Pyrenäen orient.: Porté-Puymorens - Vallée de Lanous, E und W Col de Lanoux, c. 2400 m, im Silikatschutt; 4. VIII. - 17. VIII. 1974, leg. A. Polatschek (W) [Fig. 3].

The protologue (Linnaeus, 1753: 656) has the following elements:

13. CARDAMINE foliis pinnatis: foliolis decurrentibus confluentibus.

Nasturtium alpinum minus, resedae folio. *Bauh. pin.* 104.

prodr. 45. *t.* 45. *Bocc. mus.* 2. *p.* 41. *t.* 46.

Habitat in Alpibus Helveticis, Pyrenaeis.

The phrase-name is most probably Linnaeus's own. There are two herbarium specimens of *C. resedifolia* in the Linnaean herbarium in London (LINN) but none of them seems to be eligible as the lectotype. The first (no. 835.6) bears Linnaeus's annotation "*Card. resedifolia*" at the bottom of the sheet and "All." [for Allioni] at the bottom of the plant. There is no number referring to *Species plantarum* and this specimen was apparently received from Allioni after 1753. The second specimen (no. 835.2) bears the inscription by J.E. Smith "*resedifolia* JES" at the bottom of the sheet and "Cardamine alpina minor resedae foliis Tournef. 225. Monier" on the reverse. It is worth mentioning that in his own copy of the first edition of the *Species plantarum* (deposited in the Library of the Linnean Society of London), Linnaeus wrote an almost completely new entry for this species in which he referred to L.G. Le Monnier ("D. Monier"). This entry, slightly changed and without reference to Monnier, appears in the second edition of *Species plantarum* (Linnaeus, 1762–1763: 913), which has nearly the same phrase name as in *Systema naturae*, ed. 10 (Linnaeus, 1759: 1131). Linnaeus may have known this species only from the rather poor illustrations of

Bauhin and Boccone (see below) and the specimen which he received from Monnier after 1753 and probably before 1759 prompted him to change the phrase name and the relevant entry.

There are two references to illustrations in the protologue. The first of them is in Bauhin's *Prodromus theatri botanici* (Bauhin, 1620: 45). The plant depicted here seems to be *C. reseditolia*, however it lacks a very important identification character, namely auriculate bases to the leaves and thus could be misidentified with *Cardamine glauca* Spreng. Probably this was the source of the distributional information in *Species plantarum*, as Bauhin (1620: 45) wrote "... Helvetiorum alpiibus & Pyrenaeis". The other illustration which is referred to in the protologue is that of Boccone in his *Museo di piante rare della Sicilia* (Boccone, 1697: 51 [the correct page reference is 51 not 41 as printed in *Species plantarum*]). The plant depicted here captioned as "Nasturtium alpinum, Rhesedae folio" most probably belongs to *C. reseditolia*, but the illustration is very poor and again lacking the auriculate leaf-bases. There is no herbarium specimen in Bauhin's herbarium in Basel (BAS) (Dr H. Schneider, pers. comm.) and



Figure 3. The epitype of *Cardamine reseditolia* L., W (Photograph by courtesy of the Museum of Natural History, Vienna, G. Oettel).

all attempts to find the specimen on which the illustration in Boccone's work is (or might be) based in the herbaria BOLO, P, GE, IBF, L, LY, OXF, and in the Austrian National Library, Vienna (dr. E. Vitek, pers. comm.) (where the Boccone specimens are placed according to Stafleu & Cowan, 1976: 147 and Lanjouw & Stafleu, 1954: 60) were not successful either.

The last cited work in the protologue is Bauhin's *Pinax* (1623). In the case of Linnaeus's references to this work, the Burser herbarium is usually consulted. However the volume V of this herbarium in which the specimen named "Nasturtium alpinum Resedae foliis Bauh." was originally placed (Juel, 1936: 30) was destroyed by fire in Uppsala in 1707 (Juel, 1936: 2) and thus it was not studied by Linnaeus.

After consideration of all elements in the protologue, and in the absence of any relevant herbarium specimen, the illustration from Bauhin's *Prodromus theatri botanici* (1620: 45) captioned "Nasturtium alpinum minus Resedae foliis" is selected here as the lectotype of the name *Cardamine resedifolia* L. However, as this illustration is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name of a taxon, the following epitype is proposed here in the sense of the Art. 9.7 of the ICBN: "Pyrenäen orient.: Porté-Puymorens - Vallée de Lanoux, E und W Col de Lanoux, c. 2400 m, im Silikatschutt; 4. VIII. - 17. VIII. 1974, leg. A. Polatschek", deposited in herbarium W. This specimen documents the chromosome number report ($2n = 16$) of Polatschek (1983: 130).

Cardamine trifolia L., *Species plantarum*: 654, 1753. - LT (designated here): LINN 835.7 [Fig. 2].

The protologue (Linnaeus, 1753: 655) has the following elements:

- 5. CARDAMINE foliis ternatis obtusis, caule subnudo.
Cardamine foliis ternatis. *Hall. helv.* 559. *Fl. suec.* 563.
Cardamine foliis ternatis crenatis, caule simplicis. *Fl. lapp.*
 257. *Hort. cliff.* 336. *Roy. lugdb.* 346.
- Cardamine alpina trifolia*. *Clus. hist.* 2. p. 127.
- Nasturtium alpinum trifolium*. *Bauh. pin.* 104.
- Habitat in Alpibus Helveticis, Lapponicis.*

Linnaeus mentioned this plant for the first time in his *Flora lapponica* (Linnaeus, 1737: 213). The data concerning the occurrence in Lapland ("Est planta mere alpina, in Lapponia rarius obuia") seem to be based on Rudbeck (1720–1724: 96), who reported this taxon from his journey through Lapland in 1695. No specimen documenting this taxon exists in Linnaeus's Lapland herbarium in Paris (Fries, 1861). In his *Flora suecica* Linnaeus (1745) reported "563. *Cardamine foliis ternatis*" among the plants occurring in "Alpes Lapponicas, quae ab occidentali & septentrionali latere Norvegiam a Suecia distinguunt" (Linnaeus, 1745: I) and gave its occurrence as "Habitat in Lapponia. O. Rudbeck. in monte Kinnekulle Westrogothiae. P. Kalm.". However, again no specimen in any of the Linnaean herbaria seems to be connected with these records. The herbarium specimen deposited in the Linnaean herbarium in London (no. 835.7), bearing Linnaeus's inscription "5 *trifoliata*" at the bottom of the sheet has an "urn" label at the bottom of the plant, which suggests that it might be a duplicate from the Clifford herbarium at BM (or another Dutch herbarium of 18th century, cf. Wijnands & Heniger, 1991) and the specimen is probably connected, like another in the Clifford herbarium, with Linnaeus's *Hortus cliffortianus*. Indeed, both plants undoubtedly belong to what is generally considered

(e.g. Jones & Akeroyd, 1993) to be *C. trifolia*. There are no reliable data about the occurrence of this species in Scandinavia and, in the absence of any specimen documenting either Rudbeck's or Kalm's record, the only explanation of these data is a misidentification with another species of the genus *Cardamine*, most probably *Cardamine amara* subsp. *amara*. There are several other records of *C. trifolia* from other parts of Europe (e.g. Romania and Ukraine, cf. Marhold, 1995b) based on misidentifications of *C. amara* subsp. *amara*.

The last specimen from herbaria connected directly with Linnaeus's work is that in the van Royen herbarium (L, no. 901.220–518) which represents *C. trifolia*, too.

The specimen of "Nasturtium Alpinum trifolium Bauh." placed in volume V of Burser's herbarium (Juel, 1936: 30), was destroyed by fire in 1707 (as in the case of *C. resedifolia*, see above), thus it is not possible to use it to explain Linnaeus's interpretation of Bauhin's polynomial (Bauhin, 1623: 104). However, as Bauhin included also the reference to Clusius (1601: 127) this polynomial undoubtedly corresponds to the current use of the name *C. trifolia*.

Among the other references in the protologue, the Clusius illustration headed "Cardamine alpina I. trifolia" (Clusius, 1601: 127) is apparently based on the material from Alps and depicts *C. trifolia* quite well. The last reference is that from Haller (1742: 559). His description is again based on the material from the Alps ("In *M. Chasseral* valle suprema. Scheuzerus suam in descensu *Furculae*") although he also included a reference to Linnaeus's *Flora lapponica*.

After consideration of all elements from the protologue the specimen in the Linnaean herbarium in London (LINN, no. 835.7) is designated here as the lectotype of the name *Cardamine trifolia* L.

Cardamine virginica L., *Species plantarum*. 656, 1753. - LT (designated here): BM, Clayton herbarium n. 462.

The protologue (Linnaeus, 1753: 656) has the following elements:

14. CARDAMINE foliis pinnatis: foliolis lanceolatis basi unidentatis.

Alyssum foliis radicalibus pinnatis in orbem positis; caulinis lanceolatis, siliculis compressis. *Gron. virg.* 170.

Nasturtium, bursae pastoris folio, virginianum, flore albo, siliqua compressa. *Pluk. alm.* 251. t. 101. f. 4.

Habitat in Virginia.

Folia radicalia in orbem digesta, pinnata: foliolis numerosis, fere imbricatis, sublanceolatis, a latere postico denticulo uno brevi juxta basin. Caulis minus foliosus: foliis raris, saepius linearibus integris. Habitus Bursae pastoris.

There is a specimen relevant to the protologue in the Linnaean herbarium in London (LINN, n. 835.18) bearing Linnaeus annotation "14 *virginica*" on the bottom of the sheet, suggesting that it was in Linnaeus's possession before 1753. Another specimen in the Linnaean herbarium in Stockholm (S, IDC no. 271–7) has only the inscription "*Cardamine virginica*" at the bottom of the sheet, which might mean that the specimen is of later origin than that in LINN. The third relevant specimen, explicitly mentioned by Gronovius (1739: 170), is in Clayton's herbarium at BM (no. 462). This herbarium is directly relevant to Linnaeus's work because it is assumed that he saw the specimens while helping Gronovius to finish *Flora virginica* (cf. Stearn, 1957:

104, 118). The latter specimen corresponds well to the current use of the name, and J.L. Reveal, College Park, on the label attached to this specimen, suggested it should be the lectotype of the name *Cardamine virginica*.

The last item in the protologue which should be considered is the illustration in Plukenet's *Phytographia* (1691: tab. 101). The plant depicted roughly corresponds to the current use of the name.

After consideration of all elements from the protologue and following the suggestion of Reveal (pers. comm.) the specimen from Clayton's herbarium in London (BM, no. 462) is designated here as the lectotype of the name *Cardamine virginica* L.

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