ESCUELA TÉCNICA SUPERIOR DE INGENIEROS DE MONTES

UNIVERSIDAD POLITÉCNICA DE MADRID

Systematics of *Senecio* sect. *Crociseris* (Compositae, Senecioneae)

JOEL CALVO CASAS

Ingeniero de Montes

DIRECTORES

CARLOS AEDO PÉREZ

Doctor en Biología

INÉS ÁLVAREZ FERNÁNDEZ

Doctora en Biología

Madrid, 2013

Tribunal nombrado por el Mgfco. y Excmo. Sr. Rector de la Universidad Politécnica de Madrid, el día ..... de ..... de 2013.

Presidente D. .....

Vocal D. .....

Vocal D. .....

Vocal D. .....

Secretario D. .....

Realizado del acto de defensa y lectura de la Tesis el día .....

de ..... de 2013 en Madrid.

Calificación ……

EL PRESIDENTE LOS VOCALES

EL SECRETARIO

“Mutisiam dicam. Numquam vidi magis singularem plantam. Herba clematidis, flos syngenesiae. Quis umquam audivit florem compositum caule scandente, cirrhoso, pinnato in hoc ordine naturali.”

“La llamaré *Mutisia*. En ninguna parte vi planta que le exceda en lo singular: su yerba es de clemátide y su flor de singenesia. ¡Quién tuvo jamás noticia de una flor compuesta con tallo trepador, zarcilloso, pinnado en este orden natural!”

Carta de Linneo a Mutis. 20 de Mayo de 1774.

Agradecimientos

En primer lugar agradecer el apoyo de Carlos Aedo e Inés Álvarez, que sin su enorme contribución en todo momento este trabajo no habría sido posible. En los aspectos nomenclaturales ha sido indispensable el conocimiento de Félix Muñoz-Garmendia, brindando siempre sus opiniones.

Ha sido vital la ayuda y compañía de toda aquella gente que han participado en mis viajes de recolección, gracias a todos por vuestros momentos! También es inestimable el soporte que recibí durante mis estancias en St. Petersburgo, Christchurch y St. Louis.

Agradezco sinceramente todas las facilidades recibidas por parte del Real Jardín Botánico de Madrid, y especialmente la oportunidad que me brindó en su momento Santiago Castroviejo y el proyecto *Flora iberica*. Y a Joan Pedrol por abrirme paso en todo esto que llamamos botánica.

Sin duda agradezco el trabajo y buena disposición de todo el personal técnico del herbario MA, y a los del laboratorio durante mi estancia entre cacharros. De la escuela de Montes doy las gracias a Carlos Morla por su generoso apoyo.

No hay que decir que sin los compañeros del botánico y de Madrid (sensu lato), semejante proyecto personal no hubiera fructificado.

A todas las personas queridas. Merci a tots!

Índice

[1]Entre corchetes numeración de los artículos en las revistas correspondientes.

Resumen

Se revisa taxonómicamente *Senecio* sect. *Crociseris* (Compositae, Senecioneae), una de las cuatro principales secciones del género en el ámbito de Eurasia y el norte de África. Este grupo comprende hierbas rizomatosas, distribuidas principalmente del oeste de Europa y noroeste de África al oeste asiático, y presenta la mayor diversidad en el Mediterráneo septentrional. El nuevo tratamiento taxonómico que se propone reconoce 28 especies y 8 subespecies. Se ha hecho un especial esfuerzo en el análisis de la variabilidad del gr. *S. doronicum*, cuya sistemática ha sido objeto de controversia durante mucho tiempo. En este grupo se aceptan tres especies: *S. doronicum*, *S. lagascanus*, y *S. provincialis*, la primera con tres subespecies: subsp. *doronicum*, subsp. *longifolius*, y subsp. *orientalis*. Con el objetivo de indagar en las relaciones de las especies dentro de la sección y de ésta con otros grupos de *Senecio*, se han llevado a cabo análisis filogenéticos basados en secuencias ITS y de cloroplasto. Los resultados sugieren que la sect. *Crociseris* es un grupo parafilético, ya que incluye las especies secuenciadas de la *sect. Doria*. Además, complejos patrones de algunas secuencias ITS sugieren eventos de hibridación. Como resultado del estudio taxonómico se proponen las siguientes combinaciones: *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo, *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo, *Senecio macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo, y *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo. Por otro lado, *S. ruthenensis* de Francia y *S. lusitanicus* de Portugal han sido sinonimizados a *S. lagascanus*, así como *S. ovatifolius*, *S. pisidicus* y *S. tmoleus* de Anatolia a *S. kolenatianus*, *S. olympicus*, y *S. castagneanus* respectivamente, *S. bertramii* de Líbano a *S. cilicius*, y *S. delbesianus* de Siria a *S. racemosus* subsp. *racemosus*. Se han lectotipificado setenta y cinco nombres, y neotipificado *S. pyrenaicus* y *S. scopolii*. *Senecio gerardi* Godr., *S. doronicum* (L.) L. y *S. paucifolius* S.G. Gmel. se propusieron a conservar. Se incluyen claves de identificación, descripciones detalladas, mapas de distribución e ilustraciones. Nueve táxones han sido ilustrados por primera vez.

Abstract

A revision of *Senecio* sect. *Crociseris* (Compositae, Senecioneae) is carried out, which is one of the four main sections of western Eurasian/northern African *Senecio* species. It comprises perennial herbs distributed in Europe, northwestern Africa, and western Asia, being the northern Mediterranean region the center of diversity. The new taxonomic treatment presented herein recognize 28 species and 8 subspecies. Remarkable efforts have been focused on the variability of the gr. *S. doronicum*, which systematics was controversial during a long time. Within this group we recognize three species: *S. doronicum*, *S. lagascanus*, and *S. provincialis*, the former with three subspecies: subsp. *doronicum*, subsp. *longifolius*, and subsp. *orientalis*. In order to tackling the evolutionary relationships of *Crociseris* species, and those between the section and the closest relatives in *Senecio*, we used phylogenetic analyses of plastid and nuclear DNA sequence data. The results of these studies indicate that sect. *Crociseris* is a paraphyletic group, since those sequenced species belonging to sect. *Doria* are nested within it. Also, complex patterns of ITS diversity suggest several hybridization events. As a result of this taxonomic revision the following new combinations are proposed: *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo, *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo, *Senecio macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo, and *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo. On the other hand, *S. ruthenensis* from France and *S. lusitanicus* from Portugal have been synonymized to *S. lagascanus*, as well as *S. ovatifolius*, *S. pisidicus*, and *S. tmoleus* from Anatolia to *S. kolenatianus, S. olympicus*, and *S. castagneanus* respectively, *S. bertramii* from Lebanon to *S. cilicius*, and *S. delbesianus* from Syria to *S. racemosus* subsp. *racemosus*. Seventy five names are lectotypified, and *Senecio pyrenaicus* and *S. scopolii* are neotypified. The names *S. gerardi*, *S. doronicum*, and *S. paucifolius* were proposed to conserve. Descriptions and distribution maps are provided for all species included as well as an identification key. Nine species are illustrated for the first time.

Introducción

El género *Senecio* L. (Compositae, Senecioneae) comprende alrededor de 1250 especies, siendo uno de los géneros más grandes dentro de las angiospermas (Bremer, 1994; Pelser, 2007; Nordenstam, 2007). Los *Senecio* están distribuidos por todos los continentes excepto la Antártida, aunque las zonas más ricas en especies son las áreas de clima mediterráneo de Sudáfrica, Chile y la cuenca Mediterránea. En otras zonas del planeta como Australasia y Mesoamérica el género está menos diversificado (Nordenstam & al., 2009). En *Senecio* se encuentran desde hierbas anuales a pequeños árboles, lo que da una idea de la gran diversidad morfológica del género. Del mismo modo estas plantas ocupan una gran diversidad de hábitats imposible de resumir en este corto espacio (Bremer, 1994; Nordenstam, 2007).

Como en otros grupos de gran envergadura, el elevado número de especies y su alta variabilidad conducen a delimitaciones taxonómicas controvertidas tanto a nivel genérico como infragenérico (Jeffrey, 1977). Centrándonos en el marco geográfico de Eurasia occidental y noroeste de África, donde se encuentra el grupo objeto de estudio, tradicionalmente se han reconocido cuatro grandes secciones dentro de *Senecio*: sect. *Crociseris* (Rchb.) Boiss., sect. *Doria* (Rchb.) Godr., sect. *Jacobaea* (Mill.) Gray, y sect. *Senecio*. Géneros como *Caucasalia* B. Nord., *Iranecio* B. Nord., y *Tephroseris* (Rchb.) Rchb. han sido segregados con gran aceptación dentro de la comunidad botánica (Bremer, 1994; Nordenstam, 2007; Pelser & al., 2007, 2010; Greuter, 2008; Blanca & Quesada, 2009; Hamzaoğlu & al., 2011). Un caso controvertido, y que merece especial atención por las implicaciones en nuestro grupo, es el restablecimiento del género *Jacobaea* Mill. (Pelser & al., 2006). El reconocimiento de este grupo como género, basado exclusivamente en datos moleculares, tiene tanto partidarios (Greuter, 2008; Nordenstam & al., 2009; Hamzaoğlu & al., 2011) como detractores (Hülber & al., 2009; Blanca & Quesada, 2009; Calvo & Aedo, in prep.).

En el marco del proyecto *Flora iberica* se han ido abordando estudios taxonómicos de grupos complejos, en los que se ha incluido tanto las especies estrictamente ibéricas como aquellas otras que forman dichos grupos y que no se encuentran en la Península o Baleares. El objetivo de este enfoque es obtener revisiones taxonómicas sólidas, en las que la variabilidad de los táxones ibéricos sea correctamente

interpretada en un contexto más amplio. Dentro de ese objetivo general, al iniciar el estudio de las Compositae, se constató que *Senecio* era un género que, por las características señaladas en los párrafos anteriores, merecía de un estudio de esta naturaleza. Dado el tamaño del género era inviable una revisión completa. Por ello se estudió qué subgrupos eran potencialmente adecuados, tanto por su tamaño, su representación en la Península, y la falta de conocimiento. Finalmente se seleccionó la sección *Crociseris*, ya que tiene un número de especies abordable en el contexto de una tesis doctoral, una buena representación en la Península y zonas aledañas como los Alpes, Apeninos, etc., y algunos subgrupos de gran complejidad taxonómica (Chater & Walters, 1976).

Un problema difícil de soslayar en los grandes géneros es la correcta delimitación de los subgrupos. El anhelo de estudiar grupos naturales bien fundamentados choca con la débil caracterización morfológica de las secciones o subgéneros, a lo que se añade el desconocimiento sobre la posición sistemática de muchas de las especies descritas a lo largo del tiempo. La sect. *Crociseris* no es ajena a estos problemas, lo que ya suponíamos al comenzar el estudio y hemos podido comprobar durante su realización. Un enfoque pragmático se hace imprescindible en estos casos y es el que hemos adoptado siguiendo el tratamiento propuesto para la sección en la *Flora Europaea* por Chater & Walters (1976).

Las plantas de nuestro grupo de estudio, *S.* sect. *Crociseris*, son hierbas rizomatosas con capítulos radiados de flores amarillas, involucro con brácteas suplementarias, y hojas generalmente no divididas que decrecen fuertemente a lo largo del tallo. Los aquenios son subcilíndricos, con vilano, glabros o con indumento. Comprende 28 especies, distribuidas principalmente del oeste de Europa y noroeste de África al oeste asiático, desde el nivel del mar hasta aproximadamente los 4300 m de altitud. La sect. *Crociseris* es morfológicamente muy cercana a la sect. *Doria*, lo que se refleja en los diferentes tratamientos taxonómicos propuestos por diversos autores desde su descripción (Reichenbach, 1831-1832). En el siglo XIX, autores como Candolle (1838) y Boissier (1875) reconocieron sendas entidades, mientras que Godron (1850), Willkomm (1865), y Hoffmann (1892) las sinonimizaron. En el siglo XX cabe destacar la obra de Schischkin (1961), autor que introdujo por primera vez el número de lígulas

para diferenciar los dos grupos, considerados series distintas dentro de *Crociseris*. No obstante, ningún criterio tuvo una aceptación general hasta el trabajo de Chater & Walters (1976), cuyo tratamiento estableció los dos grupos como secciones distintas.

El estudio ha partido de una intensa búsqueda bibliográfica que nos ha permitido recopilar gran parte de la sinonimia existente y actualizar la nomenclatura del grupo. Esto ha permitido solicitar en préstamo los materiales necesarios a los principales herbarios del mundo, de modo que se han obtenido suficientes ejemplares de herbario para conocer la variabilidad de las especies y su distribución. También se han visitado algunas de las principales instituciones con colecciones críticas para el trabajo como el Komarov Institute de San Petersburgo y el Jardín Botánico de Ginebra. El trabajo de campo se ha centrado en la Península, pero también se han podido estudiar *in situ* plantas de Marruecos, Rusia europea, Alpes orientales y occidentales, Apeninos, etc. Los resultados se presentan a continuación en tres bloques principales: revisión taxonómica, estudio filogenético, y contribuciones nomenclaturales. La revisión taxonómica incluye claves de identificación, nomenclatura con especial atención a los problemas de tipificación, descripciones detalladas, mapas de distribución e ilustraciones. El estudio de las secuencias de ITS y de cloroplasto, que representa la primera aproximación filogenética completa del grupo, ha tenido como doble objetivo indagar en las relaciones de las especies dentro de la sección y de ésta con otros grupos de *Senecio*. Por último, se presentan las contribuciones nomenclaturales más relevantes: combinaciones nuevas, tipificaciones, y tres propuestas de conservación de nombres, todos ellos, trabajos secundarios derivados de los estudios taxonómicos.

Referencias bibliográficas

Blanca, G. & C. Quesada. 2009. *Senecio* L. Pp. 316–326 *in* G. Blanca, B. Cabezudo, M. Cueto, C. Fernández López & C. Morales Torres (eds.), Flora vascular de Andalucía Oriental, vol. 4. Sevilla, Spain.

Boissier, E. 1875. Flora Orientalis, vol. 3. Genevæ, Basileæ.

Bremer, K. 1994. Asteraceae: Cladistics & Classification. Singapore.

Calvo, J. & C. Aedo. *Senecio* L. *in* S. Castroviejo (ed.), Flora iberica, vol. 16. Madrid, Spain (in prep.).

Candolle, A.P. 1838. Prodromus systematis naturalis regni vegetabilis, vol. 6. Paris, France.

Chater, A.O. & S.M. Walters. 1976. *Senecio* L. Pp. 191–205 *in* T.G. Tutin & al., Flora Europaea, vol. 4, Plantaginaceae to Compositae. Great Britain.

Godron, D.A. 1850. *Senecio* L. Pp. 110–124 *in* J.C.M. Grenier & D.A. Godron, Flore de France, vol. 2. Paris, London, Besançon.

Greuter, W. 2008. *Senecio* L. Pp. 711–720 *in* W. Greuter & E. von Raab-Straube (eds.), Med-Checklist, Dicotyledones (*Compositae*), vol. 2. Genève, Switzerland.

Hamzaoğlu, E., Ü. Budak & A. Aksoy. 2011. A new genus, *Turanecio*, of the Asteraceae (tribe *Senecioneae*). Turk J Bot 35: 479–508.

Hoffmann, K.A.O. 1892. *Senecio* L. Pp. 296–301 *in* H.G.A Engler & K.A.E. Prantl (eds.), Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen, unter Mitwirkung zahlreicher hervorragender Fachgelehrten, nº Fasc. 74. Leipzig, Germany.

Hülber, K., M. Sonnleitner, R. Flatscher, A. Berger, R. Dobrovsky, S. Niessner, T. Nigl, G.M. Schneeweiss, M. Kubešová, J. Rauchová, J. Suda & P. Schönswetter. 2009. Ecological segregation drives fine-scale cytotype distribution of *Senecio carniolicus* in the Eastern Alps. Preslia 81: 309–319.

Jeffrey, C., P. Halliday, M. Wilmot-Dear & S.W. Jones. 1977. Generic and sectional limits in *Senecio* (*Compositae*): I. Progress Report. Kew Bull. 32: 47-67.

Nordenstam, B. 2007. Senecioneae. Pp. 208–241 *in* J.W. Kadereit & C. Jeffrey (eds.), The Families and Genera of Vascular Plants, vol. 8, Flowering Plants. Eudicots. Asterales. Berlin.

Nordenstam, B., P.B. Pelser, J.W. Kadereit & L.E. Watson. 2009. Senecioneae. Pp. 503–525 *in* V.A. Funk, A. Susanna, T.F. Stuessy & R.J. Bayer (eds.), Systematics, Evolution, and Biogeography of Compositae. Vienna, Austria.

Pelser, P.B., J.-F. Veldkamp, & R. van der Meijden. 2006. New combinations in *Jacobaea* Mill. (Asteraceae-Senecioneae). Compositae Newslett. 44: 1–11.

Pelser, P.B., B. Nordenstam, J.W. Kadereit & L.E. Watson. 2007. An ITS phylogeny of tribe Senecioneae (Asteraceae) and a new delimitation of *Senecio* L. Taxon 56: 1077–1104.

Pelser, P.B., A.H. Kennedy, E.J. Tepe, J.B. Shidler, B. Nordenstam, J.W. Kadereit & L.E. Watson. 2010. Patterns and causes of incongruence between plastid and nuclear Senecioneae (Asteraceae) phylogenies. Amer. J. Bot. 97: 856–873.

Reichenbach, H.G.L. 1831–1832. Flora Germanica excursoria, vol. 1(3). Leipzig, Germany.

Schischkin, B.K. 1961. *Senecio* L. Pp. 699–788 *in* B.K. Schischkin & E.G. Bobrov, Flora of the USSR, vol. 26, Compositae. Moscow, Leningrad.

Willkomm, H.M. 1865. *Senecio* L. Pp. 111–124 *in* H.M. Willkomm & J.M.C. Lange, Prodromus florae Hispanicae, vol. 2. Stuttgart, Germany.

Systematics of *Senecio* sect. *Crociseris* (Compositae, Senecioneae)[1]

Joel Calvo[2], Inés Álvarez[2] & Carlos Aedo[2]

[1] We are grateful to the curators of ANK, ARAN, B, BC, BM, BOLO, BP, BR, BRNU, C, COI, E, F, FAR, FI, G, GAZI, GRM, GZU, H, HGI, HBIL, HUB, I, IASI, JBAG, JE, K, KRAM, L, LE, LINN, LISI, LY, M, MA, MAF, MO, MPU, MT, NAP, NCY, NY, O, OXF, P, PAD, PR, S, SALA, SANT, SBT, SEV, TBI, TLM, TU, U, UPS, US, WU, Z, ZT, the staff of LE and MO herbaria for their help during the respective visits, Félix Muñoz-Garmendia for his advices on nomenclature and his unconditional support. We also thank Juan Castillo for the drawings, Roman Ufimov and Ramón Morales for their Cyrillic and German translations respectively, John Pruski and Pieter Pelser for sharing their knowledge and expertise on the Senecioneae tribe, Luz Mauro for technical assistance, Shahina A. Ghazanfar for sharing her *Senecio* manuscript of the Flora of Iraq, and also all the staff of MA herbarium for their help. This work has been funded by the *Flora Iberica* project (CGL2011-28613-C03-01) and a PhD grant of JC (JAE-Pre, CSIC).

[2] Real Jardín Botánico-CSIC, Plaza Murillo 2, 28014 Madrid, Spain. jcalvo@rjb.csic.es

Abstract

The complexity of the evolutionary history of *Senecio* has been reflected on its conflictive taxonomy. Within this genus, the section *Crociseris* (Compositae, Senecioneae), a group of perennial herbs distributed in Europe, northwestern Africa, and western Asia, have not yet been fully revised. A worldwide revision of this section recognizing 28 species and 8 subspecies is presented here. The main morphological characters revealed as useful for species diagnosis are the number and shape of supplementary and involucral bracts, synflorescence architecture, and indumentum, shape, and size of leaves and achenes. In this new taxonomic treatment *Senecio provincialis* and *S. lagascanus* have been segregated from *S. doronicum*, whitin which three subspecies are recognized. On the other hand, *S. ruthenensis* from France and *S. lusitanicus* from Portugal have been synonymized to *S. lagascanus*, as well as *S. ovatifolius*, *S. pisidicus*, and *S. tmoleus* from Anatolia to *S. kolenatianus*, *S. olympicus*,

and *S. castagneanus* respectively, *S. bertramii* from Lebanon to *S. cilicius*, and *S. delbesianus* from Syria to *S. racemosus* subsp. *racemosus*. Sixty six names are lectotypified and *Senecio pyrenaicus* and *S. scopolii* are neotypified. Descriptions and distribution maps are provided for all species included as well as an identification key. Nine species are illustrated for the first time.

Keywords: Asteraceae, Eurasia, *Jacobaea*, lectotypification, northwestern Africa, section *Crociseris*, *Senecio*, taxonomy.

Introduction

The genus *Senecio* L. (Compositae, Senecioneae) comprises ca. 1250 species, being one of the largest genera of flowering plants (Bremer, 1994; Pelser, 2007; Nordenstam, 2007). It is almost cosmopolitan, although remarkable diversification occurs mainly in the Mediterranean climate zones, i.e., South Africa, Chile, and the Mediterranean Basin. Less representatives may be found in Australasia and Mesoamerica, and no native species inhabit the West Indies (Nordenstam & al., 2009). Along its distribution area, the genus *Senecio* shows an extraordinarly morphological diversity in which almost all habits are present (annual and perennial herbs, subshrubs or shrubs, small trees), successfully colonizing a wide range of habitats (Bremer, 1994; Nordenstam, 2007).

The high variability in the concept of *Senecio* and its sections employed by different authors makes difficult to reach a consensus on its delimitation (Jeffrey, 1977) and the number of sections that includes. In the geographical frame where our study group occurs (i.e., western Eurasia and northwestern Africa), four main sections are classically recognized: sect. *Crociseris* (Rchb.) Boiss., sect. *Doria* (Rchb.) Godr., sect. *Jacobaea* (Mill.) Gray, and sect. *Senecio*. During the last decades several genera, such as *Caucasalia* B. Nord., *Iranecio* B. Nord., and *Tephroseris* (Rchb.) Rchb. were segregated from Eurasian *Senecio* with a widespread acceptance (Bremer, 1994; Nordenstam, 2007; Pelser & al., 2007, 2010; Greuter, 2008; Blanca & Quesada, 2009; Hamzaoğlu & al., 2011). By contrast, the genus *Turanecio* Hamzaoğlu seems to be not accepted (Euro+Med, 2006-). The recent reinstatement of the genus *Jacobaea* Mill. (Pelser & al., 2006) is more controversial. While some authors accept this genus

(Greuter, 2008; Nordenstam & al., 2009; Hamzaoğlu & al., 2011), others do not recognize it (Hülber & al., 2009; Blanca & Quesada, 2009; Calvo & Aedo, in prep.). This is explained by the inability to establish a morphological delimitation of *Jacobaea*, accompained by an extraordinary morphological variability shared with several species of *Senecio* belonging to all sections that grow in similar habitats overlapping distribution areas. The fact that the main diagnostic character for the *Jacobaea* genus is the individual ITS sequence, makes classification arbitrary when different ITS sequences are obtained from one individual (Calvo & al., 2013b). Therefore, in the present study the genus *Jacobaea* is not recognized, and the combined names under this genus are included as synonyms of *Senecio*.

Our study group, *Senecio* sect. *Crociseris* (sensu Chater & Walters, 1976), includes rhizomatous herbs with yellow radiate capitula, involucre with supplementary bracts, and leaves usually undivided and decreasing in size up the stem. The achenes are subcylindrical, with pappus, glabrous or with indumentum. It comprises 28 species, distributed mainly from western Europe and northwestern Africa to western Asia, growing from sea level to 4300 m of elevation. The morphological characters to distinguish between species of this section and those of sect. *Doria*, are not clear. Consequently, different taxonomic treatments concerning both sections have been proposed over time. Chater & Walters (1976) distinguish the sect. *Crociseris* from sect. *Doria* by the absence of stolons (usually present in sect. *Doria*), the higher number of ligulate florets [(10–)12–22 vs. (0–)5–6(–8)], and leaves that decrease in size to higher up the stem (vs. leaves usually of similar size). The characters of the leaves and stolons are, however, highly variable among species. Otherwise, the number of ligulate florets use to be a consistent character to discriminate each other. Recently, phylogenetic analysis carried on by Pelser (2007) and Calvo & al. (2013b) indicate that species of sect. *Crociseris* and sect. *Doria* form a monophyletic clade. However, this result saw the light along the present taxonomic study, and therefore species of the section *Doria* have not been included here, as it should be in the taxonomic treatment of a monophyletic group.

Although there are several regional studies of the section *Crociseris* (Reichenbach, 1831–1832; Candolle, 1838; Willkomm, 1865; Boissier, 1875; Schischkin, 1961; Chater & Walters, 1976; Nordenstam, 1989), this is the first time that

a worldwide revision for this section is presented, including updated nomenclature, identification keys, descriptions, distributions maps, and drawings.

Material and Methods

Around 5500 dried specimens were studied from the following herbaria: B, BC, BM, BR, C, E, F, FI, G, GAZI, H, HGI, HBIL, IASI, JBAG, JE, K, L, LE, LISI, M, MA, MO, MT, NY, O, PR, S, TU, UPS, US, WU, Z, ZT. From other institutions, only photographs of specimens, or additional information, were available: ANK, ARAN, BOLO, BP, BRNU, COI, FAR, GRM, GZU, HUB, I, KRAM, LINN, LY, MAF, MPU, NAP, NCY, OXF, P, PAD, SALA, SANT, SBT, SEV, TBI, TLM, U. Some field work has been carried out to collect new specimens and to know the variability of characters within populations. Several field trips through Croatia, France, Italy, Latvia, Morocco, Portugal, Slovenia, Russia, and Spain yielded 102 new herbarium specimens of *Senecio* sect. *Crociseris* belonging to 10 taxa.

A comprehensive synonymy of *Crociseris* species has been compiled. Types of all accepted species and most synonyms have been studied, although we have had difficulties in locating some types (e.g., *S. apenninus* Tausch, *S. pyrenaicus* L., *S. riparius* Wallr., *S. scopolii* Hoppe & Hornsch.). The disposition of names for which no type material could be located or obtained is based on the opinions of previous authors or exceptionally from the original description. Where no reliable opinion was found, these names are included in the "Dubious or Excluded Names" section.

Ninety four characters were recorded to prepare the species descriptions, of which forty one were qualitative and forty seven quantitative (plus six ratios derived). Qualitative characters were studied directly by eye or with the aid of binocular lenses, while the quantitative characters were recorded using a Mitutoyo Digital Caliper, CD-15DC. The most frequent values are given by percentiles and are shown without brackets, and the extreme values are included in parenthesis.

Habitat, altitude range, and flowering period are summarized from herbarium labels.

Taxonomic History

The infrageneric name *Crociseris* was described as unranked by Reichenbach (1831-1832) within the genus *Cineraria* L. to include only one species, *C. arachnoidea* Sieber ex Rchb. (homotypic synonym of *Senecio scopolii*), based on the fact to be the only one bearing supplementary bracts. Subsequently Candolle (1838) combined, neither specifying the rank, the name *Crociseris* within the genus *Senecio* embracing six species in additon to *S. arachnoideus* Sieber ex DC. *Senecio eriospermus* DC. and *S. mollis* Willd. were also doubtfully included within the section, now considered members of genus *Iranecio* and sect. *Jacobaea* respectively. The author defined the section as an European group of perennial herbs, displaying radiate capitulum, solitary or in lax synflorescence, with supplementary bracts, leaves entire or scarcely dentate, and achenes glabrous.

Four years later, Boissier (1844) properly established the name *Crociseris* as a section within *Senecio*. He followed the Candolle's criterion, adding too those species with hairy achenes. This classification persisted with minor modifications until Godron (1850), who included the *Crociseris* species from France within sect. *Doria* on the base of the undivided leaves, the largely exserted ligulate florets, and the campanulate involucre with supplementary bracts. Likewise, Willkomm (1865) followed the same criterion for those species from Iberian Peninsula. Hoffmann (1892) widened the sense of sect. *Crociseris* including the Candolle's infrageneric groups *Crociseris* and *Sarracenici* (which harbours *Doria* species), and the Boissier's section *Doria* and *Oliganthi*. On the other hand, Fourreau (1868) even proposed the different genus *Crociseris* (Rchb.) Fourr., but his classification had no acceptance.

Despite all the different criteria about the sectional treatments, with the respective species transfers, no one got a widespread acceptance. In fact, after that Boissier (1875) recognized again both sections mainly based on the capitula size, and number of supplementary bracts. In his compendium "Flora Orientalis", he embraced twelve species within *Crociseris*. Moreover, it is worthwhile to mention that Boissier implicitly broadened the limits section to western Asia due to the inclusion of several species from Anatolia described by himself.

During the first half of the 20th century there were several regional works (Rouy, 1903; Sosnowsky, 1929) recognizing the sect. *Crociseris*. These authors mainly

follow the Boissier's criterion, but a comprehensive delimitation of both groups as different sections or as a whole was still lacking.

Later, Schischkin (1961) proposed three series within the sect. *Crociseris*, including the *Doria* species in one of them. The author introduced the number of ligulate florets to discriminate among the series. This work should be noted as embraces a high number of species and this is the first author to include within the section two species from Middle Asia, *S. franchetii* C. Winkl. and *S. olgae* Regel & Schmalh. Likewise, the sect. *Crociseris* was recognized by Nordenstam (1989), who included 7 taxa from Persia and adjacent regions.

Focusing on the european geographic frame, the Chater & Walters' treatment from 1976 represents the largest contribution to the infrageneric taxonomy of *Senecio* in Europe. These authors included ca. 11 species within sect. *Crociseris*, and 5 within sect. *Doria*.

Recently, on the base of molecular phylogenetic studies, some authors (Pelser & al., 2006; Pelser in Calvo & al., 2013b) indicated the need to transfer several species that were traditionally placed in sect. *Crociseris* to the genus *Jacobaea* (*S. auricula* Bourg. ex Coss., *S. paludosus* L., *S. racemosus* (M. Bieb.) DC.). Subsequently, Nordenstam & Greuter in Greuter & Raab-Straube (2006) and Nordenstam in Greuter & Raab-Straube (2007) made new combinations for four additional sect. *Crociseris* species in *Jacobaea* (*S. buschianus* Sosn., *S. cilicius* Boiss., *S. inops* Boiss. & Balansa, *S. trapezuntinus* Boiss.).

Along its taxonomic history, a large number of taxonomic actions were taken within sect. *Crociseris*. Besides the above mentined transfers to *Jacobaea*, it has to be noted the proposal of new combinations (Holub, 1962; Avetisyan, 1971; Matthews, 1975; Nordenstam, 1989; Wiebe, 2000; Greuter, 2003), and some lectotypifications (Holub, 1962; Bellot & Casaseca, 1975; Matthews, 1975; Burdet & al., 1983; Nordenstam, 1989; Kadereit, 1998; Strid, 2000; Menitsky & Konechnaya, 2001; Marhold & al., 2003). Despite all of these actions nomenclatural stability was still lacking for the section. During the present study and immediately preceding it, some lectotypifications and combinations were done (Calvo & al., 2012; Calvo & al., 2013a), as well as proposals to conserve three names (Calvo & al., 2011a, 2011b, 2011c).

Morphology

Rhizomes

All representatives of *Senecio* sect. *Crociseris* are perennial rhizomatous herbs. The shape and structure of the rhizome are similar within the section, ± horizontal, with swelled fastigiate roots. It has not taxonomic value to discriminate between species.

Stems

The stems are always erect (rarely ascending in *S. pyrenaicus*), corrugated or sulcate, usually solid (fistulous in *S. paludosus*), leaved (subscapose in *S. auricula*), and usually not ramificated. The stems are often simple, ending in a single capitulum or branched in the upper part when bearing several capitula. Exceptions are seen in *S. doriiformis* DC., *S. pyrenaicus*, and *S. transylvanicus* Boiss., which sometimes display branches on the lower and middle part of the stem.

The stem base is sometimes useful to discriminate among species, according to the presence/absence of remnants of old leaves, and the presence/absence of tufts of hairs. *Senecio auricula* have a conspicuous tufts of long hairs, up to 5 mm long, in the insertion point between the basal leaves and the base of the stem. Less conspicous are the tufts of hairs that sometimes have *S. castagneanus* DC., *S. paulsenii* O. Hoffm., and *S. pseudoorientalis* Schischk. Finally it have to be noted that some species (*S. buschianus, S. franchetii, S. kolenatianus* C.A. Mey., *S. olgae, S. paulsenii, S. pyrenaicus, S. racemosus*) display the lower part of the stem violet coloured, although it has not taxonomic value because it is highly variable.

Leaves

Leaves are simple, alternate, usually entire to irregularly dentate or crenate, and usually decreasing in size up the stem. The last character was used, among others, by Chater & Walters (1976) to discriminate the *Crociseris* species from *Doria* species. Nonetheless, such character is not consistent within the sect. *Crociseris*, and therefore, useless to discriminate between both sections. The group integrated by *S. doriiformis, S. paludosus, S. pyrenaicus,* and *S. transylvanicus* display leaves not strongly decreasing in size up the stem.

Leaf characters are useful, although its variability may be notable mainly regarding the size and shape. Since the leaves usually decreasing in size up the stem, the basal leaves and cauline leaves are necessary for description purposes. Regarding the cauline leaves, we have been distinguished the middle and the upper ones. The middle cauline leaves correspond to those inserted in the middle part of the stem, and the upper ones are the last leaves just before the first branch of the synflorescence. For those specimens with solitary capitulum, the last leaf of the stem was measured.

With the exception of *S. doriiformis*, *S. paludosus*, *S. pyrenaicus*, and *S. transylvanicus*, which do not develop basal leaves or they are promptly caducous, the basal leaves usually tend to persist, at least until the flowering time. These are petiolated, and they may be lanceolate, oblanceolate, ovate, reniform, as well as deltate or lyrate. *Senecio auricula* is the only species with succulent, sessile basal leaves arranged in rosette sitting on the ground. Regarding to the leaf margin, *S. macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo is the only *Crociseris* member with irregularly pinnatipartite leaves. Most of the species display concolorous leaves, but in *S. eriopus* Willk., *S. paludosus*, *S. provincialis* (L.) Druce, and sometimes *S. perralderianus* Coss. are slightly discolorous because of the indumentum.

Cauline leaves usually display the same shape of basal ones, being smaller and becoming sessile up the stem. The number of cauline leaves is highly variable within a species, although in some species it could be a useful character. *Senecio auricula* is characterized to have low number of cauline leaves, sometimes subopposite, while *S. paludosus* is a densely leaved species.

Leaf venation is another good taxonomic character, easily observed in dry specimens. This character let us to discriminate *S. trapezuntinus*, *S. doriiformis*, and *S. kolenatianus* from the remainder ones, because the tertiary venation is conspicuous. Another two species, *S. perralderianus* and *S. racemosus*, sometimes have the tertiary venation slightly marked.

Synflorescence

The architecture synflorescence, as well as, the number of capitula and the synflorescence bracts are diagnostic characters. The synflorescence is often corymbose or reduced to a solitary capitulum, being less frequent those pseudocorymbose,

racemose or paniculate. *Senecio racemosus* has a unique architecture synflorescence within the section, which it is racemose or narrowly paniculate.

The number of capitula is usually notably variable within a species, although in some groups it could be a useful character. This is the case of the infraspecific entities of *S. doronicum* (L.) L., which they could be discriminate, in part, by the number of capitula. Likewise, *S. scopolli* usually bears solitary capitula, rarely more, while in the relatives species this character use to be variable.

The synflorescence bracts, those inserted after the first branch of the synflorescence, are useful to easily discriminate some species within the section. *Senecio eubaeus* Boiss. & Heldr., *S. macedonicus* Griseb., and *S. olympicus* Boiss. bear foliose synflorescence bracts. The remainder species display linear-oblong synflorescence bracts, or sometimes broadly lanceolate in *S. pseudoorientalis*.

Involucre

The involucre is differentiated between the involucral bracts (the principal ones arranged in one row), and the supplementary bracts (inserted at the lower part of the involucre as a calyculus). Both are valuable taxonomic characters to discriminate between species, besides the ratio of their lengths. The involucre may be cupuliform, bell-shaped, and less frequent obconical (e.g., *S. buschianus* and *S. racemosus*).

The involucral bracts are usually ensiform to lanceolate, acute or attenuate, with a scarious margin, dorsally killed (rarely smooth), and sometimes with a black (sometimes purplish) spot near the apex. The low number of involucral bracts in *S. cilicius*, *S. doriiformis*, *S. inops*, and *S. racemosus* [(10–)13–14(–18)] makes easy to distinguish from remaining species, in which this number ranges between (13–)21–25(–38).

The supplementary bracts are usually subulate, although a group of species (*S. joharchii* F. Ghahrem., Ezazi, Rahch. & Attar, *S. macedonicus*, *S. provincialis*, *S. olympicus*) displays supplementary bracts lanceolate to ovate, or widened at the base. These species (and sometimes *S. castagneanus*) also usually have the supplementary bracts with a scarious margin. In the case of *S. olympicus* the scarious margin may be 0.5 mm wide, usually fimbriate, which is a unique character in the section. Apart of the shape of the supplementary bracts, its number is another indispensable character. There is a group of species (*S. provincialis*, *S. macedonicus*, *S. olympicus*, *S. scopolii* subsp.

scopolii), which bear a high number of supplementary bracts ± imbricate, confering an aspect of pluriseriate supplementary bracts in *S. olympicus*.

Capitula

All *Crociseris* members have radiate capitula with yellow (rarely orange) corollas. The receptacle is epaleate, flat or slightly convex. The ligulate florets are female, fertile, sometimes with trichomes near the upper part of the tube. This character is highly variable, even within a single specimen. The tubular florets are hermaphrodite, 5-lobed. The anthers are basally shortly caudate, with a balusterform collar. The style have branches apically truncate and penicillate.

As commented under the "Taxonomic History", the number of ligulate florets was used as the main character to distinguish *Crociseris* members from *Doria*. It was yet used by Chater & Walters (1976), and previously Schischkin (1961) introduced it to differentiate series within *Crociseris* section. On the base of our biometric studies, the number of ligulate florets within the section ranges between (7–)11–16(–32). The diameter capitulum given in the descriptions includes the ligulate florets bloomed.

Achenes

The achenes are homomorphic, subcylindrical, ribbed, glabrous or with indumentum. The pappus is composed of many scabrid-barbellate fine bristles, whitish, longer than achenes. The size and indumentum of achenes are a useful taxonomic character. Achenes length ranges from 2.3 to 10.1 mm, and the number of ribs between 6–17. It has to be underlined that those species from Middle Asia (*S. franchetii*, *S. paulsenii*, *S. olgae*) have the longest achenes, ranging between 6.6–10.1 mm.

Concerning the indumentum, the achenes may be glabrous, with intercostal trichomes, with trichomes along the ribs, or along the whole surface. This character have been used, among other, to distinguish infraspecific entities. This is the case of *S. paludosus*, *S. paulsenii*, and *S. racemosus*.

The scarce available collection of some species (e.g., *S. inops*, *S. joharchii*, *S. tauricola*) makes difficult to properly describe their achenes. The length ranges indicated for these species have been taken from their protologues. In the case of *S. inops* and *S. joharchii* the measures probably correspond to immature achenes. In these cases the study of further material is needed to know their variability.

Indumentum

The indumentum of stem, leaves, involucre, and achenes (commented above) is a relevant character used in the taxonomy of the section. The trichomes are eglandular, usually pluricelular, and they confer mainly glabrescent, scabrid-arachnoid, arachnoid, floccose, and lanate surfaces. The subspecific entities of *S. paludosus* are holded mainly by the indumentum. Although this character is variable within a species and tend to be caducous, some species have a whole whitish aspect because of the indumentum (*S. cilicius*), or a whitish involucre (*S. eubaeus*, *S. tauricola*, and sometimes *S. doronicum*, *S. eriopus*, *S. scopolii* subsp. *scopolii*). Other species as *S. doriiformis*, *S. lopezii* Boiss., *S. pyrenaicus*, *S. transylvaticus*, or *S. trapezuntinus* are characterized by glabrous or glabrescent surfaces.

Taxonomy

Senecio* sect. *Crociseris (Rchb.) Boiss., Diagn. Pl. Orient. ser. 1, 4: 13. 1844. *Cineraria* [unranked] *Crociseris* Rchb., Fl. Germ. Excurs. 1: 242. 1831-1832. *Senecio* [unranked] *Crociserides* (Rchb.) DC., Prodr. 6: 357. 1838 (ICBN Art. 35.3). *Crociseris* (Rchb.) Fourr., Ann. Soc. Linn. Lyon ser. 2, 16: 404. 1868. *Senecio* sect. *Crociseris* (Rchb.) O. Hoffm. in Engl. & Prantl, Nat. Pflanzenfam. IV, 5(74): 298. 1892, nom. illeg., comb. superfl. TYPE: *Senecio scopolii* Hoppe & Hornsch, sub *Cineraria arachnoidea* Sieber ex Rchb.

Perennial herbs. *Rhizome* 0.7–12 cm long, 0.3–1.7 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 9–180 cm, erect (rarely ascending), scarcely leaved to densely leaved (rarely subscapose), corrugated or sulcate, solid (rarely fistulous), usually not ramificated, glabrescent to lanate, and base with tufts of hairs, remnants of old leaves or neither. *Basal leaves* 1.7–47.5 cm long, 0.5–13 cm wide (rarely absent), persistent or not, lanceolate to oblanceolate, ovate, reniform, deltate or lyrate (ratio basal leaf width / basal leaf length = 0.09–1.22), acute to obtuse (rarely emarginate, mucronate or toothed), attenuate to cordate, with a petiole 0.5–27 cm long (rarely sessile), entire to irregularly dentate (teeth 0.2–10 mm deep), rarely pinnatipartite, glabrescent to lanate, concolorous or discolorous. *Cauline leaves* 2–26(–60); *middle cauline leaves* 0.8–32 cm long, 0.2–12.7 cm wide, alternate (rarely subopposite),

lanceolate to oblanceolate, ovate, deltate or lyrate (ratio middle leaf width / middle leaf length = 0.05–1.23), acute to obtuse (rarely toothed or apiculate), sessile to amplexicaul-auriculate, or attenuate to cordate-truncate with a petiole up to 13 cm long, entire to irregularly dentate (teeth 0.2–10 mm deep), rarely pinnatipartite or deeply lobed at base, glabrous to lanate, tertiary venation sometimes conspicuous; *upper cauline leaves* 0.3–15.5 cm long, 0.1–6 cm wide, oblong (ratio upper leaf width / upper leaf length = 0.04–0.88), acute (sometimes obtuse), sessile to amplexicaul (rarely attenuate into a petiole up to 1 cm long), entire to slightly dentate (teeth 0.3–8 mm deep), rarely pinnatipartite, glabrescent to lanate. *Synflorescence* 2–50 cm long, corymbose to reduced to a solitary capitulum, sometimes pseudocorymbose, racemose or paniculate, with bracts linear-oblong to ovate-lanceolate similar to upper leaves. *Capitula* 1–10(–150), 18.6–60.4 mm diam; *involucre* 5–21 mm long, 6.1–32.8 mm diam, cupuliform to bell-shaped, sometimes obconical; *involucral bracts* (10–)19–26(–38), 3.7–17.4 mm long, 0.7–4.8 mm wide, with scarious margin 0.1–1.5 mm wide, usually ensiform or lanceolate, acute or attenuate, dorsally killed (rarely smooth), apex with or without a black (sometimes purplish) spot near the apex, glabrescent to lanate; *supplementary bracts* (3–)6–16(–44), 1.9–17 mm long, 0.2–4 mm wide, subulate, lanceolate to ovate, or widened at base, with or without scarious margin, a third to as long as principal bracts (rarely longer), glabrescent to lanate, usually not imbricate. *Ligulate florets* (7–)11–16(–32), 8.2–39.4 mm long, yellow (rarely orange); *tubular florets* 5–15.3 mm long, 0.4–2.1 mm diam, yellow (rarely orange). *Achenes* (1.2–)2.3–10.1 mm long, 0.5–1.9 mm wide, subcylindrical (ratio achene width / achene length = 0.11–0.46), shorter than pappus (ratio achene length / pappus length = 0.38–0.97), with 6–17 ribs, glabrous to covered with trichomes along the whole surface (0.1–0.4 mm long); *pappus* 4.6–15.2 mm long, whitish. Basic chromosome number of $x = 10$ (Nordenstam & al., 2009).

Distribution. *Senecio* sect. *Crociseris* is found mostly through the main ranges of Europe, western Asia, and northwestern Africa (Morocco and Algeria), growing from sea level up to 4300 m. The diversity center is the northern Mediterranean basin.

Etymology. The subdivisional epithet *Crociseris* means the yellow chicory.

Discussion. It has to be noticed that Candolle does not specify the rank of his "§. 8. Crociserides" (Candolle's *Crociserides* is the nominative plural of Reichenbach's *Crociseris*, therefore, an improper Latin termination as rules ICBN Art. 20.1 and 21.2). The symbol "§" seems to be in general usage for a subdivision of a genus, but on pag. 272 of the same volume he uses this symbol for the couplets of an infrageneric key, where it clearly does not indicate "section". Aparently, nowhere in any of the volumes of this work this symbol appears to be defined. Indeed, there are also numerous genera in this volume that are definitely subdivided into sections, and these are clearly indicated as such. The clincher to this can be seen at the index in this volume, where orders, tribes, genera, and sections are all listed and distinguished by typeface. The name *Crociserides* is not included in this list, and therefore it cannot have been considered as a section. Other names that were so labelled do appear there. Therefore, *Senecio* § *Crociserides* (Rchb.) DC. happens to be an unranked name, which under the ICBN Art. 35.3 is inoperative in questions of priority except for homonymy.

Key to species of *Senecio* sect. *Crociseris*

1a. Basal and lower cauline leaves absent or promptly caducous; cauline leaves not strongly decreasing in size up the stem……..……...…2

2a. Involucral bracts (10–)12–13(–14)...……..……..…**9. *S. doriiformis***

2b. Involucral bracts (15–)20–22(–30)……...……...……..……..3

3a. Cauline leaves sessile, glabrescent to lanate beneath, slightly discolorous; stem fistulous...…..…….....**10. *S. paludosus***

3b. Caulinar leaves attenuated into petiole, usually glabrescent beneath, concolorous; stem solid…….....4

4a. Supplementary bracts 6.3–13.8 mm long; capitula 1(–3).....**8. *S. transylvanicus***

4b. Supplementary bracts 2.5-7.5 mm long; capitula (1–)4–7(–21).....**7. *S. pyrenaicus***

1b. Basal and lower cauline leaves well developed, tend to persist, at least the lower cauline leaves; cauline leaves usually decreasing in size up the stem.....5

5a. Stem subscapose; basal leaves succulent in a crowd rosette……..…..**1. *S. auricula***

5b. Stem leaved; basal leaves neither succulent nor in a crowd rosette……..……..6

6a. Basal leaves cordate, sometimes truncate; cauline leaves amplexicaul-auriculated.....7

7a. Supplementary bracts 3–8; achenes 7.6–9.8 mm long.....**26. *S. olgae***

7b. Supplementary bracts 10–16; achenes 3.3–5.6 mm long.....8

8a. Basal leaves reniform, with scattered scabrid-arachnoid trichomes to slightly lanate beneath; achenes with scattered intercostal trichomes.....**23. *S. perralderianus***

8b. Basal leaves ovate, glabrescent beneath; achenes with dense intercostal trichomes.....**24. *S. trapezuntinus***

6b. Basal leaves attenuate to rounded, rarely subcordate; cauline leaves attenuate to semiamplexicaul.....9

9a. Leaves with ± lanate indumentum, persistent.....….....**19. *S. cilicius***

9b. Leaves glabrescent to dense arachnoid-floccose indumentum, tend to be caducous.....10

10a. Involucre whitish, densely arachnoid-floccose to lanate……..……...11

11a. Synflorescence bracts foliose.....**17. *S. eubaeus***

11b. Synflorescence bracts linear-oblong.....12

12a. Supplementary bracts (7–)13–20(–44); achenes glabrous to glabrescent, sometimes with scattered intercostal trichomes.....13

13a. Basal leaves ovate to elliptic, sometimes lanceolate (ratio basal leaf width / basal leaf length = 0.44–1.12), ± discolorous; leaf-base usually rounded to subcordate.....**5. *S. eriopus***

13b. Basal leaves lanceolate to oblanceolate, rarely obovate (ratio of basal leaf width to basal leaf length = 0.15–0.68), ± concolorous; leaf-base usually attenuate.....14

14a. Supplementary bracts ± imbricate; involucral bracts smooth, usually without a black spot; ligulate florets pale yellow; capitula 1(–3).....**6. *S. scopolii***

14b. Supplementary bracts not imbricate; involucral bracts 0–2 keeled, usually with a black spot; ligulate florets yellow to orange; capitula 1–4(–9).....**2. *S. doronicum***

12b. Supplementary bracts (6–)9–10(–16); achenes with intercostal trichomes, denser towards the apex.....**18. *S. tauricola***

10b. Involucre greenish, glabrescent to arachnoid-floccose.....15

15a. Supplementary bracts triangular (widened at base), lanceolate or ovate, rarely linear-oblong [(0.5–)1.3–2.1(–4) mm wide], usually with scarious margin.....16

16a. Involucral bracts (21–)28–34(–38); synflorescence bracts (upper leaves when capitulum solitary) linear-oblong (sometimes widened at base in *S. joharchii*).....17

17a. Basal leaves ovate to lanceolate, glabrescent to covered with scattered arachnoid trichomes above, usually discolorous; apex of the involucral bracts greenish or brownish with a black spot on the top..... **4. *S. provincialis***

17b. Basal leaves oblanceolate, densely arachnoid-floccose above, concolorous; apex of the involucral bracts violet coloured with a black spot on the top.....**28. *S. joharchii***

16b. Involucral bracts (18–)22–24(–33); synflorescence bracts (upper leaves when capitulum solitary) broadly lanceolate to ovate.....18

18a. Capitula (2–)5–9(–16); supplementary bracts (8–)10–13(–17); achenes ca. 3.8 mm long.....**12. *S. macedonicus***

18b. Capitula 1–3(–5); supplementary bracts (10–)15–20(–22); achenes ca. 7 mm long……..……**14. *S. olympicus***

15b. Supplementary bracts linear-oblong to narrowly lanceolate [(0.3–)0.6–1(–1.8) mm wide], usually without scarious margin.....19

19a. Achenes 6.6–10.1 mm long.....20

20a. Capitula 1–3(–9); stem base with tufts of hairs; involucral bracts usually with a conspicuous black spot (or purplish) near the apex.....**27. *S. paulsenii***

20b. Capitula (1–)4–8(–15); stem base without tufts of hairs; involucral bracts rarely with a faint black spot near the apex.....21

21a. Basal leaves lanceolate to broadly elliptic, attenuate to cuneate, rarely subcordate; supplementary bracts 8–10(–11).....…….....**25. *S. franchetii***

21b. Basal leaves deltate to lyrate, sometimes broadly ovate, truncate to cordate; supplementary bracts (3–)4–6(–8).....**26. *S. olgae***

19b. Achenes 3.3–6.6(–7) mm long.....22

22a. Capitula (3–)4–15(–77).....….....……...…….....23

23a. Synflorescence pseudoracemose, racemose or narrowly paniculate...….....…...24

24a. Capitula (7–)10–24(–77); involucral bracts (10–)12–13(–18), glabrescent to weakly arachnoid near the base……...……....**21. *S. racemosus***

24b. Capitula (3–)4–7(–12); involucral bracts (13–)15–20(–22), tomentose to arachnoid, denser towards base……..…….….**22. *S. buschianus***

23b. Synflorescence corymbose……..……25

25a. Achenes hairy along the whole surface, sometimes sparsely so…..……....26

26a. Synflorescence bracts broadly lanceolate to ovate……..……**12. *S. macedonicus***

26b. Synflorescence bracts linear-oblong (rarely narrowly lanceolate in *S. castagneanus*)…….....27

27a. Lamina basal leaves 15.5–47.5 cm long; capitula cupuliform; ligulate flowers 17.4–39.4 mm long; achenes 4.2–6.6 mm long.....**11. *S. lopezii***

27b. Lamina basal leaves 3.1–14.5 cm long; capitula bell-shaped to obconica; ligulate flowers 12–20.7 mm long; achenes ca. (1.5–)3.8 mm long…….....……..28

28a. Involucral bracts 13–14; supplementary bracts 4–8.....**20. *S. inops***

28b. Involucral bracts 19–28; supplementary bracts 10–18……..…**13. *S. castagneanus***

25b. Achenes glabrous to glabrescent, sometimes with scattered trichomes towards the apex.....29

29a. Supplementary bracts (7–)13–18(–26), 6.4–17 mm long.....**2. *S. doronicum***

29b. Supplementary bracts (5–)8–12(–16), 3.1–9.8 mm long.....30

30a. Capitula obconical; involucre 11–15 mm long, tomentose to arachnoid, denser towards base ……...…….……..**22. *S. buschianus***

30b. Capitula cupuliform; involucre 7–13 mm long, with scattered arachnoid trichomes to glabrescent…….……..31

31a. Stem base with tufts of hairs; involucral bracts 5.7–8.2 mm long; achenes glabrous; synflorescence bracts often broadly lanceolate.……...……..**15. *S. pseudoorientalis***

31b. Stem base without tufts of hairs**,** sometimes with remnants of old leaves; involucral bracts 6.3–12.6 mm long; achenes glabrescent; synflorescence bracts linear-oblong……..……...…….……32

33a. Cauline leaves 6–20, usually cuneate-rounded to abruptly attenuate with a petiole; tertiary venation usually slightly conspicuous; lower-stem glabrescent to slightly arachnoid.....…….……**16. *S. kolenatianus***

33b. Cauline leaves (4–)5–8(–12), all sessile, attenuate to semiamplexicaul; tertiary venation inconspicuous; lower-stem with long pluricelular trichomes, ± patent…….....**3. *S. lagascanus***

22b. Capitula 1–3….....34

34a. Achenes hairy along the whole surface, sometimes sparsely so…..……..…...35

35a. Involucral bracts 13–14; supplementary bracts 4–8.....……...**20. *S. inops***

35b. Involucral bracts 19–28; supplementary bracts 10–18..…..…...**13. *S. castagneanus***

34b. Achenes glabrous to glabrescent, sometimes with scattered intercostal trichomes…….36

36a. Supplementary bracts (5–)8–10(–16)…….……...……..……..….37

37a. Cauline leaves 6–20, usually cuneate-rounded to abruptly attenuate with a petiole; tertiary venation usually slightly conspicuous; lower-stem glabrescent to slightly arachnoid…….....**16. *S. kolenatianus***

37b. Cauline leaves 4–12, semi-amplexicaul to attenuate into a petiole; tertiary venation inconspicuous; lower-stem with long pluricelular trichomes, ± patent…….…**3. *S. lagascanus***

36b. Supplementary bracts (7–)14–22(–44)…...……...……...……...38

38a. Basal leaves ovate to elliptic, sometimes lanceolate (ratio basal leaf width / basal leaf length = 0.44–1.12), ± discolorous; leaf-base usually rounded to subcordate..….....**5. *S. eriopus***

38b. Basal leaves lanceolate to oblanceolate, rarely obovate (ratio basal leaf width / basal leaf length = 0.15–0.68), ± concolorous; leaf-base usually attenuate.....……39

39a. Supplementary bracts ± imbricate; involucral bracts smooth, usually without a black spot; ligulate florets pale yellow……..…….**6. *S. scopolii***

39b. Supplementary bracts not imbricate; involucral bracts 0-2 keeled, usually with a black spot; ligulate florets yellow to orange…….……**2. *S. doronicum***

1. *Senecio auricula* Bourg. ex Coss., Notes Pl. Crit.: 169. 1852. *Jacobaea auricula* (Bourg. ex Coss.) Pelser, Comp. Newsl. 44: 5. 2006. TYPE: Spain, Andalucía, Granada, près Baza, [37º26'N 2º44'W], 26 May 1851, *Bourgeau 1259* (lectotype, designated here, P-2823165 image!; isolectotypes, CAS-27367 image!, COI-37564 image!, E-314741! (right hand specimen), GOET-2011 image!, LE!, P-2822143 image!, P-2823166 image!, P-4311431 image! (right hand specimen), P-4311432 image!, P-4311428 image!, P-4112978 image!).

Senecio auricula var. *major* Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 117. 1865. *Senecio auricula* subsp. *major* (Willk.) Rivas Mart. & M.J. Costa, Colloques Phytosoc. 4: 83. 1976. TYPE: Spain, Alicante, Cabo de Santa Pola près Alicante, [38º12'N 0º32'W], 7 May 1852, *Bourgeau 1601* (lectotype, designated here, P-4311429 image!; isolectotypes, COI-37564 image!, E-314741! (left hand specimen), LE!, P-4112977 image!, P-4112976 image!, P-4311431 image! (left hand specimen), P-2822142 image!, P-2823164 image!, P-2823167 image!).

Senecio auricula var. *sicoricus* O. Bolòs & Vigo, Collect. Bot. (Barcelona) 17: 91. 1987. *Senecio auricula* subsp. *sicoricus* (O. Bolòs & Vigo) Ascaso & Pedrol, Fontqueria 31: 138. 1991. TYPE: Spain, Catalunya, Lleida, inter la Codina et Biosca, [41º50'N 1º18'E], 11 June 1932, *Font i Quer s.n.* (holotype, BC-75893 image!).

Senecio auricula subsp. *castellanus* Ascaso & Pedrol, Fontqueria 31: 138. 1991. TYPE: Spain, Madrid, Aranjuez, [40º01'N 3º33'W], June 1914, *Vicioso s.n.* (holotype, MA-129949!, left hand specimen).

Perennial herb. *Rhizome* 1.4–9 cm long, 0.4–1.5 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 12–53 cm, subscapose, scarcely leaved, sulcate, solid, not ramificated, arachnoid, finally glabrescent, and base with tufts of hairs (up to 5 mm) and without remnants of old leaves. *Basal leaves* 1.7–10.5 cm long, 0.5–2.3 cm wide, persistent, in rosette sitting on the ground, succulent, oblanceolate to oblong (ratio basal leaf width / basal leaf length = 0.12–0.38), toothed to rounded, sometimes emarginate, sessile, entire, usually weakly arachnoid on the margin when young (trichomes 0.7–1.7 mm long), concolorous. *Cauline leaves* 2–6; *middle cauline leaves* 0.8–6.4 cm long, 0.2–1.1 cm wide, alternate, sometimes the lower ones subopposite, oblanceolate to oblong (ratio middle leaf width / middle leaf length = 0.13–0.32), acute, sometimes obtuse, rarely toothed, semi-amplexicaul, entire, rarely with some teeth in the lower part (teeth 1–2.8 mm deep), weakly arachnoid on the margin and axis (trichomes 0.6–2 mm long, usually caducous), tertiary venation inconspicuous; *upper cauline leaves* 0.3–2.6 cm long, 0.1–0.7 cm wide, oblong (ratio upper leaf width / upper leaf length = 0.22–0.54), acute, semi-amplexicaul, entire, rarely with some tooth in the lower part (0.7–0.9 mm deep), weakly arachnoid on the margin and axis (usually caducous). *Synflorescence*

2.3–19 cm long, corymbose, with triangular-oblong short bracts. *Capitula* (1–)4–6(–11), 18.6–34.1 mm diam; *involucre* 7–13 mm long, 11.7–23.4 mm diam, cupuliform; *involucral bracts* (16–)20–22(–35), 3.7–8.4 mm long, 1.0–2.7 mm wide, with scarious margin 0.3–0.8 mm wide, subulate to lanceolate, attenuate, smooth, apex sometimes with a black-purplish spot, weakly arachnoid, finally glabrescent (trichomes 0.8–1.8 mm long); *supplementary bracts* (4–)5–7(–9), 1.9–6.8 mm long, 0.4–1.3 mm wide, subulate, without scarious margin, a third to a half as long as involucral bracts, arachnoid to weakly arachnoid on the margin, not imbricate. *Ligulate florets* 9–22, 8.2–17.1 mm long, yellow; *tubular florets* 5.1–9.4 mm long, 0.7–1.6 mm diam, yellow. *Achenes* 2.3–4.2 mm long, 0.6–1.2 mm wide, subcylindrical (ratio achene width / achene length = 0.20–0.40), shorter than pappus (ratio achene length / pappus length = 0.39–0.60), with 6–9 ribs, with trichomes 0.1–0.3 mm long covering ± the whole surface; *pappus* 4.9–8.8 mm long, whitish. Chromosome number: 2*n*=40 (Fernández Casas & Fernández Piqueras, 1978: 205). Figure 1.

Distribution and habitat. E Spain and one isolated locality in Algeria (Djelfa); open shrublands on saline and gypsiferous soils, usually accompained by *Elymus curvifolius* (Lange) Melderis, *Lepidium cardamines* L., *Lygeum spartum* L., *Schoenus nigricans* L. and *Sonchus crassifolius* Willd.; altitude 0–900 m (Figure 2).

Phenology. Flowering from March to June.

Etymology. The epithet *auricula* probably refers to the similarity of the basal leaves with the ears.

Discussion. Senecio auricula is easily distinguished from the other *Crociseris* species by its succulent basal leaves in rosette sitting on the ground, and its subscapose habit.

Some authors recognized infraespecific taxa, the most relevant *S. auricula* var. *sicoricus* and *S. auricula* subsp. *castellanus*. Bolòs & Vigo (1987) described the former on the base of the small plant size and the tridentate apex of the basal leaves, and it would be distributed through the NE Spain. On the other hand, Ascaso & Pedrol (1991) include the populations from C Spain within *S. auricula* subsp. *castellanus*, considering that they differ from the other subspecies on its pinnatifid cauline leaves. Nonetheless, we have found that the mentioned characters are not consistent neither within the

populations nor among them, and therefore, we do not recognize any subespecific rank under *S. auricula*.

Selected specimens examined. ALGERIA. **Djelfa**: environs de Djelfa, Djebel Senalba, 34º38'N, 3º8'E, May 1857, *G.L. Durando s.n.* (S); prope Djelfa, 34º38'N, 3º8'E, 27 May 1858, *V.C. Reboud s.n.* (C, NY, S). SPAIN. **Albacete**: Hellín, Fuente García, 38º29'N, 1º36'W, 14 May 2001, *M.J. Martínez Lirola s.n.* (MA); El Salobral, cerca de Albacete, 38º51'N, 1º54'W, 12 June 1986, *J. Molero 82* (B)**;** Albacete inter et Balazote, 38º53'N, 2º7'W, 17 June 1891, *P. Porta & G. Rigo 197* (E, K, WU). **Alicante**: Alicante, in collibus aridis maritimis, 38º21'N, 0º27'W, 10 May 1891, *P. Porta & G. Rigo 198* (WU); Cabo de las Huertas, 38º21'N, 0º25'W, 15 Apr 1961, *A. Rigual s.n.* (MA); Torrevella, llacuna salada de la Mata, 38º1'N, 0º41'W, 15 May 2011, *L. Serra & F. Pérez 8538* (MA). **Almería**: prope Huércal-Overa, loco dicto "La Yesera", 37º23'N, 1º55'W, 27 Mar 1986, *G. López 9747* (B, C); Almería-Tabernas road, between Rioja and Tabernas, 37º0'N, 2º26'W, 31 Mar 1971, *B.E. Smythies 512* (C). **Ciudad Real**: Entre Alcázar de San Juan y Villafranca de los Caballeros, borde de laguna de las Yeguas, 39º24'N, 3º16'W, 7 May 1978, *S. Castroviejo, S. Cirujano & J. Herrero 1187* (NY). **Cuenca**: Villar de Domingo García, pr. Pueblo, 40º14'N, 2º17'W, 17 Apr 2003, *O. García Cardo, B. Abad Garrido & J.M. Martínez Labarga 209* (MA); nördlich Huete, 40º9'N, 2º41'W, 19 May 1970, *H. Merxmüller & W. Gleisner 25760* (M). **Granada**: Baza, 37º26'N, 2º44'W, *Funk s.n.* (WU). **Lleida**: La Noguera, Cubells, entre Cubells i Camarasa, 41º51'N, 0º56'E, 25 May 2009, *J. Calvo & J. Pedrol 3627* (MA); Pla d'Urgell et Sagarra, pr. Sanahuja, 41º51'N, 1º17'E, 20 July 1858, *A.C. Costae s.n.* (LE). **Madrid**: Villamanrique de Tajo, arroyo del Valle, 40º5'N, 3º15'W, 17 Apr 2009, *J. Calvo & J.M. Martínez Labarga 3505* (MA); Colmenar de Oreja, laguna de las Esteras, 40º5'N, 3º32'W, 18 Apr 2009, *J. Calvo & S. Hantson 3512* (MA). **Navarra**: Lerín, 42º28'N, 1º58'W, 3 June 1985, *I. Aizpuru, P. Catalán & C. Aedo s.n.* (MA); au sud de Mélida, dans les Bardenas Reales, 42º17'N, 1º30'W, 13 May 1988, *J.J. Lazare 14671* (FI, H). **Soria**: Monteagudo de las Vicarías, 41º22'N, 2º9'W, 8 June 1969, *A. Segura Zubizarreta 9836* (C, H). **Tarragona**: Albarca, Pla de la Devesa, 41º17'N, 0º54'E, 21 July 2007, *J. Calvo 1179* (MA); La Ribera, vers la Palma d'Ebre, 41º17'N, 0º40'E, 16 May 1955, *P. Font i Quer & F. Masclans s.n.* (BC). **Teruel**: Cella, 40º27'N, 1º17'W, 21 Aug 1909, *F. Sennen s.n.* (MA). **Toledo**: Borox, arroyo de la Fuente de Seseña, 40º4'N, 3º42'W, 19 Apr 2009, *J. Calvo & S. Hantson 3525* (MA); Lillo, la mayor de las lagunas del Altillo, 39º42'N, 3º19'W, 12 Apr 1975, *S. Cirujano s.n.* (MA). **Zaragoza**: Valmadrid, 41º26'N, 0º53'W, 5 June 1943, *F. Cámara s.n.* (MA); Sádaba, Tres Mugas, 42º17'N, 1º23'W, 14 May 1993, *P. Urrutia 15217* (B, H).

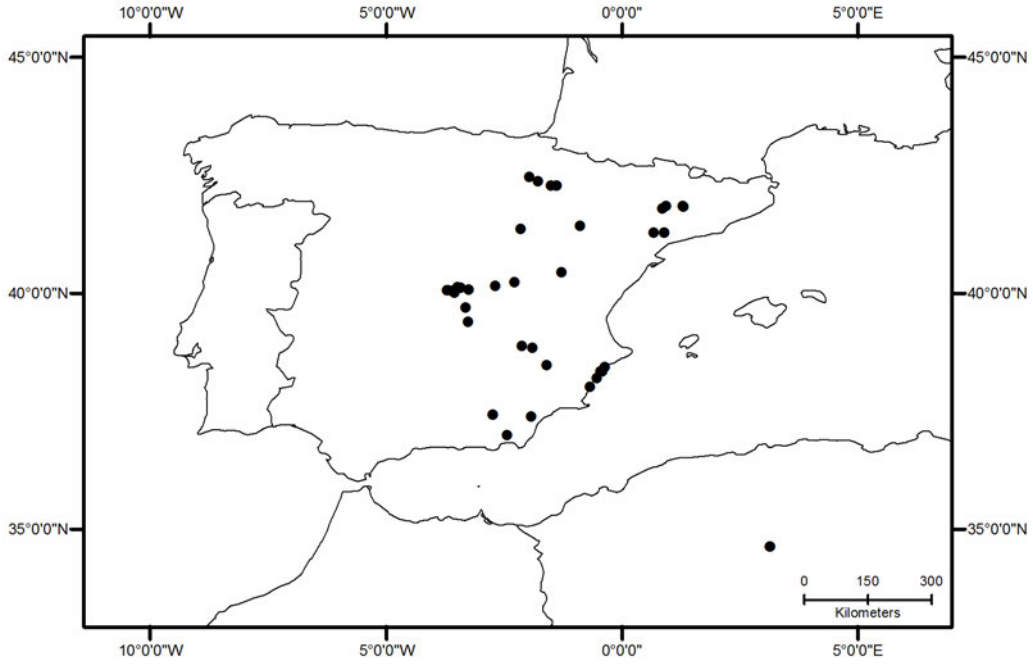


Figure 2. Distribution map for *Senecio auricula* Bourg. ex Coss. (●).

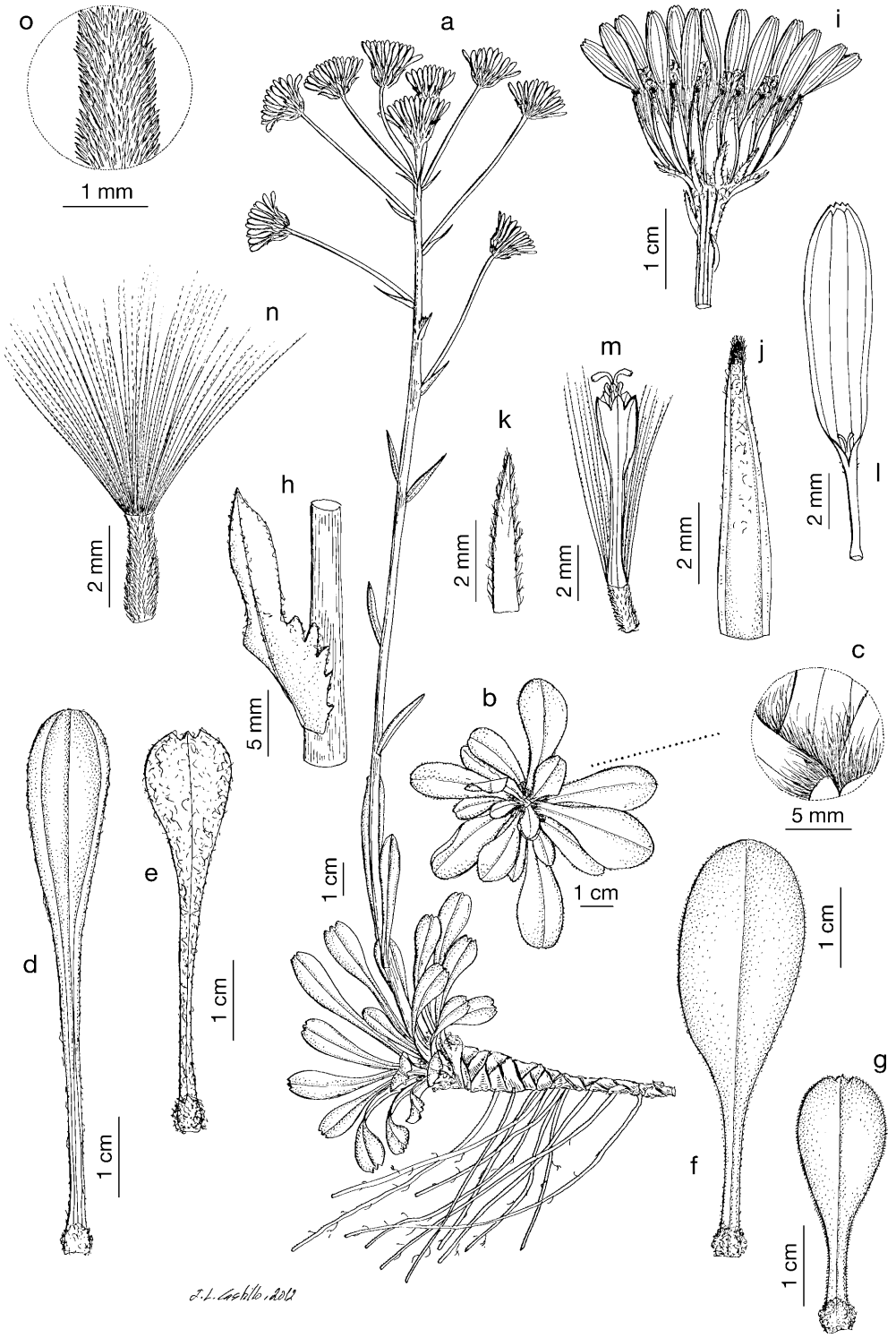


Figure 1. *Senecio auricula* Bourg. ex Coss. —a. Habit (drawn from *Calvo 3526*, MA). —b. Rosette of basal leaves (drawn from *Rigo s.n.* 17 June 1891, L). —c. Tufts of hairs (drawn from *Rigo s.n.* 17 June 1891, L). —d. Basal leaf (drawn from *Ascaso & Pedrol 1728*, MA). —e. Basal leaf (drawn from *Calvo 3526*, MA). —f. Basal leaf (drawn from *Rivas Goday s.n.* 1 May 1958, MA). —g. Basal leaf (drawn from *Rivas Goday s.n.* 1 May 1958, MA). —h. Cauline leaf (drawn from *Rivas Goday s.n.* 1 May 1958, MA). —i. Capitulum (drawn from *Castroviejo 1187 & al.*, NY). —j. Involucral bract (drawn from *Castroviejo 1187 & al.*, NY). —k. Supplementary bract (drawn from *Castroviejo 1187 & al.*, NY). —l. Ligulate floret (drawn from *Castroviejo 1187 & al.*, NY). —m. Tubular floret (drawn from *Castroviejo 1187 & al.*, NY). —n. Achene (drawn from *Calvo 3627 & Pedrol*, MA). —o. Indumentum of achene (drawn from *Calvo 3627 & Pedrol*, MA).

2. *Senecio doronicum* (L.) L., Syst. Nat. ed. 10: 1215. 1758-1759. *Solidago doronicum* L., Sp. Pl.: 880. 1753, nom. cons. *Crociseris doronicum* (L.) Fourr., Ann. Soc. Linn. Lyon ser. 2, 16: 404. 1868. *Senecio tomentosus* Cariot & St. Lag., Étude Fl. ed. 8, 2: 470. 1888-1889, nom. illeg., non Michx. 1803 (ICBN, Art. 53.1). TYPUS: France, Haute-Savoie, Bonneville, Brezon, près de la Glacière, [46°02′N 6°25′E], July 1848, *Bourgeau 129* (typ. cons., designated by Calvo & al. (2011b: 1215) and Calvo (2012: 1133), P-3777644 image!; isolectotypes, BM-810151 image!, G-308097 image!, K!, LE!, MPU-19494 image!, P-3777665 image!, P-3777666 image!, P-3777667 image!).

Perennial herb. *Rhizome* 2.3–6.9 cm long, 0.3–0.5 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 11–71 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to arachnoid, base usually without remnants of old leaves or tufts of hairs. *Basal leaves* 4.2–14 cm long, 1.4–5.4 cm wide, persistent, sometimes caducous, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = 0.15–0.64), obtuse to acute, attenuate to cuneate, with a petiole 1.1–14 cm long, dentate to slightly dentate, sometimes subentire (teeth 0.2–2.5 mm deep), glabrescent to covered with scattered arachnoid trichomes above (trichomes 0.2–1.1 mm long), glabrescent to arachnoid beneath, concolorous. *Cauline leaves* 3–11; *middle cauline leaves* 2.8–18 cm long, 0.4–5.1 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.08–0.31), acute, rarely obtuse, sessile to semi-amplexicaul auriculate, rarely attenuate into a petiole up to 8 cm long, dentate to slightly dentate, rarely subentire (teeth 0.2–3.6 mm deep), glabrescent to covered with scattered arachnoid trichomes above (trichomes 0.1–1.9 mm long), glabrescent to arachnoid beneath, tertiary venation inconspicuous*; upper cauline leaves* 0.8–8.5 cm long, 0.1–2.7 cm wide, lanceolate to oblong (ratio upper leaf width / upper leaf length = 0.04–0.50), acute, sessile to semi-amplexicaul auriculate, entire to dentate (teeth 0.4–2.2 mm deep), glabrescent to arachnoid. *Synflorescence* reduced to a solitary capitulum or corymbose, 3.5–35 cm long, with linear-oblong bracts. *Capitula* 1–4(–9), 28.7–60.4 mm diam; *involucre* 12.5–26 mm diam, 12–19 mm long, cupuliform; *involucral bracts* (18–)24–31(–34), 6.8–13.4 mm long, 0.8–2.2 mm wide, with scarious margin 0.2–0.5 mm wide, lanceolate to ensiform, acute, 0–2 keeled, apex usually with a black spot, glabrescent to arachnoid, usually covered with scattered arachnoid trichomes (trichomes 0.1–0.9 mm long); *supplementary bracts* (7–)13–18(–26), 6.4–17 mm long, 0.5–1.5 mm wide,

subulate, without scarious margin, a half to as long as involucral bracts, sometimes longer, glabrescent to arachnoid, usually covered with scattered arachnoid trichomes (trichomes 0.1–1.1 mm long), not imbricate. *Ligulate florets* 13–23, 14.4–29.6 mm long, yellow to orange; *tubular florets* 5.6–10.5 mm long, 0.6–1.9 mm diam, yellow to light orange. *Achenes* 3.9–5.8 mm long, 0.8–1.5 mm wide, subcylindrical (ratio achene width / achene length = 0.16–0.38), shorter than pappus (ratio achene length / pappus length = 0.58–0.76), with 11–14 ribs, glabrous, sometimes with scattered trichomes near the top ca. 0.1 mm long; *pappus* 6.4–9.8 mm long, whitish.

Etymology. The epithet *doronicum* probably refers to the similarity of its flowers with the genus *Doronicum*.

Discussion. Senecio doronicum is characterized by bearing solitary or several capitula, which are relatively large, usually showing supplementary bracts as long as the involucral ones. This taxon presents a widespread distribution through the southern european mountain ranges, from Cantabrian Mountains to septentrional Dinaric Alps. As other species with wide distribution, the morphological intraspecific variability is expectedly high, mainly in number of capitula, number of supplementary bracts, indumentum of involucre, and also shape and indumentum of leaves.

The similar species are *S. provincialis*, *S. lagascanus* and *S. scopolii*, with which partially overlaps its area of distribution. *Senecio doronicum* differs from *S. provincialis* in its linear-oblong supplementary bracts, usually a three half to as long as involucral bracts, sometimes longer, and its lanceolate to oblanceolate basal leaves, attenuate, ± concolorous. In contrast, *S. provincialis* has supplementary bracts widened at the base, usually a quarter to a three-quarters as long as involucral bracts, and basal leaves ovate to lanceolate, rounded to cuneate (rarely attenuate), ± discolour. From *S. lagascanus* differs in its longer supplementary bracts, slightly numerous, usually larger capitula, and for the absence of patent long pluricelular trichomes on the lower part of the stem. *Senecio doronicum* has sparsely pluricelular trichomes or arachnoid trichomes, although not obviously patent on the lower part of the stem. *Senecio doronicum* can be also confused with *S. scopolii* but they differ in the supplementary bracts (usually higher number and ± imbricate, and without the black spot near the apex in *S. scopolii*), the colour of ligulate florets (pale yellow in *S. scopolii* vs. yellow to orange in *S.*

doronicum), and the leaves consistency (soft and thin in *S. scopolii* subsp. *scopolii* vs. thick in *S. doronicum*). In the populations from Marche and Abruzzo (Apennine Mountains), where *S. doronicum* cohabits with *S. scopolii*, these mentioned characters lost consistency and many specimens show characters from both species or intermediate, making difficult a clear identification.

Fiori (1903) described *S. doronicum* var. *pseudoarachnoideus* as an intermediate form between *S. doronicum* and *S. scopolii*, embracing specimens weakly floccose and almost glabrous, which may grow mixed with *S. scopolii* or even alone. The unclear distribution of these populations and the inconsistency of the distinctive characters lead us to think that hybridization might have an important role in the evolutionary history of these populations. Likewise, some populations from Maritime Alps region, included here within *S. doronicum*, display a combination of morphological character states that are considered diagnostic for *S. doronicum* or *S. provincialis*. In this case, the involucre with many supplementary bracts as long as the involucral ones (even longer), ± imbricate, without black spot near the apex, and dense indumentum is quite remarkable. Difficulties with characterizing these populations as either *S. provincialis* or *S. doronicum* were already noted by Reichenbach (1854), Rouy (1903), and Briquet & Cavillier (1916). See Calvo & al. (2013b) for more details and phylogenetic relationships.

This variability follows geographical patterns, and in most cases these populations can be easily distinguished morphologically, therefore, in the present taxonomic treatment the following subspecies are recognized:

Key to subspecies of *Senecio doronicum*

1a. Leaves with scattered arachnoid trichomes above, weakly arachnoid to floccose beneath; involucre weakly arachnoid to floccose.....**2a. *S. doronicum* subsp. *doronicum***

1b. Leaves glabrescent above, covered with scattered scabrid-arachnoid trichomes beneath; involucre glabrescent or with scattered scabrid-arachnoid trichomes.....2

2a. Capitula solitary, rarely up to 3; supplementary bracts (7–)10–15(–18), 8.9–13.3 mm long, as long as the involucral ones, sometimes slightly shorter; ligulate florets usually light orange.....**2b. *S. doronicum* subsp. *longifolius***

2b. Capitula 2–4(–9), rarely solitary; supplementary bracts (9–)14–18(–24), 8.6–17.0 mm long, usually as long as the involucral ones, often slightly longer; ligulate florets usually yellow.....**2c. *S. doronicum* subsp. *orientalis***

2a. *Senecio doronicum* subsp. *doronicum*

Doronicum incanum L., Sp. Pl.: 886. 1753. TYPE: Switzerland, prope Gothard Rhaetia, [46º38'N 8º25'E], *Bauhin s.n.* (lectotype, designated by Calvo & al. (2012: 127), Herb. Burser X: 29, UPS image!).

Senecio barrelieri Gouan, Ill. Observ. Bot.: 68. 1773. *Senecio montanus* Lam., Fl. Franç. 2: 130. 1779, nom. illeg. (ICBN Art. 11.4). *Senecio doronicum* var. *barrelieri* (Gouan) Duby, Bot. Gall.: 263. 1828. TYPE: Plantae per Galliam, Hispaniam et Italiam observatae, Ic. 229. 1714 (lectotype, designated here).

Senecio doronicum var. *vulgaris* DC., Prodr. 6: 357. 1838. TYPE: France, Haute-Savoie, Brezon, [46º02'N 6º26'E], 9 Aug 1817, sine collector (lectotype, designated here, G-DC!).

Senecio doronicum var. *polycephalus* DC., Prodr. 6: 357. 1838. TYPE: France, Haute-Savoie, Chamonix, Col de Balme, [46º01'N 6º58'E], sine collector (lectotype, designated here, G-DC!).

Senecio doronicum var. *arachnoideo-floccosus* Hegetschw. & Heer, Fl. Schweiz: 831. 1840. TYPE: Switzerland, Ticino, Malvaglia, Vogelberg [Vogelsberg, 46º28'N 9º03'E], 1834, *Heer s.n.* (lectotype, designated here, G-DC!).

Senecio doronicum var. *glabratus* Hegetschw. & Heer, Fl. Schweiz: 831. 1840. TYPE: Switzerland, Alps, *Hegetschweiler & Heer s.n.* (Z?, not found).

Senecio doronicum var. *niveo-tomentosus* Hegetschw. & Heer, Fl. Schweiz: 831.1840. TYPE: Switzerland, Alps, *Hegetschweiler & Heer s.n.* (Z?, not found).

Senecio doronicum var. *contractus* Rouy in Rouy & Foucaud, Fl. France 8: 327. 1903. TYPE: France, Hautes-Alpes, Vars, Col de Vars, [44º37'N 6º40'E], 6 Aug 1883, *Arvet-Touvet & al. 4143* (lectotype, designated here, LY!; isolectotypes, FI!, G-DC!, MT!, P-3777650 image!, P-3778658 image!, P-3777630 image!, P-3683267 image!).

Senecio doronicum var. *pseudogerardi* Rouy in Rouy & Foucaud, Fl. France 8: 328. 1903 ["pseudo-gerardi"]. SYNTYPES: France, "Jura; la Dôle, le Reculet, le Colombier de Gex; Alpes; haute Provence; Forez; Cévennes; Auvergne; Corbières; Pyrénnées", *Rouy s.n.* (LY?, non found).

Senecio doronicum var. *jagglianus* Chenevard, Bull. Herb. Boissier ser. 2, 4: 644. 1904. *Senecio doronicum* f. *jagglianus* (Chenevard) Fiori in Fiori & Paol., Fl. Italia 4: 181. 1907 ["jaegglianus"]. SYNTYPES: Switzerland, Valais, Pierre à Voir, [46º07'N 7º12'E], *Chenevard s.n.* (G?, not found); Switzerland, Ticino, val Vigornesso, [46º21'N 8º47'E], *Jaeggli s.n.* (G?, not found).

Senecio doronicum f. *calvescens* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 33. 1916. SYNTYPES: France-Italy, Alpes-Maritimes, "mont Mangiabo, près de Breil; vallée sup. de la Gordolasca; mont Clapier; col de Fremamorta; val Ciastiglione; bergerie du lac de Vens, vall. sup. de la Tinée (herb. Saint-Yves)" (LAU?, non found).

Senecio doronicum f. *leucocephalus* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 33. 1916. TYPE: France, Alpes-Maritimes, montagne des Muntis sur Fontan, [44º01'N 7º33'E], 7 July 1886, *Reverchon 166* (lectotype, designated here, P-3777629 image!; isolectotypes, B-10-0299574 image!, P-3683343 image!).

Senecio doronicum f. *odontotus* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 33. 1916. SYNTYPES: France-Italy, Alpes-Maritimes, "Sella Piastra, entre les vallées de l'Ellero et de Pesio; mont Ventabron près Breil; env. de Beuil: Tète de Giarons" (G?, non found).

Senecio doronicum var. *laricetorum* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 36. 1916. TYPE: France, Alpes-Maritimes, between le mont Tournairet and la Tête de Siruol, [44º01'N 7º14'E], 20 July 1905, *Briquet & Cavillier s.n.* (G?, not found).

Senecio doronicum var. *microcephalus* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 34. 1916. TYPE: Italy, Liguria, Albenga, Zuccarello, monte Nero, [44º06'N 8º04'E], *Briquet & Cavillier s.n.* (G?, not found).

Stem covered with scattered scabrid-arachnoid trichomes to floccose. *Leaves* covered with scattered arachnoid trichomes above, arachnoid to floccose beneath. *Capitula* (1–)2–4(–7); *involucral bracts* (20–)24–30(–34), weakly arachnoid to floccose; *supplementary bracts* (9–)14–22(–26), 6.4–12.9 mm long, a three-quarters to as long as involucral ones, weakly arachnoid to floccose. *Ligulate florets* yellow or light orange. Chromosome number: 2*n*=40, 80*, 120** (Guinochet, 1967: 1623, see comments below; *Afzelius, 1951: 68; *Küpfer, 1972: 1753; **Küpfer, 1972: 1753). Figures 4, 8A, 9A.

Iconography. Jacquin (1778, fig. 45); Reichenbach (1853, fig. 975-1); Fiori (1904: 414 n.º 3496); Hegi (1928, pl. 268-2).

Distribution and habitat. Austria, France, Germany, Italy, Switzerland; alpine meadows, montane pastures, rocky slopes, edge of woods of *Abies alba* Mill., *Fagus sylvatica* L., *Picea abies* (L.) H. Karst., *Pinus mugo* Turra, on calcareous and siliceous soils; altitude 1500–2600 m (Fig. 3).

Phenology. Flowering from June to September.

Discussion. The efforts to find the original material of *Senecio barrelieri* were unsuccessful, thus, we lectotypify it on the Barrelier's illustration n.º 229, the only one that matches with a *Senecio* species. The remainder illustrations cited in the protologue seem to correspond to other genera, probably *Crepis* L. According to Timbal-Lagrave (1875) the illustration and the protologue provided by Gouan are incoherent. The description and distribution (eastern Pyrennes) matches with *S. provincialis* [also

supported by Gautier (1897)], while the illustration seems to correspond to *S. doronicum* subsp. *doronicum* because it shows several capitula (6), and basal leaves lanceolate, not cordate-ovate or ovate as indicates the description. He solved the problem describing two varieties, *S. doronicum* var. *barrelieri* and *S. gerardi* var. *corbariensis*. The former corresponds to the Barrelier's illustration, a plant distributed throught the Alps. *Senecio gerardi* var. *corbariensis* corresponds to the original description and distribution of *S. barrelieri*, synonymy excluded, but it is illegitime under the ICBN Art. 11.4. A feasible solution is to typify *S. barrelieri* on the Barrelier's illustration n.º 229 becoming a heterotypic synonym of *S. doronicum* subsp. *doronicum*. This solution is coherent if we consider that *S. barrelieri* has been scarcely used in taxonomic treatments, and traditionally the botanist included it as a synonym of *S. doronicum s.l.* Likewise, we did not located the original material of *S. montanus*. As Lamarck cited the Barrelier's illustration n.º 229 in the protologue, we lectotypify the name *S. montanus* on that illustration, and therefore, it also becomes a heterotypic synonym of *S. doronicum* subsp. *doronicum*. It has to be noted that the author probably wrongly used the names *S. doronicum* and *S. montanus*. In the description of *S. doronicum*, the author cited that the basal leaves are oval to oblong, with a simple capitulum, and that it grows through the Provence mountains, which matches better with *S. provincialis*. On the other hand, *S. montanus* is described as a plant with basal leaves oval to lanceolate, the upper ones slightly glabrous, with a terminal corymbe, distributed through the mountains of meridional provinces, which fits better with *S. doronicum* subsp. *doronicum*. See also the nomenclatural discussion in Calvo & al. (2011b).

The chromosome number of *S. doronicum* 2*n*=40 reported by Guinochet (1967) is based on material collected at Auron (Alpes-Maritimes, France), where *S. doronicum* subsp. *doronicum* and *S. provincialis* grow. Considering that the other reports for *S. doronicum* are different (2*n*=80, 120), and 2*n*=40 matches with the chromosome number reported for *S. provincialis*, we consider it doubtful. We could not revise the mentioned material.

Selected specimens examined. AUSTRIA. **Salzburg**: Salzburger Alpen, 47º40'N, 13º13'E, 16 June 1909, *A. Spitzel 435* (G). **Tyrol**: Nordtirol, Lechtaler Alpen, Simshütte und Falmedonjöchl, 47º12'N, 10º21'E, 12 July 1964, *W. Dietrich 1063* (M); Obergurgl, op helling ten westen van Gurgler Ache, 46º53'N, 11º1'E, 8 Aug 1976, *J.H. Ietswaart 11337* (L). **Vorarlberg**: Silvretta-Gruppe, Jamtal, 46º52'N, 10º6'E, 22 July 1984, *H. Hertel 28025* (M); Lindauerhütte, 47º2'N, 9º50'E, 9 July 1952, *J. Ooststroom 16190* (L). FRANCE. **Alpes-de-Haute-Provence**: Fours, 16 km südlich Barcelonette an der Straβe zum

Col de la Cayolle, 44º15'N, 6º44'E, 10 Aug 1972, *D. Podlech 24489* (M); près du Villard d'Allos, 44º14'N, 6º38'E, 8 July 1859, *E.A. Willmott s.n.* (K). **Alpes-Maritimes**: Col de Tende, 44º8'N, 7º33'E, 27 June 1861, *E. Bourgeau 334* (F); St. Etienne-de-Tinée, 44º15'N, 6º56'E, 17 June 1964, *G.F. Witte 15686* (UPS). **Drôme**: cime du Montuez sur le Vercors, 44º55'N, 5º18'E, 13 July 1951, *J. Terré 1762* (K). **Hautes-Alpes**: col du Galibier, cara sur, 45º3'N, 6º24'E, 20 Aug 2010, *J. Calvo 5030* (MA); montagne des Trois Evéchés, près de Villars d'Arene, 45º3'N, 6º21'E, 19 July 1858, *C. Ozanon 94* (F). **Haute-Savoie**: glacière au Brezon, 46º2'N, 6º25'E, 11 Sep 1860, *E. Bourgeau s.n.* (F); Chène des Aravis near the Col des Aravis, path from the Via Ferrata to the Aig de Borderan, 45º53'N, 6º29'E, 28 Aug 1999, *P. Hein 6064* (B). **Isère**: La Moucherolle, 45º1'N, 5º32'E, 22 July 1885, *A. Marais s.n* (MT). **Savoie**: pr. col du Galibier, cara norte, alrededor de Les Granges, 45º4'N, 6º25'E, 20 Aug 2010, *J. Calvo 5000* (MA); Mont Cenis, 45º15'N, 6º54'E, *E. Rostan s.n.* (B). GERMANY. **Bavaria**: Ammergauer Alpen. Hochplatte, E der Roggentalgabel, 47º33'N, 10º50'E, 11 July 1988, *P. Eggensberger 221* (M); Allgäuer Alpen, Oberstdorf, am Linkerskopf, 47º16'N, 10º16'E, 17 July 1947, *H. Merxmüller & W. Wiedmann 17707* (M). ITALY. **Aosta Valley**: Val d'Aoste, Val Savaranche, 45º46'N, 7º5'E, 12 June 1982, *H. Bamps-Rayez 45* (BR); ascent to Grand St. Bernard pass, 45º51'N, 7º8'E, 25 July 1966, *R.K. Brummitt 5441* (K). **Liguria**: ex monte Porcile, liguria orientalis, 44º21'N, 9º30'E, [sine collector] (L). **Lombardy**: Bergamsker Alpen, Südhänge des Arera-Massiva vom Sattel südlich P. 2023 zum Pizzo Arera Felshänge, 45º56'N, 9º48'E, 14 Aug 1977, *W. Lippert 15992* (M); Longobardia sup., prov. di Sondrio, Bormio, loco dicto S. Pietro, 46º28'N, 10º23'E, 2 July 1905, *M. Longa 973* (E). **Piedmont**: Col de Nivolet, 45º28'N, 7º8'E, 31 July 1887, *R. Beyer s.n.* (B); Limonetto, 44º10'N, 7º33'E, 25 May 2010, *J. Calvo & A. Unió 4666* (MA). **Trentino-Alto Adige/Südtirol**: prov. Bolzano, Matschtal, boven Matsch, 46º43'N, 10º41'E, 9 July 1956, *J. Ooststroom 19319* (L); supra Trafoi, 46º33'N, 10º30'E, 28 July 1888, *A. Zimmeter s.n* (US). **Veneto**: Monte Baldo, helling langs Monte Altissimo, 45º42'N, 10º50'E, 5 July 1971, *J.E. Langhe 368/1971* (BR). SWITZERLAND. **Bern**: Mürren bij Interlaken, 46º33'N, 7º53'E, July 1968, *A. Beek s.n.* (L); Klein Scheidegg, 46º33'N, 7º57'E, 19 July 1958, *J.S. Womersley s.n* (K). **Graubünden**: au pied du Piz Padella, Haut Engadin, 46º31'N, 9º49'E, 30 July 1868, *R.J. Shuttleworth s.n.* (MO); Engiadina Bassa, between Guarda and Lavin, 46º46'N, 10º7'E, 9 July 1979, *E. Zogg 4605* (MA). **Obwalden**: summit of Pilatus, 46º58'N, 8º15'E, 22 Aug 1907, *J.R. Churchill s.n.* (MO). **St. Gallen**: Flumserberge, 200 m. WSW der Zigerlücke über Lias-Sandstein, 47º3'N, 9º13'E, 26 Aug 1951, *E. Sulger Büel s.n.* (NY). **Uri**: vicinity of Klausen-pass, uppermost part of Schächental, 46º52'N, 8º50'E, 20 Aug 1978, *K.U. Kramer 6621* (MA). **Valais**: Val Ferret près de Mont Percé, 45º53'N, 7º7'E, 23 July 1975, *M. Dittrich 2007* (G); Valsorey, Grand Combin, 45º53'N, 7º17'E, 12 July 1990, *E. Valdés-Bermejo 12016* (MA). **Vaud**: Tour d'Aï, 46º22'N, 7º0'E, July 1918, *B. Wiki s.n.* (G); La Vare, Alpes de Bex, 46º15'N, 7º8'E, 20 Aug 1899, *E. Wilczek s.n.* (O).

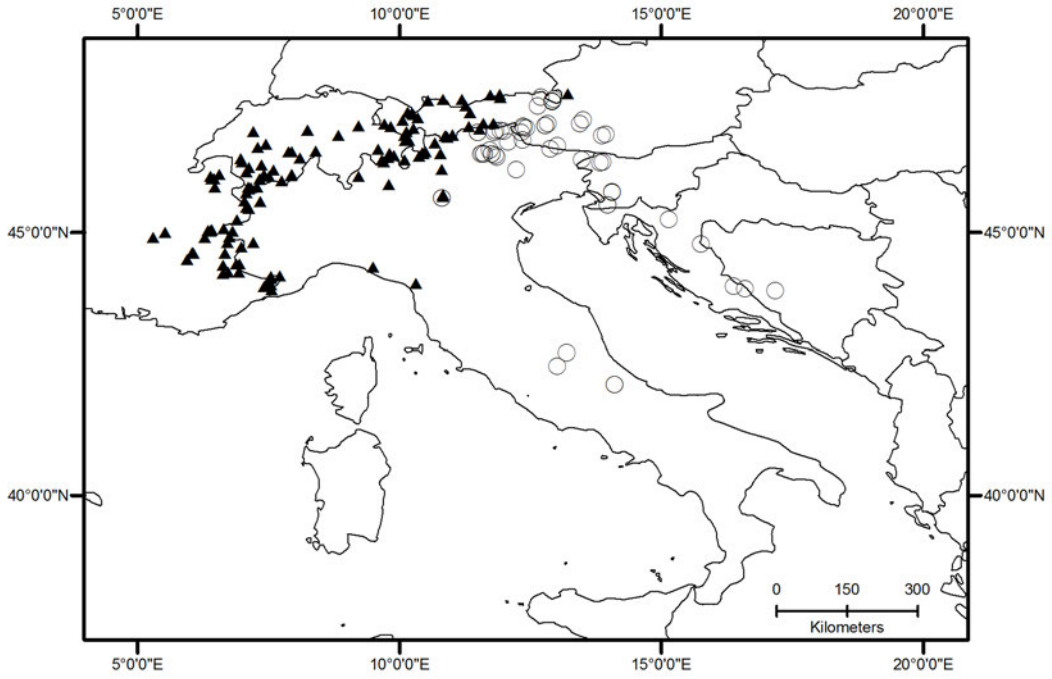


Figure 3. Distribution map for *Senecio doronicum* subsp. *doronicum* (L.) L. (▲) and *S. doronicum* subsp. *orientalis* (Ten.) J. Calvo (○).

Figure 4. *Senecio doronicum* (L.) L. subsp. *doronicum, sine collector* 20 June 1960 (MO).

2b. *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo, Novon (submitted). *Senecio doronicum* var. *longifolius* Willk., Oesterr. Bot. Z. 41: 4. 1891 ["longifolia"]. TYPE: Spain, Catalonia, Vall d'Aran, lago de Toro (Viella), [42º38'N 0º43'E], July 1873, *Compañó s.n.* (lectotype, designated by Calvo & al. (2013a), COI-37582 image!).

Cineraria longifolia var. *uniflora* Lapeyr., Hist. Pl. Pyrénées: 521. 1813. TYPE: France, Ariège, Massat, Port de Saleix, Taupadoux, [42º46'N 1º24'E], *Lapeyrouse s.n.* (TLM?, not found).

Senecio mampodrensis Gand., Bull. Soc. Bot. France 57: 98. 1910. TYPE: Spain, Castilla y León, León, Acebedo, Picos de Mampodre, [43º02'N 5º10'W], 29 June 1905, *Gandoger s.n.* (lectotype, designated here, MO!; isolectotype, B-10-0325062!).

Stem covered with scattered scabrid-arachnoid trichomes, the base sometimes ± arachnoid. *Leaves* glabrescent above, with scattered scabrid-arachnoid trichomes beneath. *Capitula* 1–1(–3); *involucral bracts* (20–)22–26(–32), glabrescent to scattered scabrid-arachnoid trichomes; *supplementary bracts* (7–)10–15(–18), 8.9–13.3 mm long, as long as the involucral ones, sometimes slightly shorter, with scattered arachnoid trichomes on the margin. *Ligulate flowers* usually light orange. Chromosome number: 2*n*=120 (Gallego, 1983: 131, sub *S. lagascanus*, see comments below). Figures 6, 8B, 9B, 10D.

Distribution. Andorra, France, Spain; alpine meadows, montane pastures, rocky slopes, edge of woods of *Abies alba*, *Fagus sylvatica*, *Pinus uncinata* Ramond ex DC., on calcareous and siliceous soils; altitude 1100–2500 m (Figure 5).

Phenology. Flowering from June to August.

Discussion. This subspecies is mainly distributed through Cantabrian Mountains and Pyrenees. However some scattered populations have been found in SE France, where the most outstanding are those from Jura Mountains. Although these specimens display characters that correspond to *S. doronicum* subsp. *longifolius*, the phylogenetic analyses indicate that these populations from Jura Mountains are nested with *S. doronicum* subsp. *doronicum* from Alps (Calvo & al., 2013b). The nearest populations of subsp.

doronicum grow at Haute-Savoie (France) and Vaud (Switzerland), around 45 km and 70 km far away, respectively. They are well characterized because of their synflorescences with solitary to several capitula, and their arachnoid to slightly floccose indumentum.

The chromosome number reported by Gallego (1983) is based on a missidentified collection (*Devesa & al. 1894/80*, SEV) from Puerto de Tarna (Oviedo, Spain), which corresponds to *S. doronicum* subsp. *longifolius* instead *S. lagascanus*.

Selected specimens examined. ANDORRA. Ordino, port de Siguer, estanyons de Banyell, 42º38'N, 1º34'E, 30 Aug 2002, *C. Aedo, I. Aizpuru & J. Pedrol 8630* (MA); inter port d'Embalire et pic Negre, 42º31'N, 1º42'E, 26 July 1944, *H. Sleumer 1471* (L). FRANCE. **Ain**: Jurassus mons, Le Reculet, 46º15'N, 5º55'E, 18 July 1886, *H.A. Romieux s.n.* (H). **Cantal**: près au sud-est de Malbo, 44º58'N, 2º45'E, 26 June 1884, *J. de Puyfol 1714* (MT, WU); Puy Mary, 45º6'N, 2º40'E, 20 July 1971, *A. Touw 13280* (L). **Haute-Garonne**: boven Jouéou - Laou d'Esbas, Luchon, 42º43'N, 0º36'E, 7 July 1951, *J.D. Verleur s.n.* (L); Vallon d'Esquiery, 42º45'N, 0º29'E, 16 July 1951, *J.D. Verleur s.n.* (L). **Hautes-Pyrénées**: Tourmalet, 42º54'N, 0º8'E, July 1869, *H. Bordère 1251* (MA); echelle des Sarradets im Cirque de Gavarnie, ca. 4.5 km S Gavarnie, 42º41'N, 0º1'W, 18 July 1982, *W. Dietrich 6056* (M). **Puy-de-Dôme**: Col de la Croix-Morand, entre la Cascade du Queurenich et le Saut-du-Loup et au-dessus de la grande Cascade du Mont-Dore, 45º35'N, 2º51'E, July 1971, *V. Rastetter 6297* (MA). **Pyrénées-Orientales**: Capcir, vallée de Galba, 42º38'N, 2º2'E, 10 Aug 1916, *F. Sennen 2690* (MA). **Tarn**: Mazamet, pic de Nore, 43º26'N, 2º28'E, 28 June 2011, *J. Calvo 5658* (MA). SPAIN. **Asturias**: Puerto Ventana, Teberga, 43º3'N, 6º0'W, 26 June 1986, *C. Aedo s.n.* (MA); Lena, Tuiza de Arriba, peña Ubiña, ladera este, 43º1'N, 5º56'W, 25 July 2009, *J. Calvo 4020* (MA). **Cantabria**: monte Salborón, Camaleño, 43º6'N, 4º48'W, 10 July 1991, *C. Aedo s.n.* (MA). **Huesca**: Sahún, macizo del Posets, refugio de Angel Orús, 42º36'N, 0º26'E, 20 Aug 1987, *M. Luceño & al. 141* (MA); Caldares de Baños, NNE Balneario de Panticosa, 42º45'N, 0º13'W, 20 July 2005, *J. Müller 10330* (BR). **León**: pr. Polvoredo, ladera S de Peña Ten, 43º5'N, 5º7'W, 10 July 2012, *C. Aedo & J. Pedrol 19192* (MA); Villargusán de Babia, 42º59'N, 5º58'W, July 1983, *C.M. Romero Rodríguez s.n.* (MA). **Lleida**: Pallars, pr. Espot, 42º34'N, 1º4'E, 9 July 1977, *F.J. Fernández Casas & al. 2022* (MA); circo de Colomés, 42º38'N, 0º56'E, 8 July 1966, *S. Rivas-Martínez s.n.* (MA). **Navarra**: Valle del Roncal, puerto de Arras, 42º57'N, 0º48'W, 27 July 1969, *E.F. Galiano, S. Silvestre & B. Valdés s.n.* (MA); Borau-Aísa, cerca del Mallo de Lecherín, 42º46'N, 0º35'W, 17 July 1985, *P. Montserrat, L. Villar & D. Gómez s.n.* (MA). SWITZERLAND. **Vaud**: Jura, Massif du Jura, La Dole, 46º25'N, 6º5'E, 17 Aug 2010, *J. Calvo 4982* (MA); La Rippe, entre le châlet de La Dôle et le sommet de La Dôle, 46º25'N, 6º5'E, 21 July 1979, *A. Stork 7906* (B).

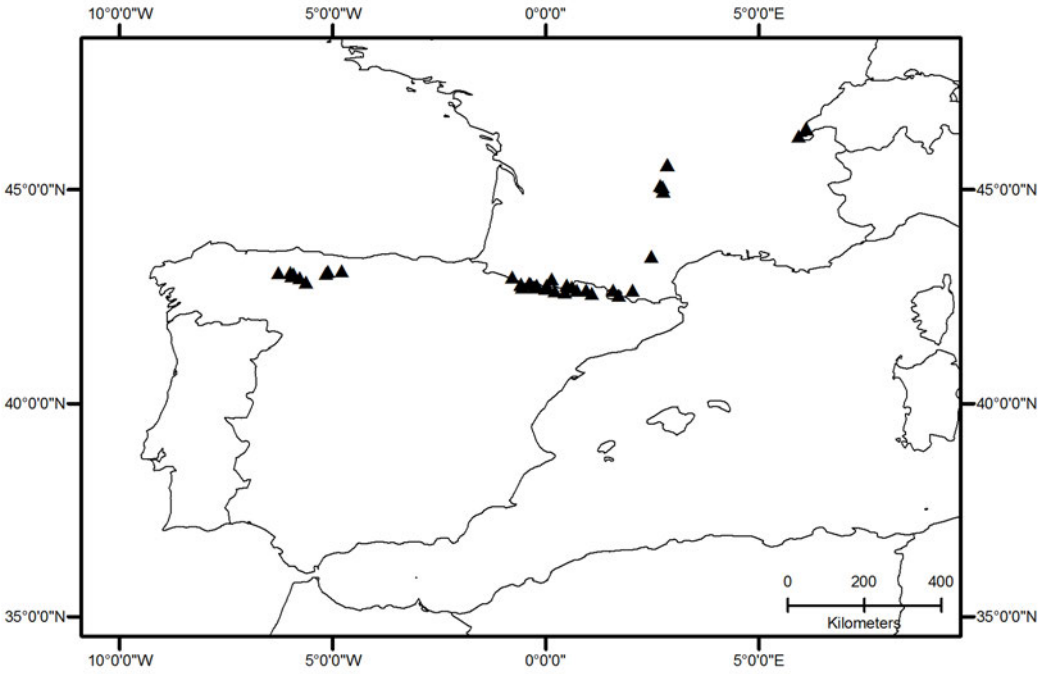


Figure 5. Distribution map for *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo (▲).

Figure 6. *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo , *Fdez. Casas 2022 & al.* (NY).

2c. *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo, Novon (submitted). *Senecio orientalis* Ten., Fl. Napol. 2: 222. 1820, nom. illeg., non Mill. 1768 (ICBN, Art. 53.1). TYPE: Italy, Lazio, Rieti, Accumoli, M. di Accumoli, [42º43'N 13º11'E], *Orsini s.n.* (lectotype, designated by Calvo & al. (2013a), NAP image!).

Senecio doronicum var. *angustifolius* Vis., Fl. Dalmat. 2: 71. 1847 [“angustifolia”]. TYPE: Croatia, elatiore montium Dinara, [44º03'N 16º23'E], *Visiani s.n.* (lectotype, designated here, PAD image!).

Senecio doronicum var. *neglectus* Paolucci, Fl. Marchig.: 348. 1891. *Senecio doronicum* subsp. *neglectus* (Paolucci) Arcang., Comp. Fl. Ital. ed. 2: 670. 1894. SYNTYPES: Italy, “A M. Birro (Nard., Utili), presso Castelluccio (Ottav.), sul Priore (Marz.), sul M. dei Fiori (Ors.), a M. Nerone (Scagn.!), sul Sibilla, sul Farnio, al Valico di Gualdo, sul M. Catria, nelle quali località l'ho raccolta. Rinvenni la var. sul Sibilla, e l'ebbi del Sanvicino da Grilli.” (non found).

Stem glabrescent to covered with scattered scabrid-arachnoid trichomes. *Leaves* glabrescent on both faces, rarely with scattered scabrid-arachnoid trichomes beneath. *Capitula* (1–)2–4(–9); *involucral bracts* (18–)28–32(–34), glabrescent to scattered scabrid-arachnoid trichomes; *supplementary bracts* (9–)14–18(–24), 8.6–17 mm long, usually as long as the involucral ones, often slightly longer, with scattered arachnoid trichomes. *Ligulate florets* usually yellow. Chromosome number: unknown. Figures 7, 8C, 9C.

Distribution and habitat. Austria, Bosnia-Herzegovina, Croatia, Germany, Italy, Slovenia; alpine meadows, montane pastures, screes, on calcareous and siliceous soils; altitude 800–2500 m (Figure 3).

Phenology. Flowering from June to September.

Discussion. Senecio doroncium subsp. *orientalis* is an amphi-Adriatic species present also in eastern Alps. In some localities of this region, subsp. *orientalis* overlaps with

subsp. *doronicum*, such as in Monte Baldo (Veneto, Italy), where most of the studied collections belong to subsp. *orientalis*.

The type material of *Senecio orientalis* corresponds to a Orsini's collection from Monti di Accumoli, currently at Lazio, but belonging to Abruzzi during the Kingdom of the Two Sicilies.

Senecio apenninus, described from Apennine Mountains without precise locality, is likely similar to subsp. *orientalis*. Unfortunatelly, the original material of *S. apenninus* could not been located. However, three collections identified under the mentioned name, that match with the Tausch's protologue, have been studied. The specimens were collected at Monte Terminillo, Rieti (Lazio), Monte Vulture (Abruzzo), and Corno alle Scale (Emilia–Romagna). The presence of long pediceles, small capitula, and specially the short supplementary bracts --a quarter to half as long as the involucral ones-- is quite remarkable. Further field work is needed to clarify the variability of the populations and the taxonomic position for these populations. Until then, this name is placed under "Doubtful or excluded names".

Selected specimens examined. AUSTRIA. **Carinthia**: Kärnten, Gurktaler Alpen, Ebene Reichenau, 46º53'N, 13º56'E, 16 Sep 1978, *M.A. Fischer s.n.* (WU); Carinzia, Mauthen, Kotschak, 46º40'N, 13º0'E, Aug 1908, *C. Marchesetti s.n.* (FI). **Salzburg**: Lungau, Silbereck, 47º5'N, 13º26'E, Sep 1921, *F. Vierhapper s.n.* (WU); Kitzbüheler Schieferalpen, Hang oberhalb der Spielberg-Alm, 47º25'N, 12º38'E, 15 Aug 1965, *G. Wagenitz 556* (B). **Tyrol**: Osttirol, Venedigergruppe, am Naturlehrpfad I von Bichl über Katin zur Sajat Hütte, 47º2'N, 12º21'E, 29 July 1985, *E. Albertshofer s.n.* (M); Praegraten [Prägraten], 47º1'N, 12º22'E, 7 Aug 1865, *H. Gander s.n.* (B). BOSNIA-HERZEGOVINA. Dalmatien, Dinarische Alpen, Südostabhänge der Dinara, 43º59'N, 16º22'E, 8 July 1907, *E. Janchen & B. Watzl s.n.* (WU); Dinarische Alpen, Nord und Nordostabhänge des Gnjat oberhalb der Waldgrenze, 43º56'N, 16º35'E, 6 July 1907, *E. Janchen & B. Watzl s.n.* (WU); Hoher Velebit, laderas NE Malovan, contra la depresión Bunjevac, 43º54'N, 17º10'E, 23 July 1907, *E. Janchen & B. Watzl s.n.* (WU). CROATIA. Berg Klek bei Ogulin, über Musulinski-Potok, 45º15'N, 15º8'E, 15 July 1890, *R. Beyer s.n.* (B); montis Crnogredo prope Brussane, *T. Pichler 1800* (H); Pljesivica, 44º47'N, 15º45'E, *J.C. Schlosser s.n.* (WU). GERMANY. **Bavaria**: Alpes calcaires près de Berchtesgaden, 47º33'N, 12º56'E, 1 Sep 1850, *A. Einsele 877* (L); Oberbayern, Nationalpark Berchtesgaden, Zwischen Seeleinsee und Gotzenalm, 47º31'N, 12º54'E, 7 Aug 1995, *M. Weigend 3697* (M). ITALY. **Abruzzo**: Montis Cavallo, Majella, 42º7'N, 14º6'E, Aug 1875, *H. Groves s.n.* (K). **Friuli-Venezia Giulia**: Cregnedul, 46º24'N, 13º28'E, 29 Aug 1907, *V. Engelhardt s.n.* (B). **Lazio**: Rieti, NE Monte Terminillo, 42º28'N, 13º0'E, 4 Aug 1973, *H. Merxmüller & J. Grau 20731* (M). **Trentino-Alto Adige/Südtirol**: Tirolia centralis, montis Finsterstern ad Sterzing, 46º55'N, 11º29'E, *R. Huter 1800* (H); N. side of Fedaia lake at the foothills of Marmolada, 46º27'N, 11º51'E, 20 July 1965, *K. Larsen 20965* (US). **Veneto**: Monte Baldo, 45º40'N, 10º48'E, 29 July 1879, *C.O. Schlyters s.n.* (S); Monte Serva, 46º12'N, 12º13'E, 4 July 1871, *G.C. Spreitzenhofer s.n.* (B). SLOVENIA. : Čičarija, Weg von der Ortschaft Prešnica auf den Berg Slavnik, 45º32'N, 13º58'E, 7 June 1976, *M.A. Fischer s.n.* (WU); Nanos-vuori, 45º47'N, 14º3'E, 4 July 1985, *V. Kolari 2342* (H); Zatrep inter alpem Planina v Lazu et jugum Lazarske prevale, 46º20'N, 13º49'E, 4 Aug 1973, *T. Wraber s.n.* (G).

Figure 7. *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo, *Treffer s.n.* 20 July 1895 (O).

3. *Senecio lagascanus* DC., Prodr. 6: 357. 1838. *Senecio doronicum* var. *lagascanus* (DC.) Samp., Lista Esp. Herb. Portug.: 134. 1913. *Senecio doronicum* subsp. *lagascanus* (DC.) Vigo, Veg. Massís Penyagolosa: 94. 1968. TYPE: Spain, Castilla y León, montium legionensium, 1806, *Lagasca s.n.* (lectotype, designated by Bellot & Casaseca (1975: 19), G-DC!; isolectotype, MA-130656!).

Senecio ruthenensis Timb.-Lagr. & Mazuc, Note Nouv. Senecio: 3. 1854. *Senecio doronicum* subsp. *ruthenensis* (Timb.-Lagr. & Mazuc) Nyman, Consp. Fl. Eur.: 354. 1879. *Senecio doronicum* [race] *ruthenensis* (Timb.-Lagr. & Mazuc) Rouy in Rouy & Foucaud, Fl. France 8: 328. 1903. *Senecio doronicum* var. *ruthenensis* (Timb.-Lagr. & Mazuc) Bonnier, Fl. Ill. France 5: 84. 1922 ["rutenensis"]. TYPE: France, Aveyron, Floyrac près Rodez, [44º22'N 2º33'E], *Barrau s.n.* (lectotype, designated here, P-3777686 image!).

Senecio doronicum var. *floribundum* Pau, Not. Bot. Fl. Españ. 6: 59. 1896. TYPE: Spain, Teruel, *Benedicto s.n.* (lectotype, designated here, MA-442298!).

Senecio doronicum subsp. *lusitanicus* Cout., Fl. Portugal: 641. 1913. *Senecio lagascanus* subsp. *lusitanicus* (Cout.) P. Silva, Colóquio Hist. Desenvolv. Ci. Portugal, Hist. Desenvolv. Ci. Portugal (1º. 1985. Lisboa): 955. 1987. *Senecio lusitanicus* (Cout.) R. Pérez-Romero, Comp. Newsl. 47: 19. 2009. TYPE: Portugal, Estremadura, Serra de Montejunto, pr. Buarcos, [40º11'N 8º54'W], *Coutinho s.n.* (COI?, not found).

Perennial herb. *Rhizome* 1.1–3.3 cm long, 0.3–0.9 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 14–108 cm, erect, leaved, corrugated, solid, not ramificated, slightly arachnoid to glabrescent, usually with ± patent long pluricelular trichomes towards the lower part, base without remnants of old leaves or tufts of hairs. *Basal leaves* 2.8–17 cm long, 1–5.7 cm wide, persistent, lanceolate to oblanceolate, sometimes ovate (ratio basal leaf width / basal leaf length = 0.22–0.81), obtuse, rarely acute, attenuate to rounded, with a petiole 0.7–15 cm long, dentate, sometimes slightly dentate (teeth 0.4–3 mm deep), covered with scattered arachnoid trichomes to glabrescent, more dense on midrib and petiole (trichomes 0.4–2 mm long), concolorous. *Cauline leaves* 4–12; *middle cauline leaves* 0.9–16 cm long, 0.2–3 cm wide, alternate,

lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.06–0.30), acute, sometimes obtuse, semi-amplexicaul to attenuate into a petiole up to 7 cm long, entire to slightly dentate (teeth 0.7–1.8 mm deep), covered with scattered arachnoid trichomes (trichomes 0.6–2.7 mm long) to glabrescent, tertiary venation inconspicuous; *upper cauline leaves* 0.5–7.6 cm long, 0.1–1.9 cm wide, oblong to lanceolate (ratio upper leaf width / upper leaf length = 0.05–0.25), acute, sessile to semi-amplexicaul auriculate, entire to slightly dentate (teeth 1.2–2.1 mm deep), covered with scattered arachnoid trichomes to glabrescent. *Synflorescence* 2-25 cm long, corymbose, with scarce linear-oblong bracts. *Capitula* (1–)2–5(–11), 24.3–46.4 mm diam; *involucre* 9–21.5 mm diam, 7–13 mm long, cupuliform; *involucral bracts* (16–)21–22(–30), 6.3–12.6 mm long, 0.9–2.2 mm wide, with scarious margin 0.2–0.6 mm wide, lanceolate to oblong, attenuate, 0–3 weakly keeled, apex usually with a black spot, with scattered arachnoid trichomes (trichomes 0.3–1 mm long) to glabrescent; *supplementary bracts* (5–)8–10(–15), 4.3–9.8 mm long, 0.3–1.8 mm wide, subulate, without scarious margin, a half to three quarters as long as involucral bracts, with scattered arachnoid trichomes (trichomes 0.3–1.4 mm long), not imbricate. *Ligulate florets* 10–28, 12–23.4 mm long, yellow; *tubular florets* 5.3–8.9 mm long, 0.6–1.8 mm diam, yellow. *Achenes* 3.8–4.9 mm long, 0.6–1.2 mm wide, subcylindrical (ratio achene width / achene length = 0.14–0.27), shorter than pappus (ratio achene length / pappus length = 0.55–0.95), with 9–12 ribs, glabrous to glabrescent (some intercostal trichomes) 0.1–0.2 mm long; *pappus* 5–8.3 mm long, whitish. Chromosome number: 2*n*=40, 120* (Fernandes & Queirós, 1971: 46, sub *S. doronicum*; Küpfer, 1972: 1753, sub *S.* gr. *doronicum*; Küpfer, 1972: 1753, sub *S. ruthenensis*; *Küpfer, 1974: 264, see comments below). Figure 10B.

Iconography. Mazuc & Timbal-Lagrave (1834: 6, fig. 1-4, sub *S. ruthenensis*); Coste (1903: 308 n.º 1843, sub *S. ruthenensis*); Bonnier (1922: fig. 286 n.º 1423-2, sub *S. ruthenensis*); Caballero (1948: 543, 571 fig. 11).

Distribution and habitat. Spain, France, Portugal; shrublands, meadows, woods of *Quercus sp.*, *Pinus sp.* (sometimes of *Fagus sylvatica*), on calcareous or siliceous soils; altitude 240–1650 m (Figure 11).

Phenology. Flowering from May to July.

Etymology. Senecio lagascanus is named in honor of Mariano Lagasca y Segura (1776-1839), Spanish botanist who worked at the botanical garden of Madrid.

Discussion. Senecio lagascanus is characterized by usually bearing several capitula with supplementary bracts shorter than involucral ones, and the lower part of the stem with a dense indumentum composed of ± patent long pluricelular trichomes. Nonetheless, this taxon presents a high variability regarding the number of capitula. In a same population is frequent to find specimens showing several capitula (up to 11) and specimens displaying a solitary capitulum.

Senecio lagascanus is similar to *S. doronicum* and *S. provincialis*, with which partially overlaps its range, and to *S. kolenatianus* from northeastern Anatolia and Caucasus Mountains. This species differs from *S. provincialis* in the shape and number of supplementary bracts, involucre size, and the shape and indumentum of basal leaves. The supplementary bracts of *S. provincialis* are numerous, ± imbricate, and widened at the base, while *S. lagascanus* usually bears less number of supplementary bracts, not widened at the base. The involucre size is larger in *S. provincialis*, and its basal leaves are ovate to lanceolate vs. lanceolate to oblanceolate (rarely ovate) in *S. lagascanus*. Moreover, in *S. provincialis* the arachnoid indumentum beneath gives to leaves an aspect discolorous. In contrast, the *S. lagascanus* leaves are concolorous, covered with scattered arachnoid trichomes to glabrescent, more dense on midrib and petiole. Regarding to *S. doronicum* and *S. kolenatianus*, see comments under them.

The populations from Aveyron and Charente-Inférieure (France), described as *S. ruthenensis* by Mazuc & Timbal-Lagrave (1854), match perfectly with all diagnostic characters of *S. lagascanus*. Likewise, those populations from Estremadura and Beira Litoral (Portugal), which have been adscribed as *S. doronicum* subsp. *lusitanicus*, also fit *S. lagascanus*. Recently, Pérez-Romero (2009) combined this taxon as *S. lusitanicus* mainly on the base of palynological characters. However, in the present study the morphological differences concerning useful taxonomic characters such as the number and shape of supplementary bracts or habit (size, number of cauline leaves) are not relevant to consider them different taxa.

There is a Gandoger's collection of *S. lagascanus* from Jebel Haroun (Meknès-Tafilalet, Morocco). The collection corresponds to the Gandoger's expedition "Flora Africae Borealis, 1910-11". Other specimens from this expedition not present in northern Africa (i.e., *Geranium sanguineum* L.), suggests the probabilty of several

labelling mistakes. Thus, the presence of this taxon in N Africa should be confirmed by new collections.

Bellot & Casaseca (1975) lectotipified *S. lagascanus* on a specimen kept at G-DC., and designated one isolectotype kept at MA. The specimen from Candolle' herbarium consists in only one specimen notably ruined, namely, without capitula and most of the leaves broken. Fortunatelly the specimen kept at MA clearly shows the diagnostic characters of this species.

The procedence of the material used by Küpfer (1974) to report the chromosome number of *S. lagascanus* 2*n*=120 is not specified, could being Cantabrian Mountains or Pyrenees. Considering that this region also harbours *S. doronicum* subsp. *longifolius*, whose chromosome number is 2*n*=120, and the remainder reports for *S. lagascanus* coincide with 2*n*=40, we consider this report doubtful.

Selected specimens examined. FRANCE. **Ariège**: près Foix, 42º57'N, 1º37'E, 12 July 1906, *H. Guilhot s.n.* (MA); Pech de Caraybat près Foix, 42º57'N, 1º37'E, 15 July 1900, *H. Guilhot s.n.* (NY). **Aveyron**: Rodez, pr. Cadayrac, 44º28'N, 2º33'E, 27 June 2011, *J. Calvo 5622* (MA); Devèze de Floirac, près Rodez, 44º22'N, 2º33'E, 20 June 1869, *J. de Puyfol 306* (MA, WU). **Charente**: Saint-Christophe, bois, 46º0'N, 0º51'E, 3 July 1898, *J. Foucaud & Jousset 4265* (G); Bois de Saint-Christophe, 46º0'N, 0º51'E, 15 June 1890, *E. Gadeceau s.n.* (NY). **Charente-Maritime**: Courçon-d'Aunis, forêt de Benon, près de la rute de Benon, 46º13'N, 0º48'W, 10 June 1930, *A. Bouchon s.n.* (B); forêt de Benon, 46º13'N, 0º48'W, 14 July 1874, *J. Lloyd s.n.* (NY). PORTUGAL. **Beira Litoral**: Figueira da Foz, Cabo Mondego, 40º11'N, 8º54'W, 25 May 1972, *J. Amaral Franco 5162* (LISI); Quiaios, 40º12'N, 8º51'W, 25 May 1972, *F. Bellot, B. Casaseca & S. Castroviejo s.n.* (MA). **Estremadura**: Montejunto, parte alta, alrededores Ermida de Nossa Senhora das Neves, 39º10'N, 9º3'W, 13 May 2010, *J. Calvo 4623* (MA); Arranhó de Baixo, 38º57'N, 9º8'W, May 1942, *J.M. Carvalho & F.M. Flores 2526* (LISI). SPAIN. **Álava**: Salvatierra, Sierra de Entzia, Atxuri, 42º48'N, 2º19'W, 6 July 1986, *J.A. Alejandre & B. Fernández de Betoño 1076* (MA); Peñacerrada, Mte. Toloño, 42º37'N, 2º44'W, 21 July 1986, *J.A. Alejandre & P. Urrutia 9876* (MA). **Burgos**: Castilla, Candepajares, 42º38'N, 3º1'W, 2 July 1909, *H. Elías 940* (E, H, L); Villaescusa de Roa, monte de Villaescusa frente a Fuenteoco, 41º44'N, 4º3'W, 26 July 1983, *J.L. Fernández Alonso 220* (MA). **Cantabria**: Paracuelles, Hermandad de Campóo de Suso, 43º1'N, 4º13'W, 29 June 1986, *C. Aedo s.n.* (MA); Valdeprado del Río, Hormiguera, 42º52'N, 4º7'W, 1 June 2000, *M. Pardo de Santayana 1416* (MA). **Castellón**: La Jana, rambla de Cervera, 40º28'N, 0º13'E, 28 May 2011, *J. Calvo, T. Buira & D. Mesa 5550* (MA); entre Fredes y el Boixar, 40º41'N, 0º8'E, 8 June 1999, *J. Güemes & al. 2682* (MA). **Huesca**: Sierra de Guara, collado de Chemelosas, 42º18'N, 0º14'W, 24 June 1995, *I. Álvarez s.n.* (MA); Monegros, Sierra de Alcubierre, al W de San Caprasio, 41º43'N, 0º32'W, 9 June 1996, *J. Molero & Ll. Sáez s.n.* (C). **La Rioja**: Turruncún, Sierra de Préjano, Peña Isasa, 42º10'N, 2º8'W, 25 June 1985, *F. Amich & J. Sánchez 83* (E, K); Foncea, 42º37'N, 3º1'W, 28 June 1908, *H. Elías s.n.* (MA). **León**: Monte de Villaobispo, 42º29'N, 6º4'W, June , *M. Lagasca s.n.* (MA). **Navarra**: Esteribar, Saigos, 42º57'N, 1º31'W, 4 June 1988, *I. Aizpuru & P. Catalán 21164* (MA); Nazar, Peña Gallet, Costalera, 42º38'N, 2º17'W, 25 June 1998, *M. Velayos & al. 9210* (MA). **Palencia**: Cervera de Pisuerga, collados y crestas calizas entre Pico de las Cruces y Peña Celada, 42º51'N, 4º32'W, 29 May 1990, *J.A. Alejandre 1075* (MA); Dehesa de Montejo, valle de Tosande, 42º50'N, 4º32'W, 14 July 1995, *E. Monasterio & al. 1334* (MA). **Soria**: Oncala, Mte. Cayo, 41º57'N, 2º16'W, 17 May 1990, *J.A. Alejandre 691* (MA); Arévalo de la Sierra, in nemore Dehesa Mata, 41º57'N, 2º24'W, 24 June 1978, *A. Segura Zubizarreta 16941* (B, BR, C, FI, H, MA). **Tarragona**: Horta de Sant Joan, pr. mas de Josepó, 40º51'N, 0º18'E, 26 May 2011, *J. Calvo & T. Buira 5516* (MA); Puertos de Horta, 40º51'N, 0º18'E, 15 June 1915, *P. Font i Quer s.n.* (BC). **Teruel**: Torre los Negros, pr. barranco del Tejar, 40º49'N, 1º4'W, 29 May 2011, *J. Calvo 5560* (MA); Valacloche, 40º11'N, 1º5'W, June 1893, *É. Reverchon 809* (FI, K, NY, WU). **Valladolid**: Castromonte, 41º46'N, 5º4'W, 27 June 1978, *B. Casaseca & al. s.n.* (MA); Encinas de Esgueva, camino de "Fuentelasbrujas" a "El Gricio", 41º45'N, 4º5'W, 5 June 1993, *R. Castillo & J.L. Fernández Alonso 10605* (MA).

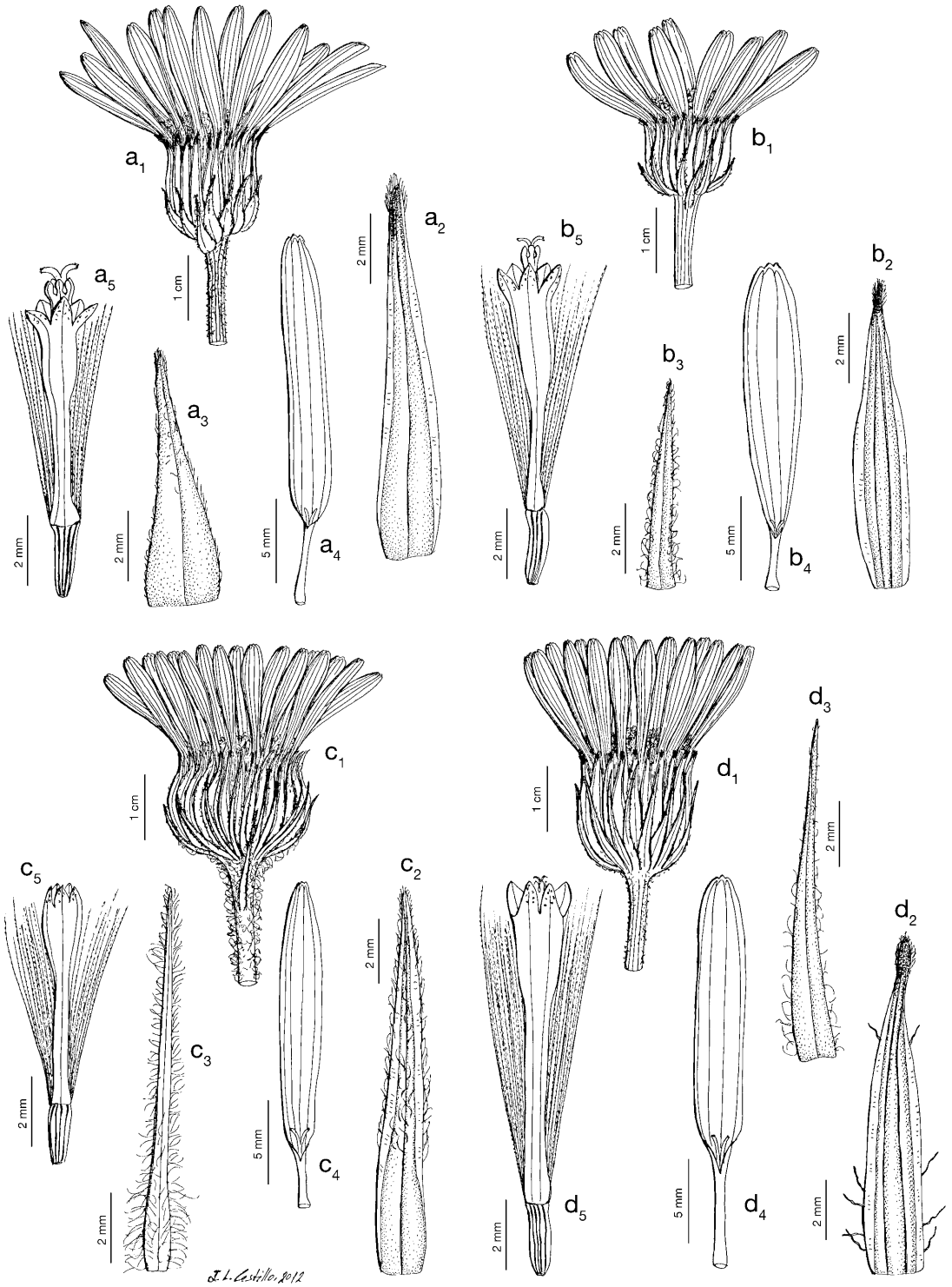


Figure 10. A. *Senecio provincialis* (L.) Druce (drawn from *Puech s.n.* 27 June, M). —a_1. Capitulum. —a_2. Involucral bract. —a_3. Supplementary bract. —a_4. Ligulate floret. —a_5. Tubular floret. B. *Senecio lagascanus* DC. (drawn from *Molero & Sáez s.n.* 9 June 1996, C). —b_1. Capitulum. —b_2. Involucral bract. —b_3. Supplementary bract. —b_4. Ligulate floret. —b_5. Tubular floret. C. *Senecio scopolii* Hoppe & Hornsch. subsp. *scopolii* (drawn from *Pichler 65*, G). —c_1. Capitulum. —c_2. Involucral bract. —c_3. Supplementary bract. —c_4. Ligulate floret. —c_5. Tubular floret. D. *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo (drawn from *Amich & al. s.n.* 18 June 1979, MA). —d_1. Capitulum. —d_2. Involucral bract. —d_3. Supplementary bract. —d_4. Ligulate floret. —d_5. Tubular floret.

4. *Senecio provincialis* (L.) Druce, Rep. Bot. Soc. Exch. Club Brit. Isles 3: 423. 1914. *Inula provincialis* L., Sp. Pl.: 884. 1753, nom. rej. prop. *Senecio provincialis* (L.) Juel, Nova Acta Regiae Soc. Sci. Upsal. ser. 4, 5(7): 54. 1923, nom. illeg., comb. superfl. *Senecio doronicum* var. *provincialis* (L.) Breistr., Bull. Mens. Soc. Linn. Soc. Bot. Lyon: 79. 1960, nom. inval. (ICBN, Art. 33.4). TYPE: France, Collendaneis Galloprovinciae, sine collector (lectotype, designated by Calvo & al. (2011a: 602), Herb. Burser VI: 127, UPS image!).

Senecio gerardi Godr. in Gren. & Godr., Fl. France 2: 122. 1850, nom. cons. prop. *Crociseris gerardi* (Godr.) Fourr., Ann. Soc. Linn. Lyon ser. 2, 16: 404. 1868. *Senecio doronicum* subsp. *gerardi* (Godr.) Nyman, Consp. Fl. Eur.: 354. 1879. *Senecio doronicum* subsp. *gerardi* (Godr.) Arcang., Comp. Fl. Ital.: 346. 1882, nom. illeg., comb. superfl. *Senecio doronicum* [race] *gerardi* (Godr.) Rouy in Rouy & Foucaud, Fl. France 8: 328. 1903. *Senecio doronicum* subsp. *gerardi* (Godr.) Malag., Subsp. Variac. Geogr.: 15. 1973, nom. illeg., comb. superfl. *Senecio doronicum* f. *subtomentosus* Fiori in Fiori & Paol., Fl. Italia 3: 218. 1903. TYPE: France, Var, montagne Sainte-Victoire, [43º31'N 5º36'E], *Castagne s.n.* (lectotype, designated by Calvo & al. (2011a: 602), NCY-13523 image!).

Lepicaune tomentosa Lapeyr., Hist. Pl. Pyrénées: 481. 1813. *Senecio doronicum* var. *tomentosus* (Lapeyr.) Duby, Hist. Pl. Pyrénées: 263. 1828. *Senecio tomentosus* (Lapeyr.) Dulac, Fl. Hautes-Pyrénées: 507. 1867, nom. illeg., non Salisb. 1796 (ICBN, Art. 53.1). *Senecio doronicum* subvar. *tomentosus* (Lapeyr.) Rouy in Rouy & Foucaud, Fl. France 8: 327. 1903. *Senecio doronicum* f. *tomentosus* (Lapeyr.) Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 33. 1916. TYPE: France, Languedoc-Roussillon, Pyrénées-Orientales, Conat, [42º36'N 2º21'E], *Lapeyrouse s.n.* (TLM?, not found).

Senecio obovatus Arv.-Touv., Essai Pl. Dauphiné: 36. 1872, nom. illeg., non Willd. 1803 (ICBN, Art. 53.1). *Senecio aronicum* Arv.-Touv. nom. subst., Essai Esp. Var. Pl.: 10. 1873. TYPE: France, Hautes Alpes, Briançon, Cervières, [44º52'N 6º43'E], 1871, *Arvet-Touvet s.n.* (lectotype, designated here, GRM image!).

Senecio gerardi var. *corbariensis* Timb.-Lagr., Mém. Acad. Sci. Toulouse ser. 7, 7: 474. 1875. *Senecio provincialis* var. *corbariensis* (Timb.-Lagr.) Kerguélen, Index Synon. Fl. France: XVI. 1993 (see ICBN Art. 33.5). TYPE: France, Aude, Tuchan, sommet du Tauch, [42º54'N 2º40'E], 1 June 1875, *Timbal-Lagrave s.n.* (lectotype, designated here, P-3777563 image!).

Senecio gerardi var. *polycephalus* Lamotte, Prodr. Fl. Plat. Centr.: 398. 1881. TYPE: France, Gard, Blandas près d'Alzon, [43º54'N 3º30'E], *Diomède s.n.* (CLF?, not found).

Perennial herb. *Rhizome* 1.1–3.9 cm long, 0.3–0.7 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 12–61 cm, erect, leaved, corrugated, solid, not ramificated, sparsely arachnoid to covered with scattered arachnoid trichomes, sometimes floccose near the base, base without remnants of old leaves or tufts of hairs. *Basal leaves* 2.7–16.3 cm long, 1.4–7.5 cm wide, persistent, ovate to lanceolate (ratio basal leaf width / basal leaf length = 0.30–0.85), obtuse, rarely acute, rounded to cuneate, with a petiole 1.8–14.5 cm long, irregularly dentate to subentire, often crenate (teeth 0.6–1.4 mm deep), glabrescent to covered with scattered arachnoid trichomes above, arachnoid to slightly lanate beneath, usually discolorous. *Cauline leaves* 2–9; *middle cauline leaves* 1.7–19.9 cm long, 0.2–5.3 cm wide, alternate, broadly lanceolate (ratio middle leaf width / middle leaf length = 0.07–0.49), acute, sessile or attenuate into a petiole up to 3 cm long, slightly dentate to entire (teeth 0.5–1.2 mm deep), glabrescent to covered with scattered arachnoid trichomes above, arachnoid to slightly lanate beneath, tertiary venation inconspicuous; *upper cauline leaves* 0.9–4.5 cm long, 0.1–0.9 cm wide, linear to narrowly lanceolate (ratio upper leaf width / upper leaf length = 0.06–0.27), acute, sessile, entire, ± arachnoid. *Synflorescence* reduced to a solitary capitulum or pseudocorymbose, 7–20 cm long, with scarce linear-oblong bracts. *Capitula* 1(–4), 26.5–54.2 mm diam; *involucre* 11.5–24 mm diam, 11–16 mm long, cupuliform; *involucral bracts* (21–)28–34(–38), 9.7–16.5 mm long, 0.8–1.8 mm wide, with scarious margin 0.1–0.7 mm wide, lanceolate to oblong, long-attenuate, 0–2 keeled, apex usually with a black spot, with scattered arachnoid trichomes to glabrescent (trichomes 0.3–1.1 mm long); *supplementary bracts* (9–)16–24(–30), 6–12.6 mm long, 0.6–1.9 mm wide, broadly lanceolate to triangular, sometimes with scarious margin up to 0.4 mm, a quarter to a three-quarters as long as involucral bracts,

with scattered arachnoid trichomes to arachnoid, rarely glabrescent (trichomes 0.3–1.2 mm long), ± imbricate. *Ligulate florets* 15–21, 14.5–25.8 mm long, yellow; *tubular florets* 5.9–8.7 mm long, 0.7–1.4 mm diam, yellow. *Achenes* 4–4.6 mm long, 0.9–1 mm wide, subcylindrical (ratio achene width / achene length = 0.20–0.23), shorter than pappus (ratio achene length / pappus length = 0.58–0.61), with 13–14 ribs, glabrous to glabrescent; *pappus* 6.6–9.2 mm long, whitish. Chromosome number: 2*n*=40 (Guinochet & Logeois, 1962: 474; Küpfer, 1969: 36-38, sub *S. doronicum s.l.*, see comments below; Küpfer 1972: 1753, sub *S. gerardi*). Figure 10A.

Iconography. Gérard (1761: 196 fig. 7); Coste (1903: 308 n.º 1844, sub *S. gerardi*); Bonnier (1922: fig. 286 n.º 1423-b, sub *S. gerardi*).

Distribution and habitat. France and Spain; camephytic meadows, exposed rocky places, shrublands, and open woods of *Pinus nigra* J.F. Arnold, *Pinus halepensis* Mill., *Quercus faginea* Lam., rarely on subalpine meadows, usually accompained by *Buxus sempervirens* L., *Arctostaphylos uva-ursi* (L.) Spreng., *Serratula nudicaulis* (L.) DC., *Valeriana tuberosa* L., on calacareous soil; altitude 175–1800 m (Figure 11).

Phenology. Flowering from April to June.

Etymology. The epithet *provincialis* refers to the Provence, ancient region of southeastern France.

Discussion. This species is recognizable by its supplementary bracts widened at the base, usually slightly scarious on the margin and ± imbricate, and by its basal leaves. These are ovate to lanceolate with the base of the lamina rounded to cuneate, glabrescent to covered with scattered arachnoid trichomes above, arachnoid to slightly lanate beneath, ± discolour. It is particulary variable in number of capitula, which may be solitary or up to 4, and the shape and indumentum of basal leaves.

Senecio provincialis is similar to *S. doronicum* and *S. lagascanus*, with which partially overlaps its area of distribution. Characters to differenciate those species are given in both *S. doronicum* and *S. lagascanus* comments. The variability observed in

capitula number among populations can not hold the infraespecific entities because the lack of geographic delimitation of these populations.

Plants resulting from a potential hybridization event between *S. provincialis* and *S. lagascanus* were found in a population from La Segarra (Catalonia, Spain; *Calvo 3622 & Pedrol*, MA). This population is composed of few specimens that display various combinations of diagnostic features of both species. For more details see Calvo & al. (2013b).

Since the proposal to conserve the name *S. gerardi* against *Inula provincialis* (Calvo & al., 2011a) was rejected (Applequist, 2012), the priority name for this taxon is *S. provincialis*. About tipification details see also Calvo & al., 2011a.

The original material used by Küpfer (1969) to report the chromosome number of *S. provincialis* 2*n*=40 was collected at Puig d'Alp (Girona, Spain), where only is known the presence of this taxon. However, the testimony voucher has not revised.

Selected specimens examined. FRANCE. **Alpes-de-Haute-Provence**: Barcelonnette, 44º22'N, 6º38'E, 1851, [*illegible*] (NY). **Alpes-Maritimes**: Caussols, summet de Calern, 43º45'N, 6º55'E, 24 May 2010, *J. Calvo & A. Unió 4659* (MA); Caussols, sur le plateau de Caussols au sud de la route D.12 entre l'Embut et le col de l'Ecre, 43º44'N, 6º56'E, 31 May 1990, *B. Retz 89951* (B, H, MA). **Aude**: Tuchan, montagne de Tauch, parte alta, 42º54'N, 2º40'E, 30 May 2009, *J. Calvo & T. Buira 3702* (MA); Narbonne, montage d'Alaric, 43º8'N, 2º37'E, 4 June 1887, *C. Copineau s.n.* (F). **Aveyron**: Viala-du-Pas-de-Jaux (Aveyron), Bois de la Garrigue, 43º58'N, 3º3'E, 27 May 1906, *H. Puech s.n.* (B, H, M); Saint Beauzély, 44º9'N, 2º57'E, 10 June 1903, *J. Soulié s.n.* (B). **Bouches-du-Rhône**: sur la tête de Carpiagne près Marsella, 43º15'N, 5º30'E, 24 May 1857, *G. Rouy s.n.* (NCY); Roque Forcade (B du Rhone), 43º18'N, 5º39'E, 3 June 1866, *G. Rouy s.n.* (K). **Gard**: Le Vigan, 43º59'N, 3º35'E, June 1866, *T. Diomède s.n.* (NY). **Haute-Garonne**: S. Michel-des-Sers, 43º8'N, 1º3'E, 17 May 1869, [*illegible*] (WU). **Hautes-Alpes**: Briançon, Cervières, 44º52'N, 6º43'E, 1871, *J.M.C. Arvet-Touvet s.n.* (GRM). **Hérault**: Mont. de la Serane bey Montpellier, 1807, *D. Corbin s.n.* (LE); Le Cros, 43º52'N, 3º21'E, 9 June 1934, *M. Martínez s.n.* (MA). **Lozère**: Lozère, 44º26'N, 3º49'E, 20 June 1848, *M. Lamotte 2170* (NCY). **Pyrénées-Orientales**: Pyr-Or., Massif du Coronat, à Belloc, 42º36'N, 2º21'E, 16 June 1898, *F. Sennen s.n.* (BC). **Var**: Ampus, montagne de la Cabrière, 43º36'N, 6º22'E, May 1916, *P. Cousturier & Wiedmann s.n.* (NY); Mont. Coudon dans le bois au nord, 43º9'N, 5º59'E, 16 May 1854, *H. Jacquin & Metz s.n.* (UPS). **Vaucluse**: sommet du Ventoux, 44º9'N, 5º17'E, 25 June 1877, *E. Reverchon s.n.* (WU). SPAIN. **Barcelona**: Collsuspina, Serra de Castellar, 41º48'N, 2º11'E, 21 May 1912, *P. Font i Quer s.n.* (BC). **Girona**: inter Alp et Tossa d'Alp, 42º20'N, 1º54'E, 27 June 1976, *F.J. Fernández Casas & al. 1263* (MA); Baix Empordà, Torroella de Montgrí, a prop de l'ermita de Santa Caterina, 42º3'N, 3º8'E, 18 Apr 2004, *J. Font s.n.* (HGI). **Lleida**: La Segarra, Torrefeta i Florejacs, pr. serra de Miravall, 41º49'N, 1º14'E, 25 May 2009, *J. Calvo & J. Pedrol 3622* (MA); Montsec d'Ares, voltants de Sant Alís, 42º2'N, 0º45'E, 19 June 1979, *A. Romo s.n.* (BC). **Tarragona**: Muntanyes de Prades, La Pena vers Rojals, 41º20'N, 1º5'E, 28 May 1950, *E. Batalla s.n.* (BC); El Priorat, La Morera de Montsant, pr. Pla de la Mola, 41º17'N, 0º53'E, 26 May 2009, *J. Calvo & J. Nogués 3642* (MA).

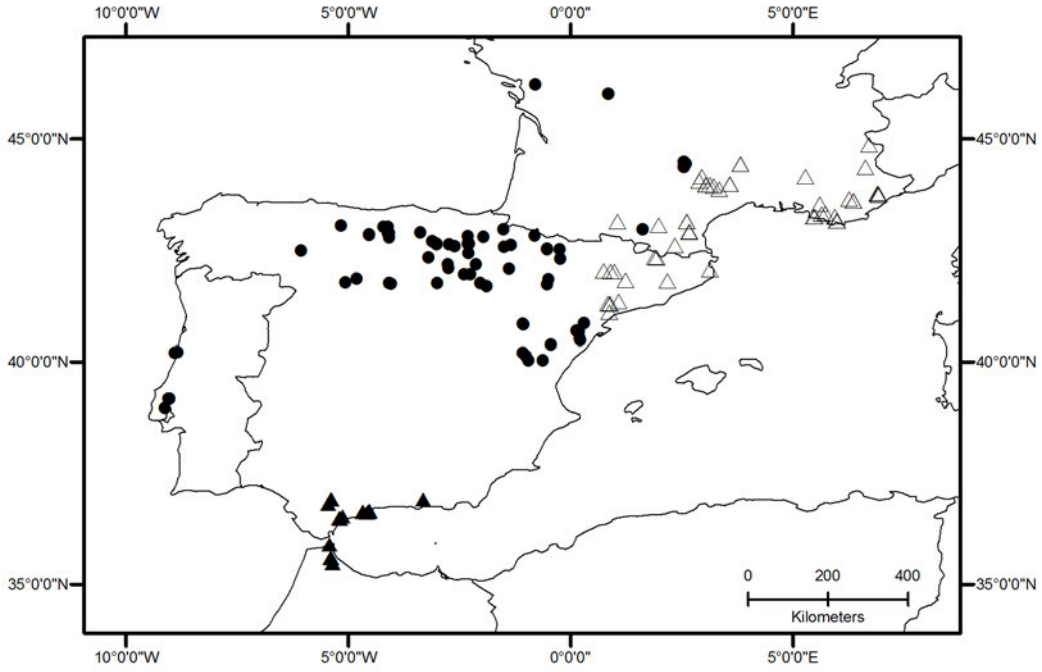


Figure 11. Distribution map for *Senecio provincialis* (L.) Druce (Δ), *S. lagascanus* DC. (●), and *S. eriopus* Willk. (▲).

5. *Senecio eriopus* Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 116. 1865. TYPE: Spain, Málaga, Sierra Bermeja, [36º29'N 05º12'W], 1845, *Willkomm 729* (lectotype, designated here, COI-37583 image!; isolectotype, MA-130578!, MO!, P-3688109 image!).

Senecio doronicum var. *hosmariensis* J. Ball, J. Bot. 2: 367. 1873 [“hosmariense”]. *Senecio eriopus* var. *hosmariensis* (J. Ball) Pau, Cavanillesia 2: 90. 1929. *Senecio eriopus* subsp. *hosmariensis* (J. Ball) Blanca, Lagascalia 18: 309. 1996. TYPE: Morocco, Tetuán, Monte Beni Hosmar, [35º28'N 05º21'W], 12 Apr 1871, *Ball s.n.* (lectotype, designated here, K-311469!).

Perennial herb. *Rhizome* 1.2–3.2 cm long, 0.5–0.8 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 9–75 cm, erect, scarcely leaved, corrugated, solid, not ramificated, lanate to covered with scattered arachnoid trichomes, base without remnants of old leaves or tufts of hairs. *Basal leaves* 2.6–11.6 cm long, 1.8–8.2 cm wide, persistent, ovate to elliptic, sometimes lanceolate (ratio basal leaf width / basal leaf length = 0.44–1.12), obtuse, subcordate to attenuate, with a petiole 1.4–18 cm long, crenate to dentate (teeth 0.6–1.5 mm deep), arachnoid to glabrescent above, sparsely

floccose to scattered arachnoid trichomes beneath, sometimes violet coloured, ± discolorous. *Cauline leaves* 2–8; *middle cauline leaves* 2.3–8.8 cm long, 0.5–4.8 cm wide, alternate, lanceolate to narrowly ovate (ratio middle leaf width / middle leaf length = 0.17–0.80), acute to obtuse, sessile or attenuate into a petiole up to 8 cm long, slightly dentate, rarely subentire (teeth 0.7–2 mm deep), arachnoid to glabrescent above, sparsely floccose to scattered arachnoid trichomes beneath, tertiary venation inconspicuous; *upper cauline leaves* 1–10 cm long, 0.1–3.5 cm wide, linear to oblong (ratio upper leaf width / upper leaf length = 0.07–0.35), acute, sessile, entire, rarely slightly dentate (teeth 1–1.3 mm deep), ± arachnoid. *Synflorescence* reduced to a solitary capitulum or pseudocorymbose, 5–42 cm long, with scarce linear-oblong bracts. *Capitula* 1–2(–3), 27.6–52.6 mm diam; *involucre* 13.2–32.8 mm diam, 10–19 mm long, cupuliform; *involucral bracts* (20–)22–32(–34), 8.7–14.6 mm long, 1.1–3.1 mm wide, with scarious margin 0.2–0.8 mm wide, lanceolate to oblong, attenuate, smooth, apex sometimes with a black-purplish spot, lanate to ± arachnoid; *supplementary bracts* (9–)14–18(–20), 4.8–12.1 mm long, 0.5–1.7 mm wide, subulate, without scarious margin, a half to as long as involucral bracts, lanate to ± arachnoid, not imbricate. *Ligulate florets* 13–27, 10.9–28.2 mm long, yellow; *tubular florets* 5.8–9.4 mm long, 0.9–1.8 mm diam, yellow. *Achenes* 3.3–7 mm long, 0.7–1.5 mm wide, subcylindrical (ratio achene width / achene length = 0.14–0.27), shorter than pappus (ratio achene length / pappus length = 0.62–0.95), with 9–11 ribs, glabrous to glabrescent (scattered intercostal trichomes ca. 0.1 mm long); *pappus* 4.6–9.7 mm long, whitish. Chromosome number: unknown.

Iconography. Caballero (1948: 541, 569 fig. 10).

Distribution and habitat. S Spain and N Morocco; shrublands with *Chamaerops humilis* L., *Pistacia lentiscus* L., *Quercus coccifera* L., open woods of *Pinus halepensis*, *Quercus ilex* L., *Quercus faginea*, on calcareous soils; altitude 300–1450 m (Figure 11).

Phenology. Flowering from March to June.

Etymology. The specific epithet refers to the dense whitish color of the indumentum on stem and involucre.

Discussion. The involucre lanate to ± arachnoid, with supplementary bracts a half toas long as involucral bracts, and the basal leaves ± discolorous are the distinctive characters in *S. eriopus*. However, it is a variable species regarding the size, abundance of indumentum, and the shape of basal leaves. On this base, the populations from W Rif have been treated as a different subspecies (Pau, 1929; Blanca, 1996). Certainly, these specimens are usually smaller, more glabrescent, and they show truncate or subcordate basal leaves. The variability within the iberian populations is wider and embraces that found in W Rif, finding lanate specimens in Sierra de Líjar (Cádiz) and almost glabrescent ones in Cerro Calamorro (Sierra de Mijas, Málaga). The size and the shape of basal leaves are also highly variable. Therefore, in the present taxonomic treatment we include all populations within the same taxonomic entity.

Senecio eriopus could be confused with *S. scopolii* because the lanate involucre in some specimens, but they can be easily differenciated by the basal leaves (ovate to broadly lanceolate, usually rounded to subcordate, ± discolorous in *S. eriopus* vs. lanceolate to oblanceolate, rarely obovate, usually attenuate, ± concolorous in *S. scopolii*). Boissier (1840) recorded *S. doronicum* var. *lanatus* W.D.J. Koch (a synonym of *S. scopolii*) in southern Spain. The exsicatta on which is based such record (G!, K!, LE! and P image!) has been identified as *S. eriopus*.

Selected specimens examined. MOROCCO. **Tanger-Tétouan**: Jbel Dersa, parte alta, 35º36'N, 5º24'W, 10 Apr 2009, *J. Calvo & I. Espejo 3492* (MA); montis Dj. Dersa, supra Tetauen, 35º35'N, 5º23'W, 20 May 1930, *P. Font i Quer 679* (BC, MA, S); Djebel Musa, 35º53'N, 5º25'W, 12 May 1930, *P. Font i Quer s.n.* (BC); Djebel Dersa en las cumbres, 35º35'N, 5º23'W, 13 Apr 1929, *J. Mas Guindal s.n.* (MA). SPAIN. **Cádiz**: Algodonales, Sierra de Líjar, 36º54'N, 5º23'W, 16 May 1980, *A. Aparicio & B. Cabezudo s.n.* (MA); Zahara, sierra Margarita, 36º48'N, 5º27'W, 20 June 1983, *A. Aparicio & S. Silvestre s.n.* (MA); Algodonales, ladera norte de la sierra de Líjar, 36º54'N, 5º24'W, 17 May 2009, *J. Calvo 3607* (MA). **Granada**: Pitres, Sierra de Mecina, pico, 36º54'N, 3º19'W, 10 June 1980, *J. Molero s.n.* (MA). **Málaga**: in montibus propé Estepona et Ronda, 36º31'N, 5º8'W, *E. Boissier s.n.* (G, K, LE); Benalmádena, cerro Calamorro, 36º37'N, 4º33'W, 14 May 2009, *J. Calvo 3547* (MA); Alhaurín el Grande, Pecho Redondo, 36º37'N, 4º40'W, 15 May 2009, *J. Calvo 3565* (MA); Estepona, Sierra Bermeja, 36º29'N, 5º12'W, 3 June 1978, *F.J. Fernández Casas 2275* (MA); Sierra de Mijas supr. Churiana, 36º36'N, 4º35'W, 7 May 1879, *R. Huter, P. Porta & G. Rigo 1054* (FI, K, LE, NY).

6. *Senecio scopolii* Hoppe & Hornsch., Tageb. Reise Adriat.: 251. 1818, nom. nov. *Senecio lanatus* Scop., Fl. Carniol. ed. 2, 2: 165. 1772, [nom. subst.], nom. illeg., non L. 1758-1759 (ICBN, Art. 53.1). *Cineraria arachnoidea* Sieber ex Rchb. in Mössler, Handb. Gewächsk. ed. 2, 2: 1501. 1829, nom. illeg (ICBN Art. 11.4). *Senecio doronicum* var. *lanatus* Scop. ex W.D.J. Koch, Syn. Fl. Germ. Helv.: 391. 1837

["lanatam"]. *Senecio arachnoideus* Sieber ex DC., Prodr. 6: 357. 1838, nom. illeg. (ICBN Art. 11.4). *Senecio lanatus* var. *arachnoideus* (Sieber ex DC.) Nyman, Consp. Fl. Eur.: 355. 1879, nom. illeg. (ICBN Art. 11.4). *Senecio doronicum* var. *arachnoideus* (Sieber ex DC.) Fiori in Fiori & Paol., Fl. Italia 3: 218. 1903, nom. illeg. (ICBN Art. 11.4). TYPE: Italy, Triest, Karstwiesen am Monte Spaccato, [45º39'N 13º49'E], June 1891, *Steurer s.n.* (neotype, designated here, B-10-0299795!; isotypes B-10-0299794!, LE!, P-3688121 image!).

Perennial herb. *Rhizome* 1.5–4 cm long, 0.3–0.6 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 17–64 cm, erect, leaved to almost bared, corrugated, solid, not ramificated, arachnoid to covered with scattered arachnoid trichomes, sometimes lanate towards base and under the capitula, base without remnants of old leaves or tufts of hairs. *Basal leaves* 3.9–10.8 cm long, 1.6–4.4 cm wide, persistent, lanceolate to obovate (ratio basal leaf width / basal leaf length = 0.29–0.68), obtuse, attenuate to rounded, with a petiole 1.5–10.5 cm long, irregularly dentate, often ± crenate (teeth 0.4–1.5 mm deep), glabrescent to weakly arachnoid above, ± arachnoid to covered with scattered arachnoid trichomes beneath (trichomes ca. 0.7 mm long), concolorous. *Cauline leaves* 3–12; *middle cauline leaves* 2.3–18.2 cm long, 0.2–3.3 cm wide, alternate, lanceolate (ratio middle leaf width / middle leaf length = 0.09–0.37), acute, sessile to semi-amplexicaul, sometimes attenuate into a petiole up to 5 cm long, dentate to subentire (teeth 0.6–1.5 mm deep), glabrescent to weakly arachnoid above, ± arachnoid to covered with scattered arachnoid trichomes beneath, tertiary venation inconspicuous; *upper cauline leaves* 1.0–5.7 cm long, 0.1–0.8 cm wide, oblong to narrowly lanceolate (ratio upper leaf width / upper leaf length = 0.04–0.24), acute, sessile to semi-amplexicaul auriculate, entire to subentire, ± arachnoid. *Synflorescence* reduced to a solitary capitulum, rarely pseudocorymbose, 7.5–13 cm long, with scarce linear-oblong bracts. *Capitula* 1(–3), 29.3–55.2 mm diam; *involucre* 11.8–29.4 mm diam, 12–18 mm long, cupuliform; *involucral bracts* (18–)28–32(–34), 6.2–15.3 mm long, 1–2.1 mm wide, with scarious margin 0.2–0.6 mm wide, lanceolate to oblong, long-attenuate, smooth, apex usually without a black spot, ± lanate to covered with scattered arachnoid trichomes (trichomes 0.3–1.3 mm long); *supplementary bracts* (8–)14–26(–44), 6.9–15.2 mm long, 0.6–1.7 mm wide, long-subulate, slightly scarious on the margin, a three-quarters as long as involucral bracts to slightly longer, lanate to

covered with scattered arachnoid trichomes (trichomes 0.1–1.6 mm long), ± imbricate. *Ligulate florets* 13–32, 14.7–27.6 mm long, pale yellow; *tubular florets* 5.7–9.7 mm long, 0.7–1.5 mm diam, pale yellow. *Achenes* 4.2–6.7 mm long, 0.9–1.3 mm wide, subcylindrical (ratio achene width / achene length = 0.16–0.28), shorter than pappus (ratio achene length / pappus length = 0.58–0.75), with 10–12 ribs, glabrous to covered with scattered intercostal trichomes ca. 0.1 mm long; *pappus* 8–9 mm long, whitish.

Etymology. Senecio scopolii is named in honor of Giovanni Antonio Scopoli (1723-1788), Austrian-Italian (Tirol-born) physician, chemist and botanist.

Discussion. Senecio scopolii is characterized by its solitary capitulum, very rarely up to 3, and its arachnoid-lanate involucre with supplementary bracts as long as the involucral ones, often longer, usually without black spot near the apex, and sometimes ± imbricate. This taxon present a circum-Adriatic distribution, and is highly variable concerning the indumentum of capitula, number of supplementary bracts, and the shape, consistency and indumentum of leaves. Most populations display lanceolate to oblanceolate leaves, thin, glabrescent above, and arachnoid to weakly arachnoid beneath, while those populations from Abruzzo and Marche (Apennine Mountains) usually have obovate leaves, subcoriaceus, with scabrid-arachnoid trichomes on both faces. On this base, we recognize two subspecies. The similar species to *S. scopolii* are *S. doronicum* and *S. eriopus*. Their differences are discussed under the respective species.

According to Staffleu & Cowan (1985) the Scopoli herbarium specimens are at LINN (set received by Linnaeus), C (through Vahl), UPS (in herb. Thunberg), B (mainly destroyed), MPU (through Lapeyrouse). Our efforts to locate the original material were unsuccessful, thus, we neotypify *S. scopolii* on a Steurer's collection from nearby the locus classicus.

Key to subspecies of *Senecio scopolii*

1a. Stem leaved; leaves lanceolate to oblanceolate, usually thin, with arachnoid-floccose indumentum.....**6a. *S. scopolii* subsp. *scopolii***
1b. Stem scarcely leaved; leaves obovate, rarely lanceolate, usually subcoriaceous, with scabrid-arachnoid indumentum.....**6b. *S. scopolii* subsp. *floccosus***

6a. *Senecio scopolii* subsp. *scopolii*

Arnica lanigera Ten., Prodr. Fl. Neapol.: 49. 1812. TYPE: Italy, Basilicata, Potenza, Ruggio [Ruggia, 39º54'N 16º07'E], *Tenore s.n.* (lectotype, designated here, NAP image!; paratype, LE!, P-3688098 image!, P-3688124 image!).

Senecio doronicum var. *latifolius* Vis., Fl. Dalmat. 2: 71. 1847 ["latifolia"]. *Senecio doronicum* f. *latifolius* (Vis.) Hayek, Repert. Spec. Nov. Regni Veg. Beih. 30 (2): 674. 1931. TYPE: Croatia, in Biokovo, [43º20'N 17º03'E], *Visiani s.n.* (lectotype, designated here, PAD image!).

Senecio doronicum f. *albanicus* Kümmerle & Jáv., Bot. Közlem. 19: 28. 1920-1921. TYPE: Albania, montes nivales Korab, [41º47'N 20º32'E], 24 July 1918, *Kümmerle s.n.* (lectotype, designated here, BP-410478 image!).

Stem leaved. *Leaves* lanceolate to oblanceolate, attenuate, usually thin and soft, light green, with arachnoid-floccose indumentum. Apex of the *involucral bracts* usually without a black spot. Chromosome number: 2*n*=38-40 (Cesca & Palermo, 1981: 388, sub *S. tenorei*, see comments below). Figure 10C.

Iconography. Tenore (1830, fig. 193-1); Reichenbach (1853, fig. 975-2); Hegi (1928: 753 fig. 459).

Distribution and habitat. Albania, Bosnia-Herzegovina, Croatia, Greece, Italy, Macedonia?, Montenegro, Serbia?, Slovenia; montane and subalpine meadows, rocky slopes, edge of woods of *Fagus sylvestris* and *Carpinus sp.*, on calcareous soil; altitude 330–2800 m (Figure 12).

Phenology. Flowering from April to July.

Discussion. The specimen collected at Mount Korab (Albania) by Kümmerle was described as *Senecio doronicum* f. *albanicus*. It presents lanate involucre, and it is

remarkable the floccose indumentum on stem and leaves, confering an unusual whitish aspect.

We do not have the chance to study material of this taxon from Serbia and Macedonia, although we include them with a question mark in the distribution according to Euro+Med **(**2006-).

The chromosome number recorded by Cesca & Palermo (1981) under *S. tenorei* come from Monte Pollino (Calabria, Italy), where according to the present treatment the populations from this region correspond to *S. scopolii* subsp. *scopolii*. Otherwise, the base material for the chromosome number (2*n*=40) provided by Küpfer (1974) and Chichiriccò & Tammaro (1982) are from the Central Apennines, where both subspecies overlap their ranges. Since we could not revise the these vouchers, we prefer do not assign these countings to any subspecies.

Selected specimens examined. ALBANIA. Distrikt Hasi Pastrik, Felsige Hänge in der subalp region, 42º13'N, 20º30'E, 15 May 1918, *I. Dörfler 421* (C, G, S); Bertiscus, in monte Greben prope pagum Gusinje, 42º33'N, 19º41'E, 22 July 1933, *K.H. Rechinger & J. Scheffer 1485* (G). BOSNIA-HERZEGOVINA. Velež bei Mostar, 43º20'N, 17º59'E, 25 July 1896, *V. Curcic s.n.* (WU); inter Jastrebicu et Bijela Gora, 42º40'N, 18º31'E, 1872, *J. Pantocsek s.n.* (G). CROATIA. Velebit, Sveto Brdo, am gipfel, 44º20'N, 15º33'E, 24 July 1890, *R. Beyer s.n.* (B); Istria, Učka, 45º18'N, 14º12'E, 31 May 2010, *J. Calvo & A. Unió 4715* (MA); Splitsko-Dalmatinska, am Sveti Jure des Biokovo, 43º20'N, 17º3'E, 28 June 1927, *A. Ernst s.n.* (UPS); Monte Maggiore, loco d. Reeina, 45º15'N, 14º12'E, 27 May 1928, *K.H. Rechinger s.n.* (G). GREECE. **Epirus**: Smolikas, 40º5'N, 20º55'E, 23 June 1961, *D. Phitos 232* (M). **Thessaly**: Malakasi, mte. Tragopetra, 39º46'N, 21º17'E, 17 June 1896, *P. Sintenis 593* (G); Mandra Hodža in Pindo tymphaeo, 39º41'N, 21º11'E, 24 June 1896, *P. Sintenis 742* (B). **West Macedonia**: Kastorias, Gramos, ridge c. 2 km ESE of the main summit, 40º20'N, 20º49'E, 28 June 2004, *A. Strid & D. Vassiliades 55317* (G); Kastoria, Ep. Kastoria, 1,3 km NO Pano Arena, 40º19'N, 20º54'E, 4 July 1989, *E. Willing 7903* (B). ITALY. **Abruzzo**: Gran Sasso d'Italia, Campo Imperatore, monte Cristo, 42º26'N, 13º34'E, 4 June 1987, *C. Evrard 10800b* (F); Abruzzi, Gran Sasso Prati di Tivo, 42º29'N, 13º33'E, 8 July 1967, *J.E. Langhe s.n.* (BR). **Apulia**: Foggia, San Giovanni Rotondo, monte Calvo, 41º43'N, 15º46'E, 4 Apr 2011, *J. Calvo & A. Quintanar 5212* (MA); Hochfläche des Monte Gargano, an der Straβe Carbonara-Vico del Gargano, 41º50'N, 16º0'E, 29 Apr 1968, *P. Hiepko 123* (B); **Basilicata**: Calabriae, Piano di Pollino, 39º54'N, 16º12'E, July 1880, *V. Tenore s.n.* (FI). **Calabria**: Cosenza, Waldstufe des Mte. Pollino an der Straβe zum Col di Dragonet, 39º53'N, 16º11'E, 1 June 1968, *H. Merxmüller & W. Lippert 23760* (M); M. Pollino, in nemoribus loci "la Manfriana", 39º52'N, 16º14'E, 24 June 1898, *G. Rigo 412* (B, L, M, WU). **Campania**: Monte Alburno, Salermo, 40º32'N, 15º19'E, 2 July 1910, *C.C. Lacaita s.n.* (WU). **Lazio**: Abruzzen, Amatrice, Pizzo di Sevo, 42º39'N, 13º20'E, June 1950, *F. Markgraf & I. Markgraf s.n.* (B). **Trieste**: Tergestina, prope Basovizza, 45º37'N, 13º51'E, *C. Marchesetti 1801* (G, LE); m. Spaccato u. Lippiza, 45º39'N, 13º49'E, *M. de Tommasini 1434* (G, LE). MONTENEGRO. M. Planinica, distr. Kuči, 42º37'N, 19º30'E, 17 July 1898, *A. Baldacci 219* (LE). SLOVENIA. Koper, Lokev, Veliko Gradišče, 45º38'N, 13º55'E, 20 May 1976, *L. Feoli Chiapella 8818* (B); Primorsko, Divača, 45º40'N, 13º58'E, 7 May 1959, *E. Mayer 54796* (M); Čičarija, Slavnik supra Kozina, 45º33'N, 13º58'E, 15 May 1967, *E. Mayer 63476* (M); Karst, Knapp an der küstenländischen Grenze südwestlich von Senozec, 45º42'N, 14º1'E, 29 May 1955, *H. Merxmüller & W. Wiedmann 17896* (M); Gore prope vicum Povir, 45º41'N, 13º55'E, 11 May 1974, *T. Wraber & M. Lovka 89932* (C).

6b. *Senecio scopolii* subsp. *floccosus* (Bertol.) Greuter, Willdenowia 33: 248. 2003. *Arnica floccosa* Bertol., Lucubr. Re Herb.: 36. 1822. *Senecio lanatus* subsp. *floccosus* (Bertol.) Arcang., Comp. Fl. Ital.: 346. 1882. *Senecio tenorei* Pign., nom. nov., non *S. floccosus* Britton, Giorn. Bot. Ital. 111: 56. 1977. TYPE: Italy, Lazio, Rieti, Pizzo di Sivo, [42º40'N 13º20'E], 1818, *Orsini 90* (lectotype, designated here, BOLO image!, right hand specimen).

Senecio doronicum var. *pseudoarachnoideus* Fiori in Fiori & Paol., Fl. Italia 3: 218. 1903 [“pseudo-arachnoideus”]. TYPE: Italy, Abruzzo, montis Cornu (Gran Sasso Corno Grande, supra Campo Pericoli), [42º27'N 13º33'E], 21 Aug 1875, *Levier s.n.* (lectotype, designated here, FI!).

Plants usually subscapose, scarcely leaved on the stem. *Leaves* obovate, rarely lanceolate, rounded to attenuate, usually subcoriaceous, green, with scabrid-arachnoid trichomes. Apex of the *involucral bracts* sometimes with a black spot. Chromosome number: unknown.

Distribution and habitat. Italy; subalpine and alpine meadows, rocky slopes, edge of woods of *Fagus sylvatica*, on calcareous soil; altitude 1100–2400 m (Figure 12).

Phenology. Flowering from June to August.

Discussion. Since Bertoloni described *Arnica floccosa* at 1822, the concept of this taxon has been changed over time depending on the authors. Moreover, the vague geographic delimitation and its intraspecific variability make the circumscription more complicated. According to Fiori (1903), who recognized this taxon under the name *Senecio doronicum* var. *pseudoarachnoideus*, it sometimes grows mixed with *S. scopolii* susbp. *scopolii*. Nonetheless, the diagnostic characters mentioned above are usually useful to distinguish from each other.

As we have commented under *S. doronicum*, *S. scopolii* subsp. *floccosus* also overlaps with *S. doronicum* subsp. *orientalis* its area of distribution. Taking into account that some specimens display a combination of characters characteristic of *S. scopolii* (e.g., a single capitulum per plant) and *S. doronicum* (e.g., supplementary bracts more

glabrescent and keeled involucral bracts with an apical black spot), *S. scopolii* subsp. *floccosus* might be of hybrid origin. See Calvo & al. (2013b) for more details and phylogenetic approach.

We have already commented that this taxon could be confused with *S. eriopus* from southern Spain and northwestern Rif (Morocco) because their arachnoid-lanate involucre. The taxon under consideration also could share the ovate to obovate leaves, but in this case the indumentum of the leaves is important to distinguish from each other (arachnoid-floccose in *S. eriopus* vs. scabrid-arachnoid in *S. scopolii* subsp. *floccosus*).

Selected specimens examined. ITALY. **Abruzzo**: L'Aquila, Campo Imperatore, 42º26'N, 13º33'E, 30 June 2002, *C. Aedo & al. 8287* (MA); Pizzo di Sivo, 42º40'N, 13º20'E, *T. Caruel s.n.* (G); Montes Cavallo, Magilla in Aprutio, 42º8'N, 14º5'E, Aug 1875, *H. Groves s.n.* (FI); Val di Canella, Monte Amaro, 42º5'N, 14º5'E, 10 Aug 1874, *H. Groves s.n.* (FI); Gran Sasso, M. Corno, 42º28'N, 13º33'E, July 1905, *M. Guadagno s.n.* (MA); montis Corno, suprà Pietra Camele, 42º29'N, 13º33'E, 27 Aug 1856, *A. Huet de Pavillon & E. Huet de Pavillon 360* (G); regionis alpina editioris montis Majella (lat. oriental in Vall. Canella), 42º5'N, 14º7'E, 10 Aug 1874, *E. Levier s.n.* (FI); mont. elatior sub-alpin Mt. Cornu, 42º26'N, 13º42'E, Oct 1851, *A. Orsini s.n.* (FI); in Aprutii montibus, Pizzo di Sivo, 42º40'N, 13º20'E, 1859, *F. Parlatore s.n.* (MO). **Marche**: Mt. Sibyllae, 42º53'N, 13º12'E, June 1845, *D. Marzialetti s.n.* (FI); Apennin central, refuge du Mte. Vettore, 42º50'N, 13º16'E, 30 July 1975, *P. Ozenda s.n.* (G); M. Vettore (Umbria), 42º49'N, 13º16'E, 3 July 1877, *R. Ricci s.n.* (FI); limite lungo prope Caldarola, 43º5'N, 13º11'E, 15 June 1879, *R. Ricci s.n.* (FI).

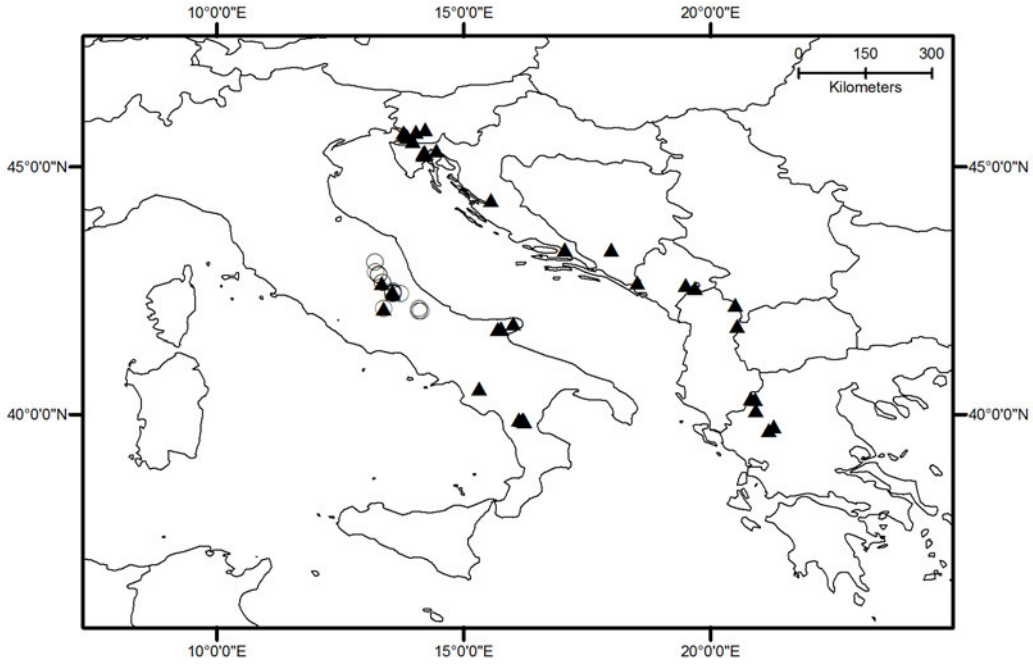


Figure 12. Distribution map for *Senecio scopolii* Hoppe & Hornsch. subsp. *scopolii* (▲) and *S. scopolii* subsp. *floccosus* (Bertol.) Greuter (○).

7. *Senecio pyrenaicus* L. in Loefl., Iter Hispan.: 304, 61. 1758. TYPE: Spain, Catalonia, Montes de Núria, [42º24'N 2º09'E], 22 Aug 1949, *Font i Quer 692* (neotype, designated here, MA-348733!; isotypes, ARAN-67956 image!, F-1395364!, HBIL-16186 image!).

Senecio persicaefolius Ramond, Bull. Sci. Soc. Philom. Paris 43: 146. 1801, nom. illeg. non L. 1760 (ICBN, Art. 53.1). TYPE: Bull. Sci. Soc. Philom. Paris 43: tab. 11 fig. 3. 1801 (lectotype, designated here, ICBN Art. 8.1).

Senecio caespitosus Brot., Fl. Lusit. 1: 390. 1804 [“cespitosus”]. *Senecio tournefortii* subsp. *caespitosus* (Brot.) Cout., Fl. Portugal: 641. 1913. *Senecio pyrenaicus* var. *caespitosus* (Brot.) Pau, Bol. Soc. Ibér. Ci. Nat. 23: 106. 1924-1925. *Senecio pyrenaicus* subsp. *caespitosus* (Brot.) Malag., Sin. Fl. Ibér. 76: 1202. 1977. *Senecio pyrenaicus* subsp. *herminicus* Rivas Mart., Anales Real Acad. Farm. 47: 476. 1981, nom. illeg. (ICBN Art. 11.4). *Senecio pyrenaicus* subsp. *caespitosus* (Brot.) Franco, Nova Fl. Portugal 2: 570, 426. 1984 [“caespitosis”], nom. illeg., comb. superfl. TYPE: Portugal, ex Lusitania, 1804, *Hoffmannsegg s.n.* (lectotype, designated here, LE!).

Senecio rotundifolius Lapeyr., Hist. Pl. Pyrénées: 517. 1813. *Senecio doronicum* var. *rotundifolius* (Lapeyr.) DC., Prodr. 6: 357. 1838. *Senecio doronicum* var. *rotundifolius* (Lapeyr.) Steud., Nomencl. Bot. ed. 2, 2: 560. 1841, nom. illeg., comb. superfl. *Senecio doronicum* subvar. *rotundifolius* (Lapeyr.) Nyman, Consp. Fl. Eur.: 354. 1879. *Senecio doronicum* f. *rotundifolius* (Lapeyr.) Fiori in Fiori & Paol., Fl. Italia 4: 181. 1907. TYPE: France, Ariège, Vicdessos, Tres Seignous, [42º49'N 1º28'E], *Lapeyrouse s.n.* (lectotype, designated here, TLM image!).

Senecio tournefortii Lapeyr., Hist. Pl. Pyrénées: 516. 1813. TYPE: France, Hautes-Pyrénées, Luz-Saint-Sauveur, Cazau d’Estiba, Pen du Brada, [42º53'N 0º03'W], *Lapeyrouse s.n.* (lectotype, designated here, TLM image!).

Senecio tournefortii var. *granatensis* Boiss. ex DC., Prodr. 7: 301. 1838. *Senecio tournefortii* var. *integellus* Pau, Not. Bot. Fl. Españ. 6: 59. 1896, nom. illeg. (ICBN Art. 11.4). *Senecio pyrenaicus* var. *granatensis* (Boiss. ex DC.) Font Quer, Fl. Hispan. Cent. IV: 4. 1948. *Senecio pyrenaicus* subsp. *granatensis* (Boiss. ex DC.) Rivas Mart., Publ.

Inst. Biol. Apl. 42: 1967. *Senecio tournefortii* subsp. *granatensis* (Boiss. ex DC.) Malag., Subsp. Variac. Geogr.: 15. 1973. *Senecio pyrenaicus* subsp. *granatensis* (Boiss. ex DC.) Malag., Sin. Fl. Ibér. 76: 1202. 1977, nom. illeg., comb. superfl. TYPE: Spain, Andalucía, Granada, in summis Sª Nevada, [37º05'N 3º23'W], 1838, *Boissier s.n.* (lectotype, designated by Burdet & al. (1983: 799–800), G-204952 image!; isolectotypes, G-96299 image!, G-96300 image!, G-96301 image!, G-96302 image!, G-96303 image!, LE!).

Senecio tournefortii var. *aragonensis* Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 115. 1865. *Senecio tournefortii* subsp. *aragonensis* (Willk.) Malag., Subsp. Variac. Geogr.: 15. 1973. *Senecio pyrenaicus* subsp. *aragonensis* (Willk.) Malag., Sin. Fl. Ibér. 76: 1202. 1977. TYPE: Spain, Aragón, Sierra de Moncayo, [41º47'N 1º48'W], July 1850, *Willkomm 414* (lectotype, designated here, COI-37629 image!; isolectotype, LE!).

Senecio tournefortii var. *carpetanus* Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 115. 1865. *Senecio tournefortii* var. *serrulatus* Pau, Not. Bot. Fl. Españ. 6: 59. 1896, nom. illeg. (ICBN Art. 11.4). *Senecio pyrenaicus* subsp. *carpetanus* (Willk.) Rivas Mart., Anales Jard. Bot. Madrid 21: 274. 1964. *Senecio tournefortii* subsp. *carpetanus* (Willk.) Malag., Subsp. Variac. Geogr.: 15. 1973. *Senecio pyrenaicus* subsp. *carpetanus* (Willk.) Malag., Sin. Fl. Ibér. 76: 1202. 1977, nom. illeg., comb. superfl. TYPE: Spain, Ávila, Sierra de Gredos au-dessus de Bohoyo, [40º16'N 5º23'W], 10 July 1863, *Bourgeau 2515* (lectotype, designated here, COI-37627 image!; isolectotype, LE!).

Senecio tournefortii var. *pyrenaicus* Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 114. 1865. Type: Spain, Catalonia, Vall d'Aran, Arties, [42º42'N 0º52'E], without date, *Costa s.n.* (lectotype, designated here, COI-37628 image!).

Senecio tournefortii f. *angustifolia* Pau, Bol. Soc. Aragonesa Ci. Nat. 11: 40. 1912. TYPE: Spain, Galicia, Cordillera Cabrerica, July 1872, *Martín del Amo s.n.* (lectotype, designated here, MA-130469!).

Perennial herb. *Rhizome* 2.2–11.2 cm long, 0.4–1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 17–76 cm, erect, rarely ascending, densely leaved,

corrugated, solid, sometimes ramificated, covered with scattered trichomes to glabrescent, rarely ± arachnoid near the base, base without remnants of old leaves or tufts of hairs, sometimes violet coloured. *Basal leaves* 3.9–7.3 cm long, 1.1–2.4 cm wide, promptly caducous, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = 0.27–0.51), obtuse, often mucronate, attenuate to cuneate, with a petiole 0.8–5 cm long, dentate (teeth 0.6–1.5 mm deep), sometimes entire, glabrescent to covered with scattered trichomes, rarely slightly arachnoid (trichomes 0.1–0.2 mm long), concolorous. *Cauline leaves* 7–16; *middle cauline leaves* 5–11.8 cm long, 1–4.4 cm wide, alternate, lanceolate to elliptic (ratio middle leaf width / middle leaf length = 0.17–0.51), acute to obtuse acuminate, attenuate into a petiole up to 5.2 cm long, dentate, rarely entire (teeth 0.2–1.5 mm deep), glabrescent to covered with scattered trichomes (trichomes 0.1–0.7 mm long), rarely slightly arachnoid, tertiary venation inconspicuous; *upper cauline leaves* 1.7–9.3 cm long, 0.2–4.4 cm wide, lanceolate to oblong (ratio upper leaf width / upper leaf length = 0.11–0.55), acute to obtuse and acuminate, attenuate into a petiole up to 0.8 cm long, sometimes sessile, dentate (teeth 0.3–1.5 mm deep), rarely entire, glabrescent to covered with scattered trichomes. *Synflorescence* 5-30 cm long, corymbose, sometimes ± paniculate, with lanceolate-oblong bracts. *Capitula* (1–)4–7(–21), 27.2–48.9 mm diam; *involucre* 10.4–19.5 mm diam, 6–10 mm long, cupuliform; *involucral bracts* (15–)20–22(–28), 4.3–12.2 mm long, 1–2.4 mm wide, with scarious margin 0.2–0.7 mm wide, ensiform, acute, 0–2 keeled, apex with a black spot, with scattered trichomes (trichomes 0.1–0.7 mm long) or glabrescent, rarely slightly arachnoid; *supplementary bracts* (4–)6–7(–13), 2.5–7.5 mm long, 0.4–1.1 mm wide, subulate-oblong, without scarious margin, a half to as long as involucral bracts, with scattered trichomes (trichomes 0.1–0.9 mm long), sometimes only on the margin or glabrescent, rarely slightly arachnoid, not imbricate. *Ligulate florets* 11–22, 13.5–26.3 mm long, yellow; *tubular florets* 6.3–11 mm long, 0.7–1.9 mm diam, yellow. *Achenes* 3.9–5.2 mm long, 0.9–1.4 mm wide, subcylindrical (ratio achene width / achene length = 0.19–0.33), shorter than pappus (ratio achene length / pappus length = 0.41–0.67), with 10–12 ribs, glabrous; *pappus* 6–10.8 mm long, whitish. Chromosome number: 2*n*=40 (Küpfer & Favarger, 1967: 2463, sub *S. tournefortii* var. *pyrenaicus*; Küpfer & Favarger, 1967: 2463, sub *S. tournefortii* var. *granatensis*; Queirós, 1978: 76).

Iconography. Hoffmannsegg & Link (1813-1840: 307, fig. 99, sub *S. caespitosus*); Ramond (1801: tableau 11 fig. 3, sub *S. persicaefolius*); Bonnier (1922: fig. 286 n.º1422, sub *S. tournefortii*).

Distribution and habitat. Spain, Portugal and S France; rocky outcrops, subalpine meadows, sometimes in woods of *Pinus sylvestris* L. and *Pinus uncinata*, usually on siliceous soils, less common on calcareous soils; altitude 1000–2750 m (Figure 13).

Phenology. Flowering from June to September.

Etymology. The epithet *pyrenaicus* refers to the Pyrenees Mountains, where the species grows, and probably Linnaeus received a Barnades' collection (Catalonian botanist who collected in Pyrenees) through his pupil Loefling.

Discussion. Senecio pyrenaicus is characteristic for its glabrescent and slightly succulent leaves, all similar in size. Besides, the basal and lower cauline leaves are quickly caducous. The most similar species are *S. transylvanicus* and *S. doriiformis*, both with a range far away from the Iberian Peninsula. *Senecio pyrenaicus* and *S. transylvanicus* have glabrescent leaves regularly dentate (sometimes entire), but can be easily distinguished by the number of capitula [higher in *S. pyrenaicus*, (1–)4–7(–21) vs. 1(–3)], and the length of supplementary bracts (shorter in *S. pyrenaicus*, 2.5–7.5 vs. 6.3–13.8 mm). Regarding to *S. doriiformis*, the number of involucral bracts is a useful character to differenciate between each other [(10–)12–13(–14) vs. (15–)20–22(–28) in *S. pyrenaicus*].

This taxon presents a high variability with regard to the shape and margin of the leaves, which are usually dentate but sometimes subentire to entire. The populations from Sierra Nevada (SE Spain) were described as a subspecies on the base of their entire margin. Certainly, in this region are more frequent those specimens with subentire-entire leaves, but also are found specimens with dentate leaves. Likewise, those populations from Serra da Estrela (Portugal) were described as *Senecio caespitosus* on the base of their slightly decumbent stems. No clear pattern is observed on the distribution of the mentioned characters, and therefore no infraspecific taxa is recognized.

The presence of *S. pyrenaicus* in Galicia (NW Spain) is doubtful. It is documented by Pau (1912) based on a Martín del Amo's collection from "Cordillera Cabrerica" (*Martín del Amo* July 1872, MA). This toponym is also common in Asturias and León provinces, where *S. pyrenaicus* is well known. No other collection from Galicia supports its presence there.

A nomenclatural clarification about the name *S. rotundifolius* has to be noticed. Traditionally, *S. rotundifolius* has been subordinated to *S. doronicum*. According to Clos (1857), it corresponds to an extreme of variability of the leaves width in *S. pyrenaicus*.

Also, it may be interesting to stress that the labels of the isolectotypes of *Senecio tournefortii* var. *granatensis* Boiss. ex DC. wrongly show the locality Sierra Tejeda instead Sierra Nevada.

Finally, it is worthwhile to mention that we have found two putative hybrid specimens (*Calvo 4059*, MA) between *S. pyrenaicus* and *S. doria* at Carrocera (León, Spain) (see Calvo & al., 2013b).

Selected specimens examined. ANDORRA. Ordino, Sispony, subida al pic de Carroi, 42º31'N, 1º30'E, 28 Aug 2002, *C. Aedo, I. Aizpuru & J. Pedrol 8479* (MA); Puerto de Envalira, en la emisora, 42º32'N, 1º44'E, 31 Aug 1976, *E. Valdés-Bermejo & S. Castroviejo 1202* (MA). FRANCE. **Haute-Garonne**: Luchon, en montant au Port de Venasque, 42º42'N, 0º38'E, 7 Aug 1886, *F. Fages s.n.* (MA); Pyrénées centrales, Esquierry, 42º45'N, 0º28'E, 7 Sep 1852, *A. Huet de Pavillon s.n.* (LE). **Hautes-Pyrénées**: Somaoute, près de Gèdre (Hautes-Pyrénées), 42º52'N, 0º4'W, 24 July 1865, *H. Bordère 876* (LE); Hautes-Pyr., cirque de Gavarnie, 42º41'N, 0º1'W, Aug 1859, *H. Bordère s.n.* (LE). **Pyrénées-Atlantiques**: Hte. Vallee d'Ossau, 42º50'N, 0º25'W, 23 Sep 1880, *J.E. Doassans 2933* (K). **Pyrénées-Orientales**: Canigou, infra col des Cortalets, 42º32'N, 2º27'E, 2 July 1926, *K.H. Rechinger 184* (G); montagne de Madrés, 42º39'N, 2º12'E, 31 July 1884, *P.M.E. Timbal-Lagrave & E.J.M. Jeanbernat s.n.* (MT). PORTUGAL. **Beira Alta**: Sierra de Estrella, 40º25'N, 7º34'W, 1848, *F.M.J. Welwitsch 793* (LE). **Beira Baixa**: Serra da Estrella, Covão das Vaccas, 40º19'N, 7º35'W, July 1887, *A. Moller 273* (WU); Serra de Estrela, próximo à Nave de Santo Antonio, 40º18'N, 7º34'W, 12 Sep 1985, *A. Serra s.n.* (MA). SPAIN. **Almería**: Bayárcal, Sierra Nevada, El Chullo, 37º5'N, 2º59'W, 6 July 1986, *A. Segura Zubizarreta 31465* (LE). **Asturias**: Somiedo, Murias Longas, 43º3'N, 6º14'W, 24 Aug 1985, *I. Aizpuru s.n.* (MA); Lena, Tuiza de Arriba, pr. refugio del Meicín, 43º1'N, 5º56'W, 25 July 2009, *J. Calvo 3993* (MA). **Ávila**: Santiago del Collado, pr. Puerto de Peña Negra, 40º25'N, 5º18'W, 25 July 2008, *J. Calvo 2671* (MA); Mengamuñoz, puerto de Menga, 40º28'N, 5º0'W, 10 VI 1983, *M. Ladero & J. González s.n.* (MA). **Burgos**: Picos de Urbión, entre Tres-provincias y Muñalba, 42º1'N, 2º54'W, 31 July 1988, *J.A. Alejandre & B. Fernández de Betoño 249* (MA). **Cantabria**: ladera NW del pico Cuchillón, Alto Campoo, 40º31'N, 4º23'W, 6 Aug 2008, *C. Aedo 15850* (MA); Camaleño, Coriscao, las calizas de Los Calares, 43º5'N, 4º47'W, 5 Aug 1990, *J.A. Alejandre & G. Zúñiga 189* (MA). **Girona**: La Cerdanya, Guils de Cerdanya, del refugio de la Feixa a el pla dels Empedrats, 42º27'N, 1º48'E, 29 June 2011, *J. Calvo 5687* (MA); Setcases, 42º22'N, 2º18'E, 17 July 1922, *J. Cuatrecasas s.n.* (K). **Granada**: in altis Sierra Tejeda [Nevada], 37º5'N, 3º23'W, *E. Boissier 115* (G, LE); Sierra Nevada, Peñones de San Francisco, 37º5'N, 3º23'W, 9 July 2007, *J. Calvo 1084* (MA). **Guadalajara**: Cantalojas, valle del Zarzas, alto del Hornillo, 41º15'N, 3º23'W, 12 July 1986, *J.M. Cardiel s.n.* (MA). **Huesca**: Panticosa, Ibón de las Ranas, 42º45'N, 0º15'W, 14 Aug 1983, *I. Aizpuru & P. Catalán 21190* (MA); Circo de Soaso, cercanías de la cascada, valle de Ordesa, 42º39'N, 0º1'E, 5 Aug 1935, *L. Ceballos s.n.* (MA). **Jaén**: in aridis montium "Sierra de Castril", 37º55'N, 2º41'W, July 1903, *E. Reverchon 5096* (LE); Sierra de Cabrilla, 37º54'N, 2º48'W, July 1905, *E. Reverchon s.n.* (MA). **La Rioja**: Logroño, 2 km. NE del puerto de

Piqueras, 42º4'N, 2º31'W, 12 Aug 2004, *C. Aedo 10459* (MA); Canales de la Sierra, pista hacia S. Lorenzo, Las Peñuelas, 42º13'N, 2º58'W, 27 July 2008, *L. Medina 4694* (MA). **León**: Boca de Huérgano, macizo de Peña Prieta, Hoyo de Vargas, 43º1'N, 4º45'W, 15 July 1990, *J.A. Alejandre & G. Zúñiga 285* (MA); Ponferrada, Cabeza de la Yegua, 42º24'N, 6º32'W, June 1998, *A. Rodríguez-Hergueta s.n.* (SANT). **Lleida**: Pallars Sobirà, Vall Ferrera, barranc d'Aixeus hacia el Monteixo, 42º37'N, 1º21'E, 12 Sep 2009, *C. Aedo & al. 16905* (MA); Sierra del Cadí, pr. Arsèguel, 42º18'N, 1º35'E, 23 July 1993, *C. Aedo & al. 2903* (MA). **Madrid**: Pinilla del Valle, pr. la cumbre de El Nevero, 40º59'N, 3º50'W, 24 Sep 2007, *J. Calvo 1580* (MA); Valdesquí, pistas, 40º47'N, 3º58'W, 9 Sep 1992, *R. Morales & J. Esteban 1056* (MA). **Navarra**: Isaba, peña Ezkaurri, 42º51'N, 0º50'W, 22 July 1987, *P. Urrutia & al. s.n.* (MA). **Palencia**: Peña Labra, 43º2'N, 4º25'W, 16 Aug 1986, *C. Aedo s.n.* (MA); Velilla del Río Carrión, Pico Espigüete, alrededores del refugio, 42º57'N, 4º46'W, 8 Nov 2007, *J. Calvo & A. Quintanar 1832* (MA). **Salamanca**: Sierra de Béjar, El Calvitero, 40º17'N, 5º44'W, 28 July 1982, *E. Rico 281* (MA); Sierra de Béjar, Candelario, cara N del Calvitero, 40º18'N, 5º45'W, 26 July 1989, *S. Rivas-Martínez & al. 17612* (H). **Segovia**: San Ildefonso, puerto de Navacerrada, vertiente norte del Alto de las Guarramillas, 40º47'N, 3º58'W, 19 July 2009, *J. Calvo & S. Hantson 3953* (MA); Cerezo de Arriba, pico del Lobo, 41º11'N, 3º27'W, 24 June 2001, *M. Sanz Elorza s.n.* (MA). **Soria**: Laguna Negra (Picos de Urbión), 41º59'N, 2º50'W, *L.F. Aparicio s.n.* (MA). **Zaragoza**: Tarazona, Sierra del Moncayo, en el fondo del circo, 41º47'N, 1º49'W, 28 Aug 1988, *J.A. Alejandre 546* (MA).

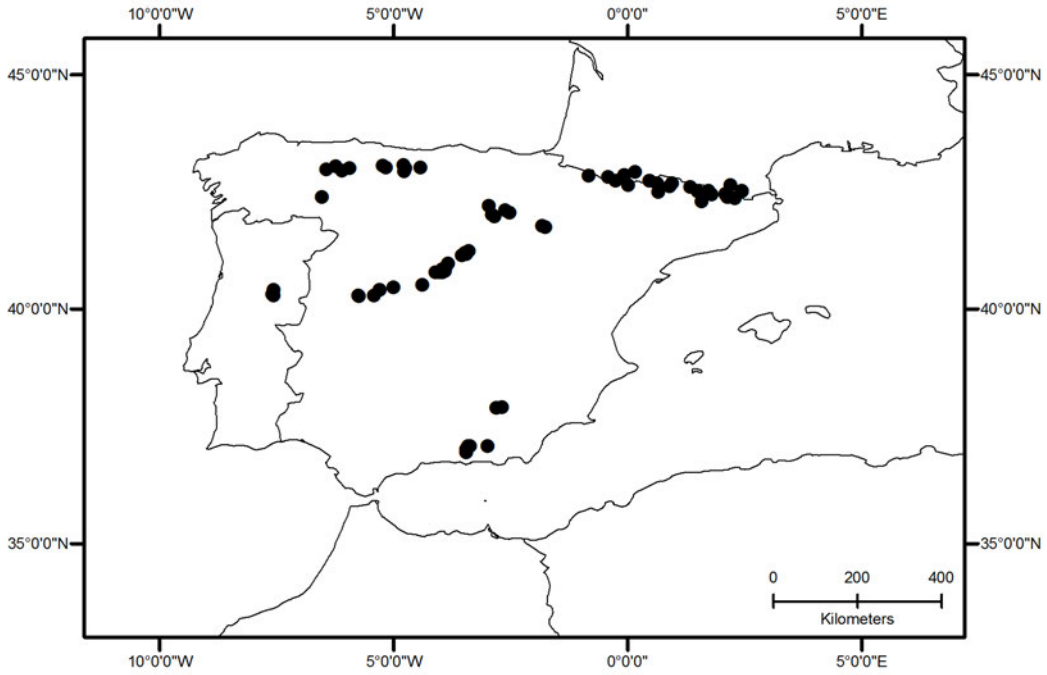


Figure 13. Distribution map for *Senecio pyrenaicus* L. (●).

8. *Senecio transylvanicus* Boiss., Diagn. Pl. Orient. ser. 2, 3: 34. 1856. *Senecio doronicum* subsp. *transylvanicus* (Boiss.) Nyman, Consp. Fl. Eur.: 354. 1879 ["transsilvanicus"]. TYPE: Romania, Braşov County, Făgăraş, in alpinis prope Arpasch, [45º36'N 24º37'E], 28 Aug 1850, *Kotschy 157* (lectotype, designated here, G-226109 image!; isolectotypes G-226110 image!, P-3683284 image!; excluded duplicate B-10-0293994).

Senecio doronicum var. *glaberrimus* Rochel, Pl. Banat. Rar.: 74. 1828. *Senecio glaberrimus* (Rochel) Schur, Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt 2: 171. 1851, nom. illeg., non DC. 1838 (ICBN, Art. 53.1). *Senecio pseudodoronicum* Schur, Enum. Pl. Transsilv.: 351. 1866 ["pseudo-doronicum"]. *Senecio rochelianus* Fuss, Fl. Transsilv.: 353. 1866, see comments below. *Senecio glaberrimus* (Rochel) Simonk., Enum. Fl. Transsilv.: 329. 1887, nom. illeg. and comb. superfl. (ICBN, Art. 53.1). *Senecio doronicum* subsp. *glaberrimus* (Rochel) Kožuharov, Opredel. Vissh. Rast. Bulg.: 786. 1992. *Senecio doronicum* var. *rochelianus* Fuss ex Nyman, Consp. Fl. Eur. Suppl. 2: 163. 1889, nom. illeg. (ICBN Art. 11.4). TYPE: Romania, Hunedoara County, Godjan, Muraru, [45º20'N 22º51'E], *Rochel s.n.* (lectotype, designated here, WU!; isolectotype LE!).

Senecio glaberrimus var. *schurii* Nyár. in Săvul. (ed.), Fl. Republ. Popul. Romîne 9: 583, 969. 1964. TYPE: Romania, Cluj, montibus Rodna, [47º29'N 24º47'E], *Schur s.n.* (holotype, LW not seen).

Perennial herb. *Rhizome* 0.7–1.2 cm long, 0.3–0.9 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 13–44 cm, erect, densely leaved, corrugated, solid, sometimes ramificated, glabrescent to covered with scattered trichomes, base without remnants of old leaves or tufts of hairs. *Basal leaves* ca. 7.2 cm long, ca. 2.1 cm wide, promptly caducous, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = ca. 0.29), acute to obtuse, attenuate to cuneate, with a petiole up to 10.3 cm long, dentate (teeth ca. 1.3 mm deep), rarely subentire, glabrescent to covered with scattered trichomes (trichomes 0.1–0.2 mm long), concolorous. *Cauline leaves* 2–14; *middle cauline leaves* 3.9–10.8 cm long, 1.2–5 cm wide, alternate, lanceolate (ratio middle leaf width / middle leaf length = 0.22–0.71), acute to obtuse, attenuate into a petiole up to 7 cm long, dentate (teeth 0.3–2.5 mm deep), rarely subentire, glabrescent to covered with scattered trichomes (trichomes 0.1–0.3 mm long), tertiary venation inconspicuous; *upper cauline leaves* 1.3–5.7 cm long, 0.1–0.9 cm wide, lanceolate to oblong (ratio upper leaf width / upper leaf length = 0.05–0.27), acute, attenuate into a petiole up to 1 cm long, rarely sessile, dentate (teeth 0.4–2 mm deep) to subentire, glabrescent to covered with scattered trichomes. *Synflorescence* reduced to a solitary capitulum, rarely pseudocorymbose, ca. 11 cm long, with scarce linear-oblong bracts. *Capitula* 1(–3),

29.7–50.8 mm diam; *involucre* 13.3–22 mm diam, 7–11 mm long, cupuliform; *involucral bracts* 20–22(–30), 5.8–10.1 mm long, 1.1–2.4 mm wide, with scarious margin 0.3–0.8 mm wide, ensiform, acute, 0–2 keeled, apex with a black spot, covered with scattered trichomes to glabrescent, rarely ± arachnoid on margins (trichomes 0.2–0.5 mm long); *supplementary bracts* (4–)5–6(–14), 6.3–13.8 mm long, 0.5–1.4 mm wide, subulate-oblong, without scarious margin, a three-quarters as long as involucral bracts to longer, with scattered trichomes on the margin (trichomes 0.1–0.7 mm long) to glabrescent, not imbricate. *Ligulate florets* 14–21, 13.4–22.6 mm long, yellow; *tubular florets* 5.8–8.8 mm long, 0.8–1.6 mm diam, yellow. *Achenes* ca. 4.9 mm long, shorter than pappus, with 10–11 ribs, glabrous or with some trichomes near the top ca. 0.1 mm long; *pappus* 6.8–8.6 mm long, whitish. Chromosome number: unknown.

Iconography. Rochel (1828, fig. 72, sub *S. doronicum* var. *glaberrimus*); Nyárády (1964: 561 pl. 108 fig. 3, as *S. glaberrimus*); Lafranchis & Sfikas (2009: 216, sub *S. doronicum*, as photo).

Distribution and habitat. Bulgaria, Greece, Macedonia, Montenegro, Romania; rocky places (granite, slate, schist, serpentine), alpine grasslands, on siliceous soil; altitude 2000–2700 m (Figure 14).

Phenology. Flowering from July to August.

Etymology. The epithet *transylvanicus* refers to the historical region called Transylvania, in the central part of Romania, where grows this species.

Discussion. Senecio transylvanicus is distinguished for its dentate, glabrescent leaves, and the synflorescence usually reduced to a solitary capitulum with supplementary bracts a three-quarters as long as involucral bracts or longer. It has the basal and cauline leaves similar in size, the basal and the lower cauline ones quickly caducous, giving a characteristic habit shared with *S. pyrenaicus*, *S. doriiformis*, and *S. paludosus*. Among these species, *S. transylanicus* only might be confused with *S. pyrenaicus* (see comments above).

The nomenclature of this species is confusing and it requires some clarifications. The name *S. glaberrimus* (Rochel) Schur is illegitime because this epithet is not available (Candolle used it at 1838 to describe a plant from southern Africa). Later, Schur realised about it and proposed the nomen novum *S. pseudodoronicum*, between April-June of 1866 (Stafleu & Cowan, 1985). On the same year, Fuss proposed another nomen novum, *S. rochelianus*, published in his "Flora Transsilvaniae Excursoria". In terms of publication date, at the end of the prelude it is written as follows: "In Villa S. Gerardi (Giresau) Pridie Calendas Januarias", referring to the eve of the first day of January. Despite it, Stafleu & Cowan (1976) do not specify the month of publication of the mentioned Flora, and therefore, we can not apply the principle of priority between *S. pseudodoronicum* and *S. rochelianus*. Considering that these names have not nomenclatural implications over *S. transylvanicus* (the priority name), we prefer do not illegitimate neither.

At 1859 Schur described another species under the name *S. transilvanicus*, which is a nom. illeg. (non Boiss. 1856) corresponding to another taxonomic entity, namely, to *S. sarracenicus* L.

The duplicate of the type material kept at B is excluded because the specimen is not *S. transylvanicus*.

Selected specimens examined. BULGARIA. **Blagoevgrad**: mt. Pirin, between lake Ribno and Muratovo lake, 41º44'N, 23º24'E, 27 July 1993, *W. Greuter & B. Pirker 23891* (B); Pirin mt., by river Banderica, 41º45'N, 23º24'E, 11 Aug 1875, *B. Kuzmanov 7572* (G). **Kyustendil**: in alpinis mt. Čador-Tepe, 42º13'N, 23º18'E, 4 Aug 1903, *L. Adamovic s.n.* (G); Rila planina, in monte Lopusniča, 42º11'N, 23º11'E, 25 Aug 1907, *C.K. Schneider & Bergmann 1420* (G, K). **Sofia**: Rila planina, montis Musallah, 42º10'N, 23º35'E, 21 Aug 1907, *C.K. Schneider & Bergmann 828* (G, K); supra lacus montis Mušala rhodopes centralis, 42º10'N, 23º35'E, 25 Aug 1892, *J. Wagner 73* (G, LE). GREECE. **Epirus**: Pindos-Gebirge, Gipfelfluren des Smolikas-Ostgipfels, 40º5'N, 20º55'E, 15 July 1982, *D. Podlech 37863* (M); montes Smolika, in summo monte Smolika, 40º5'N, 20º55'E, 9 July 1958, *K.H. Rechinger 20968* (K). MACEDONIA. Pelister, Baba Mts., Yugoslavian Macedonia, 40º55'N, 21º10'E, 17 Aug 1964, *J.C. Archibald 608* (E); in reg. alpina m. Peristeri, 41º0'N, 21º11'E, 31 July 1871, *T.G. Orphanides 1065* (G, WU); in cacumine montis Pelister (Lyncos), 41º0'N, 21º11'E, 19 July 1862, *T.G. Orphanides 85* (G, LE). MONTENEGRO. M. Kom Kučki, 42º41'N, 19º38'E, 8 Aug 1891, *A. Baldacci 51* (G, WU). ROMANIA. **Argeș**: Negoi, 45º35'N, 24º34'E, Aug 1870, *A. Falck s.n.* (K); Fogarascher Gebirge, 45º36'N, 24º47'E, 6 Aug 1922, *K. Rechinger s.n.* (G). **Bistrița-Năsăud**: comit. Maramaros: in rup. montis Nagy Pietrosz, ad pag. Borsa, 47º35'N, 24º38'E, 22 July 1909, *S. Jávorka & Filarnky 2080* (LE); Rodnei Mountains, on Gargalău peak, 47º33'N, 24º48'E, 30 July 1950, *M. Răvărut s.n.* (MA). **Caraș-Severin**: in alpibus editioribus Banatas, Transylvania, 45º16'N, 22º31'E, Aug 1853, *J. Heuffel s.n.* (G). **Gorj**: Transsilvania, distr. Hunedoara, montis Borescu, adversus montes Rătezat, 45º21'N, 23º33'E, 12 July 1924, *E.I. Nyárády & E. Pop 829* (K, S). **Hunedoara**: Transsylvania, vurvu Aragyes intra Alpes Retyezat, 45º20'N, 22º55'E, 17 Aug 1886, *A. Degen 65* (WU); Retezat Mountains, on Peleaga peak, 45º21'N, 22º53'E, 21 Aug 2002, *C. Sîrbu s.n.* (MA).

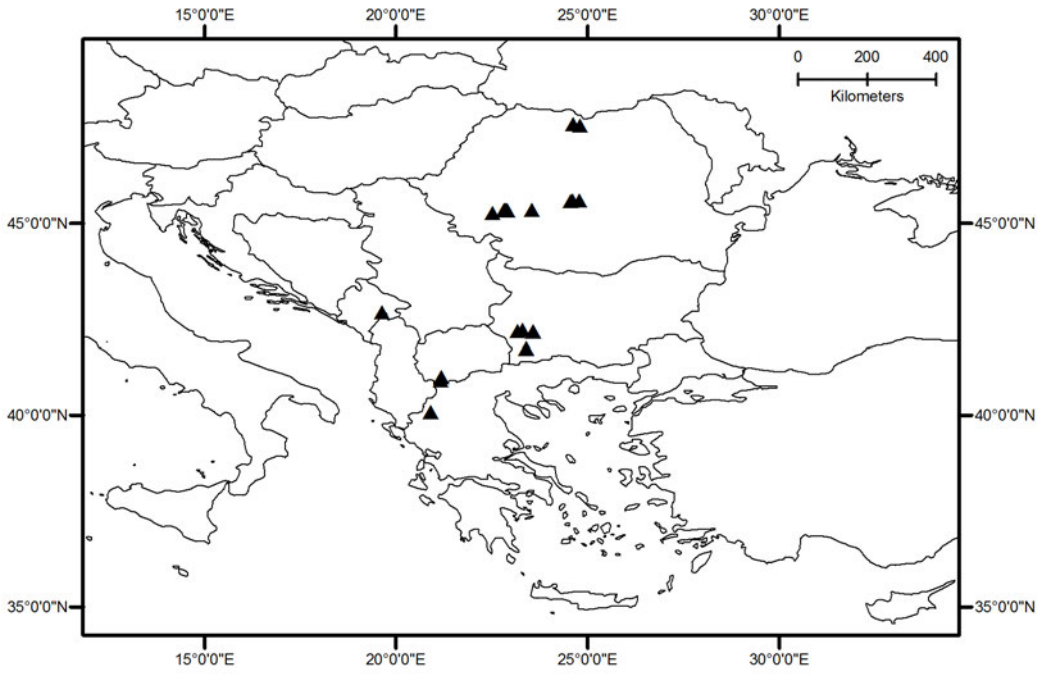


Figure 14. Distribution map for *Senecio transylvanicus* Boiss. (▲).

9. *Senecio doriiformis* DC., Prodr. 6: 352. 1838. Type: Lebanon, Libaniis, 1837, *Aucher-Eloy 3440* (lectotype, designated by Nordenstam (1989: 65), G-DC-204944 image!; isolectotypes, G-96297 image!, G-150318 image!).

Perennial herb. *Rhizome* thick, from where usually arise several shoots. *Stem* 37–95 cm, erect, densely leaved, corrugated, solid, sometimes ramificated, glabrescent, sometimes weakly arachnoid, base without remnants of old leaves or tufts of hairs. *Basal leaves* ca. 3.8 cm long, ca. 3.5 cm wide, promptly caducous, ovate-rhomboid to broadly lanceolate (ratio basal leaf width / basal leaf length = ca. 0.92), obtuse, attenuate to ± truncate, sometimes subcordate, with a petiole up to 5.5 cm long, entire to denticulate, glabrescent, concolorous. *Cauline leaves* 11–26; *middle cauline leaves* 5.3–13 cm long, 1.7–5.9 cm wide, alternate, ovate to lanceolate (ratio middle leaf width / middle leaf length = 0.20–0.66), obtuse, ± truncate to attenuate into a petiole 0.5–3.2 cm long, sometimes asimetric, entire to denticulate, sometimes slightly dentate (teeth 0.5–2.5 mm deep), glabrescent to covered with scattered trichomes (trichomes 0.2–0.4 mm long), tertiary venation conspicuous (unless on dry); *upper cauline leaves* 1.7–10.5 cm long, 0.3–3.2 cm wide, ovate to lanceolate (ratio upper leaf width / upper leaf length = 0.11–0.59), acute to obtuse, sessile, sometimes abruptly attenuate into a petiole up to 0.7

cm, entire to denticulate (denticles ca. 1 mm long), glabrescent to scattered trichomes. *Synflorescence* 4.5–38 cm long, corymbose to corymbose paniculate, with linear-lanceolate bracts. *Capitula* (3–)10–22(–47), 20.1–25.8 mm diam; *involucre* 6.1–9.5 mm diam, 6–8 mm long, narrowly cupuliform; *involucral bracts* (10–)12–13(–14), 4–6.4 mm long, 1.4–2.3 mm wide, with scarious margin 0.3–0.7 mm wide, ensiform, acute, 1–3 weakly keeled, apex without a black spot, glabrescent to weakly arachnoid (trichomes 0.1-0.2 mm long); *supplementary bracts* (5–)6–7(–8), 2.1–5.1 mm long, 0.2–0.7 mm wide, subulate, without scarious margin, a half to almost as long as involucral bracts, glabrescent to weakly arachnoid (trichomes ca. 0.1 mm long), not imbricate. *Ligulate florets* 8–10, 9.5–13.1 mm long, yellow; *tubular florets* 6.8–9.2 mm long, 0.7–1.5 mm diam, yellow. *Achenes* 2.9–5.1 mm long, 1.0–1.5 mm wide, subcylindrical (ratio achene width / achene length = 0.24–0.46), shorter than pappus (ratio achene length / pappus length = 0.47–0.66), with 11–12 ribs, glabrescent or with some scattered intercostal trichomes up to 0.1 mm long; *pappus* 5.7–9.1 mm long, whitish. Chromosome number: unknown.

Etymology. The specific epithet *doriiformis* probably refers to the slight similarities with *S. doria* regarding the size and architecture of the capitulum. Certainly, *S. doriiformis* capitulum is one of the smallest whitin the sect. *Crociseris*.

Discussion. Senecio doriiformis is a distinctive species among the Anatolian *Crociseris* ones because its habit, which displays several ramificated shoots from the same rhizome, usually forming tufts. Moreover, it bears numerous cauline leaves not decreasing strongly up to the stem, with a conspicuous tertiary venation (better observed on dried material), and basal leaves promptly caducous. Such type of habit is shared with *S. pyrenaicus* from Iberian Peninsula, which bears considerably larger capitula, and numerous involucral bracts (10–14 vs. 15–28). It is a variable species mainly regarding to the shape of leaves, which is useful to distinguish between the two subspecies recognized. Disagreeing with Nordenstam (1989), the leave margin (entire in subsp. *doriiformis* vs. slightly denticulate-crenate in subsp. *orientalis*) is not a valuable character to distinguish between the two taxa.

Key to subspecies of *Senecio doriiformis*

1a. Cauline leaves ovate-rhomboid to broadly lanceolate, ± truncate to abruptly attenuate into a petiole 1.2–3.2 cm long, often conspicously asimetric.....**9a. *S. doriiformis* subsp. *doriiformis***

1b. Cauline leaves lanceolate, sessile to attenuate into a petiole up to 3 cm long, not asimetric or weakly.....**9b. *S. doriiformis* subsp. *orientalis***

9a. *Senecio doriiformis* subsp. *doriiformis*

Middle cauline leaves 5.3–9 cm long, 2.4–5.9 cm wide, ovate-rhomboid to broadly lanceolate (ratio middle leaf width / middle leaf length = 0.35–0.66), ± truncate to abruptly attenuate into a petiole 1.2–3.2 cm long, often conspicously asimetric; *upper cauline leaves* 1.7–7.7 cm long, 0.3–3.2 cm wide, ovate to lanceolate (ratio upper leaf width / upper leaf length = 0.15–0.59), sessile, sometimes abruptly attenuate into a petiole up to 0.7 cm.

Iconography. Nordenstam (1989, tab. 39).

Distribution and habitat. Iraq, Lebanon, Syria; rocky places, woods of *Cedrus libani* A. Rich.; on calcareous soil; altitude 1500–2500 m (Figure 15).

Phenology. Flowering from June to July.

Discussion. The populations from the vicinity of Van province (Turkey), recently ascribed to *S. doriiformis* subsp. *doriiformis* (Budak & al., 2009), correspond to *S. doriiformis* subsp. *orientalis* because of its cauline leaves lanceolate, and sessile to attenuate into a petiole.

Selected specimens examined. IRAQ. Pira Magrun, 35º46’N, 45º13’E, 23 Oct 1960, *W. Haines 1847* (K). LEBANON. Cedars-Bcharré (El Alez), 34º14’N, 36º3’E, 16 Nov 2003, *J. Breidy 233* (K); northern Lebanon, slopes of Jebel Makmel, 34º16’N, 36º5’E, 3 Sep 1931, *A. Eig & M. Zohary s.n.* (US); Jabal Barouk, 33º42’N, 35º40’E, 13 Aug 1933, *P. Mouterde s.n.* (G); au dessus du Cèdres de Bcharré, 34º15’N, 36º0’E, 13 Sep 1951, *H. Pabot s.n.* (G); in vicin. Arz Er Rab (i.e. cedretum supra Bcharreh), in rupibus calcareis prope cedretum, 34º15’N, 36º1’E, 15 June 1933, *G. Samuelsson 6063* (S); Arz Er Rab, 34º15’N, 36º1’E, 15 June 1933, *E. Wall 622* (S). SYRIA. Antilibanon Djebel esch Scheik ob Baalbeek, 33º44’N, 36º22’E, 27 June 1937, *A. Bertschinger 4540* (G); Bludan, 33º44’N, 36º7’E, 7 Aug 1945, *P.H.*

Davis 10040 (E); Kafrah, 34º46’N, 36º16’E, 1822, *C.G. Ehrenberg 265* (K, LE); entre le passage Ahahé-t-Hencra et la source Aïn-el-Hacadine, sommet du Djebel Cheikh, 33º44’N, 36º22’E, 18 July 1856, *C. Gaillardot 1314* (B, BR, C, F, G, K, LE, S); M. Dschebel Scheich, Antilibani, pr. Damas, 33º44’N, 36º22’E, July , *C. Gaillardot 1940* (O); montis Hermon, in valle Orny frequens parte occidentali, 33º26’N, 35º49’E, 3 July 1855, *T. Kotschy 222* (NY, S, UPS, US); Bloudane, 33º44’N, 36º8’E, 10 July 1932, *P. Mouterde s.n.* (G); Jebel Maaloula, 33º54’N, 36º38’E, 22 July 1952, *H. Pabot s.n.* (G); Jebel Lemnar, 33º58’N, 36º20’E, 25 July 1952, *H. Pabot s.n.* (G).

9b. *Senecio doriiformis* subsp. *orientalis* (Fenzl) V.A. Matthews, Notes Roy. Bot. Gard. Edinburgh 33: 434. 1975. *Senecio nemorensis* var. *orientalis* Fenzl in Tchich., Asie Mineure 2: 294. 1860. *Senecio doriiformis* var. *megalophron* Fenzl ex Boiss., Fl. Orient. 3: 407. 1875, nom. illeg. (ICBN Art. 11.4). *Senecio doriiformis* var. *orientalis* (Fenzl) Hand.-Mazz., Ann. K.K. Naturhist. Hofmus. 27: 437. 1913. TYPE: Turkey, Mersin, région montagneuse supérieure du Taurus, près de Gulek-Maden, [37º16'N 34º46'E], 16 Aug 1855, *Balansa 654* (lectotype, designated here, G-96309 image!; isolectotypes, C!, E-287936 image!, G-96310 image!, GOET-2037 image!, LE!, WAG-646 image!).

Middle cauline leaves 8–13 cm long, 1.7–3.7 cm wide, lanceolate (ratio middle leaf width / middle leaf length = 0.20–0.43), sessile to attenuate into a petiole up to 3 cm long, not asimetric or weakly; *upper cauline leaves* 3.7–10.5 cm long, 0.4–2.5 cm wide, lanceolate (ratio upper leaf width / upper leaf length = 0.11–0.36), sessile, sometimes attenuate into a petiole up to 0.3 cm.

Iconography. Nordenstam (1989, tab. 40).

Distribution and habitat. Iran?, Turkey (southern central-east Anatolia); rocky places, woods of *Cedrus libani* A. Rich.; on calcareous soil; altitude 1000-2500 m (Figure 15).

Phenology. Flowering from June to July.

Discussion. This subspecies has been confused with *S. pseudoorientalis*. In fact, some sheets of the exsiccata *Kotschy 121*, under the name *S. megalophron*, correspond to *S. pseudoorientalis* (B-10-0325112!, BR-505713!, M-30304 image!, MPU-12833 image!, MPU-12834 image!, S!, WU!). Although they can be easily distinguished (size capitula, number of involucral bracts, etc.), missidentification may occur due to their overlapping

ranges in some regions such as in the Taurus Mountains. Consequently, the paratype *Kotschy 121* should be rejected as original material.

Nordenstam (1989) cited a Haussknecht's collection (herbarium not specified) from Avroman and Shahu (Kermanshah Province, northwestern Iran), under de name *S. doriiformis* subsp. *orientalis*. Likewise, Lotfi & al. (2010) recorded such taxon from the iranian Kurdestan Province (*Mozaffarian 74827*, TARI), and Kermanshah Province (*Tavakoli & Mirabdali 2900*, TARI). Unfortunately we can not study the mentioned collection, thus, we include Iran with a question mark in the distribution. Taking into account that the nearest population is that from Pira Magrun (northeastern Iraq), around 140 km far away, corresponds to *S. doriiformis* subsp. *doriiformis*, we have some doubts about the identifications. Further collections are needed to elucidate the proper taxonomic entity of the iranian populations.

Selected specimens examined. TURKEY. **Adana**: Karaisali, Koca Çukur Yaylasi - Katir gediği, 37º25'N, 35º1'E, 29 June 1959, *A. Huber-Morath 15840* (G). **Antalya**: Ak Dağ (S of Geyik Dağ), 36º52'N, 32º10'E, 28 Aug 1947, *P.H. Davis 14331* (C, G, H, K). **Konya**: Tauri alpes, BulgarDagh, versus plumbi fodinas, 37º26'N, 34º20'E, 11 Aug 1853, *T. Kotschy 251* (B, BR, K, LE, S, UPS, WU). **Malatya**: Taurus Cataonicus, inter urbem Malatja et vicum Kjachta, 38º3'N, 38º2'E, 16 July 1910, *H.F. Handel-Mazzetti 474* (WU); Dedeyasi, Taslch, 38º13'N, 37º51'E, 17 Aug 1966, *H. Peşmen 1069* (G). **Maraş**: Akher Dagh, 37º39'N, 36º59'E, July 1907, *M. Haradjian 1694* (G, LE); Akher Dagh, 37º39'N, 36º59'E, Sep 1907, *M. Haradjian 1738* (E, G, K, LE); Akherdagh, 37º39'N, 36º59'E, 15 Sep 1884, *B. Post 119* (G, US). **Mersin**: Tauri Alpes, BulgarDagh, in valle Karli Boghas, 37º9'N, 34º27'E, 13 July 1853, *T. Kotschy 121* (G, K, LE, UPS); Güllek, 37º15'N, 34º46'E, July 1896, *W. Siehe 667* (G, K, LE, S, WU). **Niğde**: in vicinitate oppidi Çamardi, montes Ala Dağlar, loco Demir-kazik dicto, 37º51'N, 35º6'E, 9 Aug 1992, *V. Vašák s.n.* (BR). **Van**: Çatak, Dalbasti köyü, 37º54'N, 42º55'E, 20 July 2002, *B. Bani 1255* (GAZI); Artos Dag above Gevas, 38º15'N, 43º3'E, 14 July 1954, *P.H. Davis & O. Polunin 22690* (ANK); Karduchia, ad fontes hospitium Chana Putkie, 38º7'N, 42º48'E, Sep 1859, *T. Kotschy 626* (S, UPS).

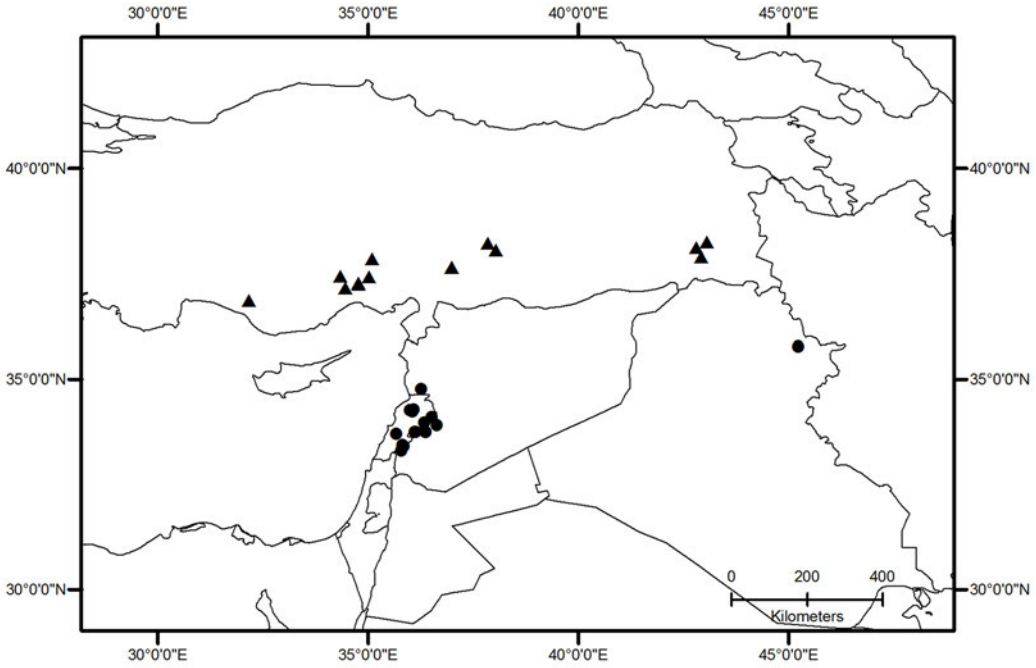


Figure 15. Distribution map for *Senecio doriiformis* DC. subsp. *doriiformis* (●), and *S. doriiformis* subsp. *orientalis* (Fenzl) V.A. Matthews (▲).

10. *Senecio paludosus* L., Sp. Pl.: 870. 1753. *Jacobaea paludosa* (L.) P. Gaertn., B. Mey. & Scherb., Oekon. Fl. Wetterau: 211. 1801. *Jacobaea paludosa* (L.) Opiz, Seznam: 54. 1852, nom. illeg., comb. superfl. *Doria paludosa* (L.) Fourr., Ann. Soc. Linn. Lyon ser. 2, 16: 404. 1868. TYPE: Sweden, Scania, sine collector (lectotype, designated by Kadereit (1998: 366), LINN 996.57 image!).

Perennial herb. *Rhizome* up to 10 cm long, 0.4–0.8 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 58–180 cm, erect, densely leaved, corrugated, fistulous, not ramificated, glabrescent to weakly lanate, base without remnants of old leaves or tufts of hairs. *Basal leaves* absent. *Cauline leaves* numerous (16–60), the lower ones withering early, ± discolorous; *middle cauline leaves* 6.8–21 cm long, 0.5–4.4 cm wide, alternate, narrowly lanceolate to lanceolate (ratio middle leaf width / middle leaf length = 0.05–0.27), acute, sessile to subsessile, rarely attenuate into a petiole up to 1 cm long, serrate to dentate (teeth 0.5–5.7 mm deep), glabrescent to floccose above, glabrescent to lanate beneath, rarely glabrescent, tertiary venation inconspicuous; *upper cauline leaves* 1–14.4 cm long, 0.1–1.5 cm wide, narrowly lanceolate to lanceolate (ratio upper leaf width / upper leaf length = 0.04–0.50), acute, sessile, rarely attenuate into a petiole up to 1 cm long, serrate to subentire (teeth 0.3–1.9 mm deep), glabrescent to floccose above,

glabrescent to lanate beneath, rarely glabrescent. *Synflorescence* 5–33 cm long, corymbose to subcorymbose, with lanceolate-oblong bracts. *Capitula* (5–)9–25(–150), 23.2–42.4 mm diam; *involucre* 9.7–16.5 mm diam, 5–8 mm long, bell-shaped to obconical; *involucral bracts* (16–)20–22(–26), 4–6.8 mm long, 0.7–1.6 mm wide, with scarious margin 0.2–0.5 mm wide, lanceolate, acute, smooth, apex sometimes with a faint black spot, glabrescent to lanate; *supplementary bracts* (5–)9–13(–17), 2–6.9 mm long, 0.2–0.7 mm wide, subulate, without scarious margin, a third to a two-thirds as long as involucral bracts, glabrescent to lanate, not imbricate. *Ligulate florets* 13–24, 10.5–23.1 mm long, yellow; *tubular florets* 5–8 mm long, 0.4–1.3 mm diam, yellow. *Achenes* 2.4–4.9 mm long, 0.5–0.8 mm wide, subcylindrical (ratio achene width / achene length = 0.11–0.28), shorter than pappus (ratio achene length / pappus length = 0.38–0.68), with 7–14 ribs, glabrous to covered with scattered trichomes along the whole surface 0.1–0.2 mm long; *pappus* 4.9–8.6 mm long, whitish.

Etymology. The epithet *paludosus* probably refers to the habitat where usually grows this species, the marshes.

Discussion. Senecio paludosus is a distinctive species with numerous cauline leaves, sessile to subsessile, dentate, not decreasing abruptly up to the stem. The fistulous stem and the corymbose synflorescence with numerous and small capitula are another diagnostic characters. In some cases it has been confused with *S. nemorensis* L. (or related species), which belongs to *Senecio* sect. *Doria*. However, they may be easily differentiated by the number of ligulate florets: 13–24 in S. *paludosus* vs. 1–8 in *S.* gr. *nemorensis* (Chater & Walters, 1976). It is a variable species regarding to the leaves and achenes indumentum, characters that hold the two subspecies here recognized.

Key to subspecies of *Senecio paludosus*

1a. Leaves glabrescent to weakly tomentose-lanate beneath, 0.5–2.3(–4) cm wide; achenes glabrous or hairy on the whole surface.....**10a. *S. paludosus* subsp. *paludosus***

1b. Leaves ± tomentose-lanate beneath, 1–4.4 cm wide; achenes hairy only in upper part.....**10b. *S. paludosus* subsp. *lanatus***

10a. *Senecio paludosus* subsp. *paludosus*

Senecio byzantinus L., Sp. Pl.: 871. 1753. *Senecio paludosus* var. *byzantinus* (L.) Nyman, Consp. Fl. Eur.: 354. 1879. TYPE: cultivated at Hortus Upsalensis (lectotype, designated by Calvo & al. (2012: 127-128), Herb. S-Linn 348.7, S image!).

Senecio bohemicus Tausch, Syll. Pl. Nov. 2: 253. 1828. *Senecio paludosus* var. *bohemicus* (Tausch) Steud., Nomencl. Bot. ed. 2, 2: 563. 1841. *Senecio paludosus* var. *glabratus* W.D.J. Koch, Syn. Fl. Germ. Helv. ed. 2: 431. 1843, nom. illeg. (ICBN Art. 11.4). *Jacobaea kosteleckii* Opiz, Seznam: 54. 1852, nom. illeg. (ICBN Art. 11.4). *Senecio paludosus* subsp. *bohemicus* (Tausch) Čelak., Prodr. Fl. Böhmen: 242. 1871. TYPE: Czech Republic, Bohemia, Aus Gräben um Liebitz, [50º18'N 14º35'E], *Tausch 815b* (lectotype, designated by Holub (1962:33), PR 122710! (right hand specimen); isolectotypes, LE!).

Senecio immunis Wallr., Erst. Beitr. Fl. Hercyn.: 278. 1840. *Senecio paludosus* subvar. *immunis* (Wallr.) Nyman, Consp. Fl. Eur.: 354. 1879. TYPE: Germany, Hercynia, *Wallroth s.n.* (PR?, not found).

Senecio munitus Wallr., Erst. Beitr. Fl. Hercyn.: 278. 1840. *Senecio paludosus* subvar. *munitus* (Wallr.) Nyman, Consp. Fl. Eur.: 353. 1879. TYPE: Germany, Hercynia, *Wallroth s.n.* (PR?, not found).

Senecio paludosus var. *nudiusculus* Ledeb., Fl. Ross. 2: 639. 1845, nom. illeg. (ICBN Art. 11.4). TYPE: Latvia-Estonia, Livonia, *Ledebour s.n.* (lectotype, designated here, LE!).

Senecio paludosus var. *vulgaris* Ledeb., Fl. Ross. 2: 640. 1845. TYPE: Latvia, Curonia, 1841, *Lindemann s.n.* (lectotype, designated by Marhold & al. (2003: 375), LE!).

Senecio paludosus var. *grandidens* Rupr., Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 12: 220. 1854. TYPE: Rusia, Pskov Oblast, inter Gdow & Pskow prope Sholtscha, [58ºN 28ºE], 12 July 1853, *Ruprecht s.n.* (lectotype, designated here, LE!).

Senecio paludosus var. *tomentosus* Evers, Verh. K.K. Zool.-Bot. Ges. Wien 46: 77. 1896, nom. illeg. (ICBN Art. 53.1). TYPE: Italy, Trentino-Alto Adige, Tridetum, vallis Athesis, inter Mattarello et Aldeno, [45º59'N 11º06'E], 7 June 1895, *Evers 8991* (lectotype, designated here, GZU-275331 image!).

Senecio paludosus var. *subinteger* Rouy in Rouy & Foucaud, Fl. France 8: 326. 1903. TYPE: France, Marne, la Vesle á Muizon prés Reims, [49º16'N 3º53'E], 28 July 1872, *Rouy 344* (lectotype, designated by Marhold & al. (2003: 376), LY image!).

Senecio paludosus var. *procopiani* Hormuz., Österr. Bot. Z. 61: 275. 1911. TYPE: Romania, Bukovina, Dorna-Vatra, Runc hill, [47º21'N 25º20'E], 28 Sep, *Procopianu-Procopovici s.n.* (CERN?, not found).

Senecio paludosus subsp. *angustifolius* Holub, Novit. Bot. Inst. Horto Bot. Univ. Carol. Prag.: 30. 1962. *Jacobaea paludosa* subsp. *angustifolia* (Holub) B. Nord. & Greuter, Willdenowia 36: 712. 2006. TYPE: Italy, Veneto, Venetia, flum. Mincio circa il Borghetto die Vallegio pr. Veronam, [45º21'N 10º43'E], 10 June 1886, *Rigo s.n.* (holotype, PR-616428!; isotype, B-10-0299741!).

Senecio paludosus var. *fukarekii* Gajić, Glasn. Prir. Muz. Beogradu, B 27: 33. 1972. TYPE: Srbija [Serbia], m. Vlasina, [44º14'N 19º38'E], *Černjavski s.n.* (holotype, BEO not seen).

Senecio paludosus f. *gymnocarpus* Soó, Acta Bot. Hung. 18: 173. 1973. TYPE: Hungary, Pest, Ócsa, [47º17'N 19º12'E], *Soó s.n.* (holotype, BP not seen).

Senecio paludosus f. *hungaricus* Soó, Acta Bot. Hung. 18: 173. 1973. TYPE: Hungary, Pest, Bugyi, [47º14'N 19º10'E], *Soó s.n.* (holotype, DE not seen).

Stem weakly arachnoid in the upper half to entirely glabrescent. *Cauline leaves* glabrescent to sparsely arachnoid above, glabrescent to weakly tomentose-lanate beneath. *Involucral bracts* glabrescent to weakly arachnoid. *Achenes* glabrous to covered with scattered trichomes, sometimes ± dense through the whole surface or only

on the upper half. Chromosome number: 2*n*=20, 40* (*Kuzmanov & al., 1986: 72; Lövkvist & Hultgård, 1999: 33).

Iconography. Hegi (1928: 754 fig. 460, pl. 268-4); Nyárády (1964: 569 pl. 110 fig. 2); Konechnaya (1994: 61 pl. 5 fig. 2); Hodálová (2003: 76 fig. 2A-2B); Marhold & al. (2003: 374 fig. 1-2).

Distribution and habitat. Austria, Belarus?, Belgium, Bulgaria, Croatia, Czech Republic, Estonia, France, Germany, Great Britain, Hungary, Italy, Latvia, Lithuania?, Moldova?, Montenegro, Netherlands, Poland, Romania, Russia, Serbia, Slovakia?, Slovenia, Sweden, Switzerland, Turkey, Ukraine; marshes, banks of the rivers, edge of lakes, damp places, on silts, slimes, mud, sometimes partially submerged; altitude 0–1300 m (Figure 16).

Phenology. Flowering from June to September.

Discussion. Senecio paludosus subsp. *angustifolius* was described by Holub (1962) as a taxon characterized by displaying linear to linear-lanceolate leaves, arachnoid-tomentose beneath, glabrous (rarely subarachnoid) above, and glabrous achenes. Marhold & al. (2003), confirm the presence of this taxon in western and central Europe, and also underlined that intermediate morphological types between subsp. *paludosus* and subsp. *angustifolius* occur scattered in Netherlands, France, Germany, Austria, Czech Republic, Slovakia, and Ukraine. We have observed that the populations from Italy usually display leaves very narrow with weakly tomentose-lanate indumentum beneath, and achenes glabrous. Likewise, in Netherlands, Belgium, France and Switzerland are more common specimens with wider leaves, densely arachnoid beneath (even weakly tomentose-lanate) and achenes glabrous. Populations from Anatolia and Bulgaria bear thicker leaves, slightly arachnoid beneath, and the achenes are hairy on the whole surface. Other forms characterized for the glabrescent leaves and scattered trichomes on the whole surface of the achenes are common in Russia, Sweden, Germany, Romania, northern Austria, Poland. Nonetheless, in Poland also appear specimens with leaves arachnoid beneath and glabrescent achenes, as well as we found intermediate forms in most of the central and eastern European countries. Therefore, no

geographical pattern is observed. On this base, we do not recognize *S. paludosus* subsp. *angustifolius*, and we include it within the variability of *S. paludosus* subsp. *paludosus*. Multiple hybridization events could be responsible of such puzzling distribution and variable morphology.

Euro+Med **(**2006-) also records *S. paludosus* subsp. *paludosus* from Belarus, Lithuania, Moldova, and Slovakia. We have not studied material from these countries, thus, they appear in the text with a question mark.

Selected specimens examined. AUSTRIA. **Carinthia**: Nittel-Kärnten, Klagenfurt-SW, Siebenhügel, Molinietum N Schleusenweg, 46º36'N, 14º16'E, 19 July 1990, *G.H. Leute 9351/4* (WU). **Styria**: Stiria superior, ad lacum Gaishornsee prope pagum Gaishorn, 47º29'N, 14º32'E, July 1904, *H. Fleischmann 198* (WU). BELGIUM. Hermalle et Herstal (Liége), bords de la Meuse, 50º41'N, 5º41'E, 13 July 1868, *E. Marchal 331* (K); Kempen, Emblehem, langs de Krekelbeek, 51º9'N, 4º36'E, 3 Sep 1938, *J.G. Sloff 767* (L). BULGARIA. In agro Bataško Polje, 41º58'N, 24º12'E, 7 Aug 1887, *T. Gheorghieff s.n.* (WU). CROATIA. Vrbovec, Berek, 45º44'N, 16º49'E, 5 Sep 1917, *I. Pevalek s.n.* (WU). ESTONIA. N shore of lake Vortsjärv in front of the camping place, 58º24'N, 26º6'E, 14 Aug 1993, *R. Lampinen & T. Lampinen 18095* (H); parish of Keila, near Keila-Joa, 59º23'N, 24º18'E, 8 Aug 1875, *G. Pahnsch s.n.* (S). FRANCE. **Essonne**: Seine-et-Oise, Itteville, tourbières de la Juine, 48º31'N, 2º20'E, 15 July 1926, *M. Despaty 2088* (MA). **Haute-Saône**: Port-sur-Saône, bords de la Saône, 47º41'N, 6º2'E, 10 Aug 1932, *V. Madiot 6651* (MA). **Marne**: La Chesne, étang de Bairon, étang Neuf, 49º31'N, 4º46'E, 14 Aug 1979, *J. Duvigneaud 79* (MA). GERMANY. **Bavaria**: bords de la Woernitz près de Wassertrüdingen en Franconie, 49º1'N, 10º36'E, July 1848, *G.A. Hauser 399* (L). **Brandenburg**: Lübbenau, im Schilfbestand am Ufer des Burg-Lübbenauer, 51º51'N, 13º58'E, 21 Aug 1962, *W. Hempel s.n.* (B). **North Rhine-Westphalia**: Niederrhein, Broich bei Kempen, 50º56'N, 6º19'E, 14 July 1931, *H. Höppner 793* (K). GREAT BRITAIN. Seed from Cambridgeshire, 52º16'N, 0º5'E, 15 Aug 1991, *T. Wells s.n.* (K). HUNGARY. Comit. Pest., in palude "Szittyóürbó" territ. Ürbópuszta prope Bugyi, 47º14'N, 19º10'E, 11 June 1925, *A. Boros s.n.* (B); prope pagum Sziget-Ujfalú, 46º12'N, 19º38'E, 19 June 1879, *J.A. Tauscher s.n.* (MO). ITALY. **Lombardy**: Bresciana in loc. paludosis ad lacum d'Iseo, 45º40'N, 10º4'E, 25 June 1871, *P. Porta s.n.* (K). **Trentino-Alto Adige/Südtirol**: Bozen, Etschmööser unter Frangart, 46º28'N, 11º18'E, 11 July 1905, *H.F. Handel-Mazzetti s.n.* (WU). **Veneto**: Padova, Venetia, inter Monselice et Arquà-Petrarca, 45º15'N, 11º43'E, June 1911, *A. Fiori & A. Béguinot 1770* (WU). LATVIA. pr. Daugavpils, 55º52'N, 26º29'E, 6 Aug 2010, *J. Calvo 4933* (MA); Riga, prope Oger, 56º48'N, 24º35'E, 28 July 1912, *S. Juzepczuk 154* (LE). MONTENEGRO. Antivari, Černa Gora, 42º4'N, 19º5'E, 1894, *T. Pichler s.n.* (US). NETHERLANDS. R. Ijssel near railway-station Voorst, north-west of Zutphen, 52º9'N, 6º8'E, 18 July 1957, *J.C. Lindeman 434* (MA); forelands of R. Lek near Jaarsveld, 51º57'N, 4º58'E, 13 July 1957, *F.A. Stafleu 609* (MA). POLAND. Breslau, Oderufer bei Grüneiche, 51º4'N, 17º8'E, 8 Aug 1892, *E. Hellmann 619* (B); Zehden, 52º52'N, 14º9'E, 24 Aug 1888, *P.H.W. Taubert 1328* (B). ROMANIA. **Suceava**: Moldova, distr. Botoşani, in locis paludosis "Podetele" versus fl. Siret, 47º43'N, 26º25'E, 22 Aug 1925, *G.P. Grintescu 832* (O). **Argeş**: Bucovina, distr. Câmpulung, ad stationem viae ferreae Poiana Stampii, 45º23'N, 25º3'E, 25 Aug 1936, *G.P. Grintescu 832c* (L). **Dolj**: in valle fluminis Danubii, prope pagum Ciupercenii Noi, 43º54'N, 22º54'E, 14 June 1968, *G. Popescu & M. Păun 750* (WU). RUSSIA. **Kaliningrad**: Insterburg, 54º38'N, 21º49'E, 1 Aug 1890, *H. Kuehn s.n.* (B). **Leningrad**: coast of gulf of Finland, Lisiy Nos, 59º59'N, 30º5'E, 30 June 2010, *J. Calvo, N. Nikolaiev & A. Stanislavsky 4921* (MA). **Pskov**: pr. Novoye Nikol'skoye, 57º27'N, 28º39'E, 5 Aug 2010, *J. Calvo 4932* (MA). SERBIA. Inter Perlez et Titel, 45º12'N, 20º20'E, 9 June 1968, *E. Mayer 63380* (M); prope Neu-Palanka [Banatska Palanka], ad Danubium Bana, 44º49'N, 21º21'E, June 1869, *K.A. Sonklar s.n.* (UPS). SLOVENIA. Cerkniško jezero prope pag. Dolenje jezero, 45º46'N, 14º21'E, 17 July 1977, *E. Mayer 10001* (B); Cerkniško jezero inter pagos Dolnje Jezero et Otok, 45º44'N, 14º22'E, 12 Aug 1967, *E. Mayer 63414* (B). SWEDEN. Skåne, Håslöv, 55º26'N, 13º1'E, 8 Aug 1931, *O.J. Hasslow 1566* (K); Scania, Kristianstad, 56º0'N, 14º11'E, 31 July 1878, *L.J. Wahlstedt s.n.* (BR). SWITZERLAND. **Fribourg**: in latere dextro lacûs Neocomi infra pagum "Chabrey" reipublicae Valdiae, 46º55'N, 6º58'E, 25 June 1971, *H. Burdet & al. 97* (NY). **Vaud**: Chevroux-Dessous, La Grève, 46º53'N, 6º54'E, 14 June 1959, *E. Berger 4037* (L). TURKEY. **Bolu**: am Yeniçağa-See (bei Y. zwischen Bolu u. Gerede), 40º46'N, 32º0'E, 18 Sep 1957, *G. Wagenitz & H.-J. Beug 172* (B); am Abant Gölü (=See) südwestl.

Bolu, 40º36’N, 31º17’E, 10 Sep 1957, *G. Wagenitz & H.-J. Beug 74* (B). UKRANIE. **Chernivetska**: Basarabia, distr. Hotin, in valle rivuli Rachitna, loco "Recea" dicto, 48º22’N, 26º9’E, 24 Aug 1934, *E. Topa 832b* (O). **Dnipropetrovsk**: prov. Mohilew, praesertim circa urbem Mohilew ad Borysthenem, 48º52’N, 34º29’E, 1862, *N. Downar s.n.* (LE).

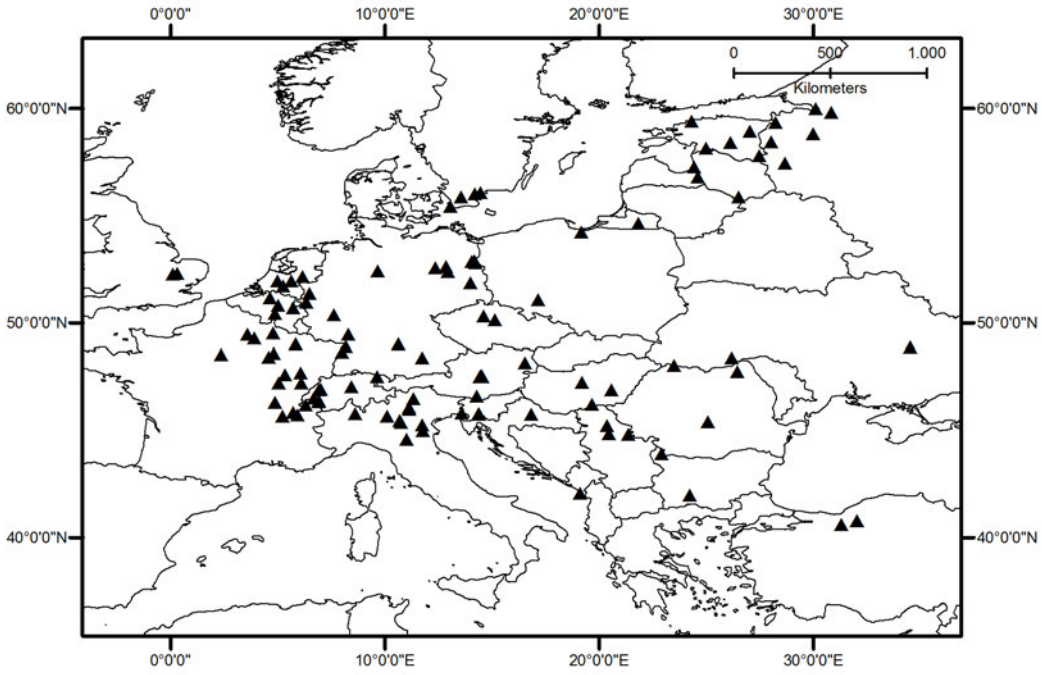


Figure 16. Distribution map for *Senecio paludosus* L. subsp. *paludosus* (▲).

10b. *Senecio paludosus* subsp. *lanatus* Holub, Novit. Bot. Inst. Horto Bot. Univ. Carol. Prag.: 32. 1962. *Jacobaea paludosa* subsp. *lanata* (Holub) B. Nord. & Greuter, Willdenowia 36: 712. 2006. TYPE: Hungary, in pratis campi Rákos, [46º18'N 20º36'E], VI. 1900, *Lengyel s.n.* (holotype, PR-63897!; isotype, S!).

Cineraria aurea L., Sp. Pl. ed. 2: 1244. 1763. *Senecio auratus* DC., nom. nov., non *S. aureus* L., Prodr. 6: 348. 1838. TYPE: sine collector (lectotype, designated by Marhold & al. (2003: 377), herb. Linn. 1000.22 (LINN image!).

Senecio lanatus S.G. Gmel., Reise Russland 1: 155. 1770-1774, nom. illeg., non L. 1758-1759 (ICBN, Art. 53.1). TYPE: Reise Russland. 1770-1774. Tableau 15-1 (lectotype, designated here, ICBN Art. 44.1).

Senecio riparius Wallr., Sched. Crit.: 482. 1822. *Senecio paludosus* var. *riparius* (Wallr.) Klett & Richt., Fl. Leipzig: 693. 1830. *Senecio paludosus* var. *nudiusculus* Rchb., Fl. Germ. Excurs.: 245. 1831-1832 [“nudiuscula”] nom. illeg. (ICBN Art. 11.4).

Senecio paludosus var. *glabriusculus* DC., Prodr. 6: 353. 1838 [“glabriuscula”] nom. illeg. (ICBN Art. 11.4). *Senecio paludosus* var. *riparius* (Wallr.) Asch., Fl. Brandenburg 1: 343. 1864, nom. illeg., comb. superf. *Senecio paludosus* var. *riparius* (Wallr.) Nyman, Consp. Fl. Eur.: 354. 1879, nom. illeg., comb. superfl. *Senecio paludosus* var. *riparius* (Wallr.) J. Weiss in Hallier & Wohlf., Syn. Deut. Schweiz. Fl. ed. 3: 1492. 1897. *Senecio paludosus* subvar. *glabriusculus* (DC.) Rouy in Rouy & Foucaud, Fl. France 8: 326. 1903 [“glabriuscula”]. *Senecio paludosus* var. *riparius* (Wallr.) Soó & Jáv., Magyar Növ. Kéz.: 691. 1951, nom. illeg., comb. superfl. TYPE: Germany, Saxony-Anhalt, Halle**,** ex agro halensis, [51º26'N 11º55'E], 1819, *Wallroth s.n.* (lectotype, designated by Marhold & al. (2003: 376), PR not seen; isolectotype, JE-14494 image!).

Senecio tomentosus Host, Fl. Austriaca 2: 476. 1831, nom. illeg., non Michx. 1803 (ICBN, Art. 53.1). *Senecio paludosus* var. *tomentosus* (Host) Nyman, Consp. Fl. Eur.: 354. 1879, nom. illeg. (ICBN, Art. 53.1). *Senecio paludosus* f. *tomentosus* (Host) Jáv., Magyar Fl.: 1143. 1925. TYPE: Hungary, pratis ad Tibiscum, *Host s.n.* (lectotype, designated by Marhold & al. (2003: 377), W image!).

Senecio tataricus Less., Linnaea 9: 192. 1835. *Jacobaea tatarica* (Less.) E. Wiebe, Turczaninowia 3: 62. 2000. TYPE: Russia, without locality, 1832, *Lessing s.n.* (lectotype, designated by Marhold & al. (2003: 377), LE!; isolectotypes, LE!).

Senecio sadleri Láng ex Sadler, Fl. Comit. Pest. ed. 2: 403. 1840. *Senecio paludosus* var. *tomentosus* W.D.J. Koch, Syn. Fl. Germ. Helv. ed. 2: 431. 1843, nom. illeg. (ICBN, Art. 53.4). *Senecio paludosus* var. *sadleri* (Láng ex Sadler) Hayek, Pflanzendecke Österr.-Ung. 1: 520, 581. 1916. TYPE: Hungary, paludosis ad Tibiscum, July 1826, *Láng s.n.* (lectotype, designated by Marhold & al. (2003: 377), WU-40193 image!).

Senecio paludosus var. *hypoleucus* Ledeb., Fl. Ross. 2: 640. 1845. *Senecio hypoleucus* (Ledeb.) Woł., Fl. Polon. Exs. n.º 445. 1896. TYPE: Hungary, ad Tibiscum, 1 Aug 1840, *Rochel s.n.* (lectotype, designated by Marhold & al. (2003: 377), LE!; isolectotype, LE!).

Senecio paludosus subsp. *tomentosus* Čelak., Prodr. Fl. Böhmen: 242. 1871, nom. illeg. (ICBN Art. 53.4). TYPE: A. Gräben u Taschitz [Dašice, 50º1'N 15º54'E], without date, *Tausch 815a* (lectotype, designated by Marhold & al. (2003: 377), PR 218250!; isolectotypes, PR-122710! (left hand specimen), LE!, PRC not seen).

Stem ± arachnoid, sometimes lanate in the upper half and glabrescent the lower half. *Cauline leaves* weakly arachnoid to floccose above, ± tomentose-lanate beneath. *Involucral bracts* sparsely arachnoid to lanate. *Achenes* with scattered trichomes on the upper half, rarely glabrescent. Chromosome number: 2*n*=40 (Váchová, 1974: 18, sub *S. paludosus*; Letz & al., 1999: 47, sub *S. paludosus* var. *tomentosus*).

Iconography. Gmelin (1770-1774, fig. 15-1, as *S. lanatus*); Reichenbach (1853, fig. 974-2, sub *S. paludosus* var. *tomentosus*); Roldugin (1966: 155 fig. 17-4, sub *S. tataricus*); Konechnaya (1994: 61 pl. 5 fig. 3, sub *S. tataricus*); Hodálová (2003: 76 fig. 2C); Marhold & al. (2003: 374 fig. 3).

Distribution and habitat. Belarus, Czech Republic, Germany, Hungary, Kazakhstan, Romania?, Russia, Slovakia?, Ukraine; marshes, banks of the rivers, edge of lakes, damp places, on silts, slimes, mud; altitude 10–90 m (Figure 17).

Phenology. Flowering from June to September.

Discussion. This taxon also presents variability on the leaves indumentum, being those populations from central Europe completly lanate beneath, while those from Russia are usually floccose. These specimens might be confused with those forms of *S. paludosus* subsp. *paludosus* that display floccose leaves beneath, but the broader leaves (1–4.4 cm) and the achenes only with trichomes on the upper part help to distinguish *S. paludosus* subsp. *lanatus*.

Marhold & al. (2003) lectotypified *S. sadleri* on a Sadler's collection, however neither the original handwriting does not seem to belong to Sadler, nor the posterior annotation in red coloured. Both could be Láng's handwriting. Taking in account that Sadler curiously used the epithet *sadleri* and he acknowledged Láng in the original description, it would think that Sadler used a Láng's collection under the name *S.*

sadleri and he conserved the epithet. Therefore, we ascribe the collection to Láng. Another specimen from Tibiscum that might be part of the original material is kept at K, besides that one cited by Marhold & al. (2003) deposited at TUB. The Láng's collection from Tibiscum (Theiß in German) identified as *S. paludosus* var. *leucophyllus* DC. is not considered original material. We located duplicates at L and LE.

Regarding to the lectotype of *S. riparius*, the curator of PR, O. Sida, kindly informed us that for now the voucher is oddly not located. Nonetheless, we found one isolectotype at JE that corresponds to *S. paludosus* subsp. *lanatus*. On the base of the available original material, and despite this name was usually subordinated to subsp. *paludosus*, we consider more appropriate to include the name *S. riparius* as a synonym of *S. paludosus* subsp. *lanatus*. Moreover, we question that the mentioned type material designated by Marhold & al. (2003) corresponds to the original material. According to the label information of the isolectotype "a me anno 1819 in agro halensi detectus & in Sched. Cr. 482 descriptus", it likely seems that the specimen was collected after the publication of the name *S. riparius*, and therefore, it could not be designated as type material.

According to Euro+Med **(**2006-) this taxon grows in Romania and its presence in Slovakia is questionable. We have not studied material from these regions, thus, both countries apper in the distribution with a question mark. Concerning the populations from western Siberia we revised only one collection from Tomsk Oblast, although Vibe (2007) also reported this taxon from Khanty-Mansi Autonomous Okrug, Tyumen Oblast, and Omsk Oblast.

Selected specimens examined. BELARUS. Lithuania, Weleśnica, distr. Pińsk, rzeki Jasiołdy, 52º13'N, 26º5'E, 15 Aug 1895, *M. Twardowska 445* (B, KRAM). HUNGARY. Ad Szarvas, 46º53'N, 20º32'E, Aug 1884, *V. Borbás s.n.* (WU); Jász-Nagykun-Szolnok, brachii mortui Tibisci ad Abádszalók, 47º28'N, 20º34'E, 30 July 1934, *A. Boros s.n.* (S); Zemplény, Tokay, 48º7'N, 21º24'E, *F. Hazslinszky s.n.* (UPS); Hungaria australis, Felsö-rét dictis prope Tisza-Roff, 47º23'N, 20º26'E, *A. Perlaky 3776* (WU). KAZAKHSTAN. **West Kazakhstan**: Ural'sk Oblast', nearby Ural'sk, in meadows along the Ural river, 51º3'N, 51º20'E, 20 July 1922, *I.W. Larin 189* (LE). RUSSIA. **Arkhangelsk**: Archangelsk extra oppidum in insula Keg ostrov flummis Durina, 64º32'N, 40º25'E, 30 July 1912, *S.J. Enander s.n.* (UPS); ad lacum Latscha [Lacha], 61º27'N, 38º54'E, 28 Aug 1899, *J.I. Lindroth s.n.* (H). **Bashkortostan**: gubern. Ufa, ad flu. Kama et Bjelajo, 55º47'N, 54º8'E, 1868, *s.n.* (LE); prov. et distr. Ufa, prope p. Durassowo, ad ripam fl. Dema, 54º25'N, 55º17'E, 21 July 1907, *I. Schirajewsky s.n.* (LE). **Novgorod**: Selishchi, Vysokoye, Vóljov river, 58º57'N, 31º43'E, 4 Aug 2010, *J. Calvo 4931* (MA). **Orenburg**: prope Orenburg, 51º53'N, 55º6'E, 1878, *J. Schell 485* (LE). **Rostov**: Novotscherkassk, 47º25'N, 40º8'E, 30 July 1910, *A. Jakouschev s.n.* (WU); prov. Don, Don (Rostow ünd Stalingrad), 64º32'N, 40º25'E, Sep 1948, *Rost s.n.* (B). **Ryazan**: prov. Rjasan, distr. Spassk, reservatum naturae Okense, ad ripam dextram fl. Para in decursu inferiore, 55º12'N, 40º8'E, 6 Aug 1975, *T. Sokova & S. Kuzmenko s.n.* (BR). **Samara**: Nikolaevsk uyezd, along the Irgiz river, on the bank by water, 53º12'N, 49º3'E, 13 June 1915, *Y. Belyakov s.n.* (LE); prov. Samara (Sesjewez), 53º16'N, 50º11'E, 6 Aug 1847, *R. Pabo s.n.* (LE). **Saratov**: 60 km of town Pugachev near settl. Sukhoi Otrog., river Bolshoi Irgiz, 51º50'N, 48º10'E, 9 July 1993,

A.K. Skvortsov & al. s.n. (MO). **Tatarstan**: Kazand, 55º41'N, 49º8'E, *S.I. Korshinsky s.n.* (LE). **Tomsk**: bank of the river Tym by the gorge Belyy Yar, alluvial meadows at the base of the cliffs, 59º53'N, 83º23'E, 17 July 1904, *P.N. Krylov s.n.* (H). **Udmurtiya**: Cheganda, bottomland of the Kama river, 55º53'N, 53º16'E, 10 Aug 1926, *V. Petrova 346* (LE). **Volgograd**: Saratow, Sarepta, 48º29'N, 44º42'E, 22 Aug 1898, *A. Becker s.n.* (B); Frolovsky reg., Don flood-lands between settlements Chernopolyanskui and Lebyazhyi, 49º31'N, 43º22'E, 29 July 1993, *I. Schanzer & T. Kramina s.n.* (MO). UKRAINE. **Chernihiv**: distric. Surash, provinc. Tschernigov, 51º29'N, 31º20'E, 25 June 1926, *V. Kreczetovicz 1009* (LE). **Kiev**: distr. Kiew, fl. Dnepr prope Kiew, 50º22'N, 30º34'E, 5 Sep 1899, *N. Zinger s.n.* (LE). **Sumy**: distr. Gluchiv, Konotop, Czernygiv, 51º14'N, 33º13'E, 22 Aug 1928, *F. Levina 333* (LE). **Odessa**: Bessarabia, Zhebrieni–Vilkov, near the Danube river, 45º28'N, 29º9'E, 7 June 1886, [*illegible*] (LE). **Zakarpattia**: Marmaross, Bustyaháza, auf sumpfigen Wiesen, 48º2'N, 23º29'E, July 1849, *L. Vágner s.n.* (UPS). **Zaporizhia**: Gubern. Catherinoslaw, in demissis ad Borysthenem infra urbem Alexandrowsk, 47º43'N, 35º8'E, 1865, *L. Gruner s.n.* (K).

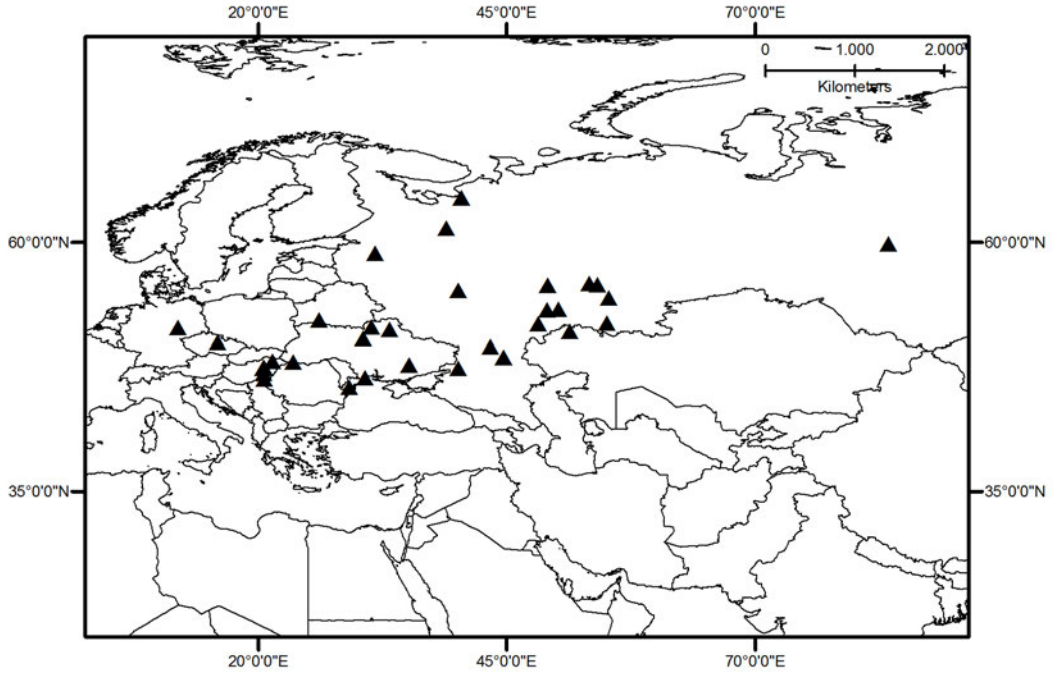


Figure 17. Distribution map for *Senecio paludosus* subsp. *lanatus* Holub (▲).

11. *Senecio lopezii* Boiss., Elench. Pl. Nov.: 60. 1838. TYPE: Spain, Andalucía, Málaga, Desierto de las Nieves prope Yunquera, [36º45'N 4º58'W], *López s.n.* (lectotype, designated by Burdet & al. (1983: 798), G-96312 image!).

Senecio grandiflorus Hoffmanns. & Link, Fl. Portug. 2: 307. 1825-1828, nom. illeg., non P.J. Bergius 1767 (ICBN, Art. 53.1). TYPE: Fl. Portug. 2: 308, fig. 100. 1825-1828 (lectotype, designated here, ICBN Art. 8.1).

Senecio gibraltaricus Rouy, Bull. Soc. Bot. France 34: 440. 1887. *Senecio lopezii* var. *minor* Willk., Oesterr. Bot. Z. 41: 3. 1891. TYPE: Spain, Andalucía, Cádiz, Los Barrios, Sierra de Palma, près Algeciras, [36º08'N 5º31'W], 10 June 1887, *Reverchon 137*

(lectotype, designated here, G-96307 image!; isolectotypes, B-10-0293987!, BM-1025978 image!, BR-505666!, G-96305 image!, G-96306 image!, JE-11050 image!, JE-11051 image!, JE-11052 image!, JE-11053 image!, LD-1224011 image!, NY!, P-4416880 image!, P-4305116 image!, S!, UPS!, WU!).

Perennial herb. *Rhizome* 2.4–5.4 cm long, 0.7–1.1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 50–112 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid to glabrescent, base without remnants of old leaves or tufts of hairs. *Basal leaves* 15.5–47.5 cm long, 2.7–7.7 cm wide, persistent, lanceolate to widely lanceolate (ratio basal leaf width / basal leaf length = 0.14–0.38), obtuse, rarely acute, attenuate to cuneate, with a petiole 5–18 cm long, entire to crenate, sometimes slightly dentate, glabrous, concolorous. *Cauline leaves* 5–10; *middle cauline leaves* 10.0–23.5 cm long, 1.6–6 cm wide, alternate, lanceolate (ratio middle leaf width / middle leaf length = 0.10–0.35), acute to obtuse, usually sessile to semi-amplexicaul, sometimes attenuate into a petiole up to 3 cm long, slightly dentate to entire (teeth 0.6–0.7 mm deep), glabrous, tertiary venation inconspicuous; *upper cauline leaves* 1.1–6.9 cm long, 0.2–1.7 cm wide, lanceolate (ratio upper leaf width / upper leaf length = 0.10–0.25), acute, sessile, entire to slightly denticulate, glabrescent. *Synflorescence* 7–38 cm long, corymbose, with scarce linear-oblong bracts. *Capitula* (4–)5–12(–19), 35.3–56.5 mm diam; *involucre* 14.5–22.6 mm diam, 9–15 mm long, cupuliform; *involucral bracts* (20–)22–24(–28), 8.2–11.5 mm long, 1.1–2.6 mm wide, with scarious margin 0.3–0.7 mm wide, subulate to lanceolate, attenuate, 1–2 weakly keeled, apex often with a black spot, glabrescent; *supplementary bracts* (10–)13–15(–18), 3.8–7.5 mm long, 0.7–1.6 mm wide, subulate, without scarious margin, a third to a three-quarters as long as involucral bracts, slightly arachnoid to glabrescent, not imbricate. *Ligulate florets* 13–14, 17.4–39.4 mm long, yellow; *tubular florets* 6.9–11 mm long, 0.9–2 mm diam, yellow. *Achenes* 4.2–6.6 mm long, 0.8–1.4 mm wide, subcylindrical (ratio achene width / achene length = 0.18–0.25), shorter than pappus (ratio achene length / pappus length = 0.57–0.78), with 9–13 ribs, with intercostal trichomes 0.1–0.3 mm long; *pappus* 6.6–9 mm long, whitish. Chromosome number: unknown. Figure 19.

Iconography. Hoffmannsegg & Link (1813-1840: 308, fig. 100, sub *S. grandiflorus*); Boissier (1841: fig. 98a); Malagarriga (1977: 1200).

Distribution and habitat. S Spain and S Portugal; woods of *Quercus suber* L., *Arbutus unedo* L., *Castanea sativa* Mill., usually accompained by *Genista triacanthos* Brot.**,** *Calicotome villosa* (Poir.) Link, *Cistus populifolius* L., *Paeonia broteri* Boiss. & Reut., on siliceous soils; altitude 110–470 m (Figure 18).

Phenology. Flowering from April to June.

Etymology. Senecio lopezii is named in honor of Salvador López Ramos (fl. 1830-1878), canon of the cathedral of Málaga, who sent some specimens to Boissier (González Bueno, 2010: 17).

Discussion. This taxon is a robust plant with large basal leaves, with several capitula grouped in a corymbose synflorescence, and the involucre with supplementary bracts shorter than involucral ones. It is usually glabrous, sometimes glabrescent to slightly arachnoid on the stem and supplementary bracts. The large lanceolate basal leaves is a charcater shared with *S. macedonicus* and *S. franchetii*, although there are other characters to differenciate between each other and their distribution ranges do not overlap. We can distinguish it from *S. macedonicus* by the absence of foliose synflorescence bracts and the shorter and more glabrescent supplementary bracts. *Senecio lopezii* is easily distinguished from *S. franchetii* by the higher number of supplementary bracts and the more glabrescent indumentum.

Senecio lopezii is a species reduced to a few populations distributed in the southwest of Iberian Peninsula. It is noteworthy that the only studied collection from the locus classicus (Yunquera, Málaga Province, Spain) is the type material. Our efforts to find it there were unsuccessful.

Selected specimens examined. PORTUGAL. **Algarve**: Lieux ombragés de la Serra da Picota, près Monchique, 37º18’N, 8º31’W, 28 June 1853, *E. Bourgeau 1923* (E, K); Monchique, vertiente norte, pr. foz da Maceira, 37º22’N, 8º32’W, 11 May 2010, *J. Calvo 4555* (MA); Monchique, vertiente norte, Portela de Viuva dirección Aljezur, 37º20’N, 8º35’W, 12 May 2010, *J. Calvo 4560* (MA); Serra de Monchique, estrada para Saboia, a ca. 2 km. de Monchique, 37º19’N, 8º33’W, 30 May 1979, *J.V.C. Malato-Beliz & J.A. Guerra 16021* (C, MA); Serra de Monchique, Barranco da Maceira, próx. à ribeira da Perna Negra, 37º23’N, 8º34’W, 30 May 1979, *J.V.C. Malato-Beliz & J.A. Guerra 16035* (C, MA). SPAIN. **Cádiz**: San Roche, alrededores del cortijo de la Alcaidesa, 36º16’N, 5º22’W, 16 May 2009, *J. Calvo 3596* (MA); Tarifa, los Morrones, 36º9’N, 5º37’W, 16 May 2009, *J. Calvo 3604* (MA); Los Barrios, Sierra del Niño, 36º10’N, 5º35’W, 27 Apr 1983, *M. Ladero & al. s.n.* (MA); San Roque, finca La Alcaidesa, Los Charcones, 36º16’N, 5º22’W, 25 Apr 1979, *G. López 1006* (MA).

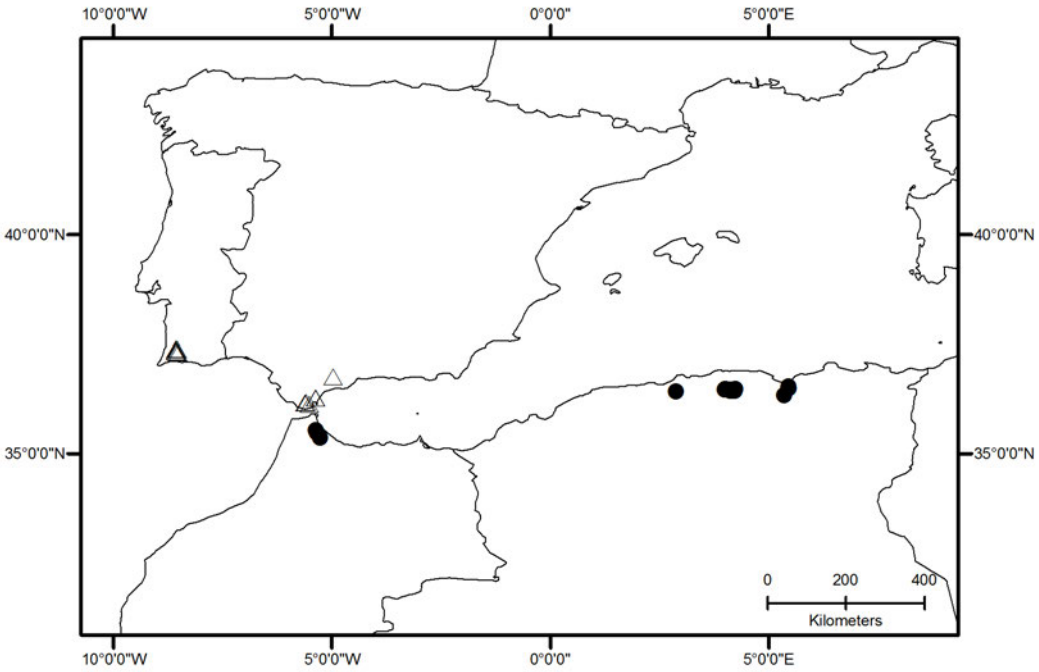


Figure 18. Distribution map for *Senecio lopezii* Boiss. (Δ) and *S. perralderianus* Coss. (●).

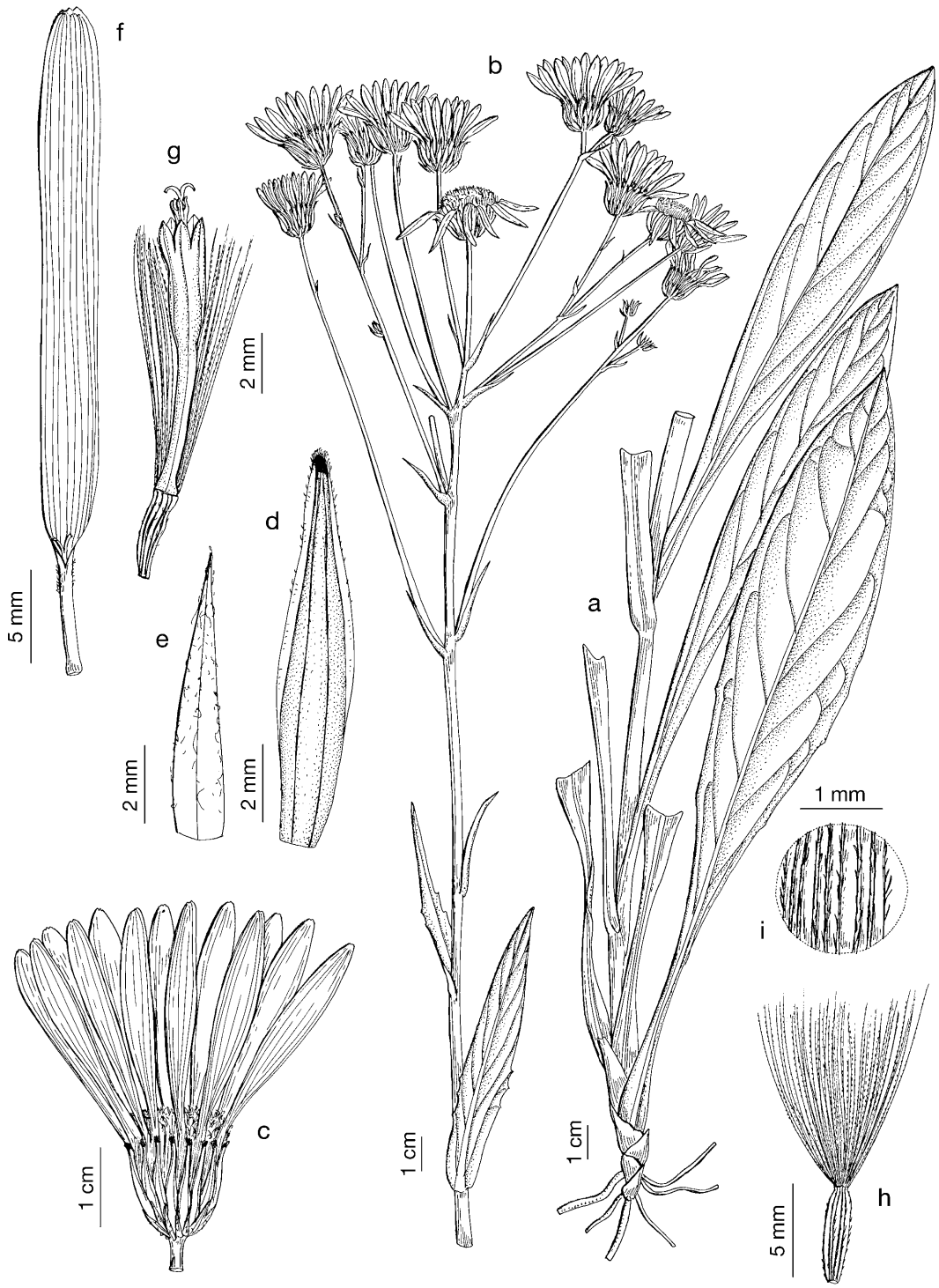


Figure 19. *Senecio lopezii* Boiss. —a, b. Habit (drawn from *Calvo 4555*, MA). —c. Capitulum (drawn from *López 1006*, MA). —d. Involucral bract (drawn from *López 1006*, MA). —e. Supplementary bract (drawn from *López 1006*, MA). —f. Ligulate floret (drawn from *López 1006*, MA). —g. Tubular floret (drawn from *López 1006*, MA). —h. Achene (drawn from *Calvo 3604*, MA). —i. Indumentum of achene (drawn from *Calvo 3604*, MA).

12. *Senecio macedonicus* Griseb., Spic. Fl. Rumel. 2: 221. 1846. TYPE: Greece, Macedonia, *Frivaldszky s.n.* (lectotype, designated by Strid (2000: 274), G-150321 image!; isolectotypes, GOET-2380 image!, K!, LE!, MO-5578157!, WU!).

Perennial herb. *Rhizome* 3.2–6.5 cm long, 0.7–1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 43–116 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to slightly arachnoid, base without remnants of old leaves or tufts of hairs. *Basal leaves* 9–21 cm long, 2.9–6.6 cm wide, persistent, sometimes caducous, lanceolate to broadly lanceolate (ratio basal leaf width / basal leaf length = 0.17–0.53), obtuse, sometimes acute, attenuate to cuneate, with a petiole 5–19 cm long, entire to crenate, sometimes slightly dentate, rarely irregularly pinnatipartite (lobes up to 25 mm deep), glabrescent to weakly arachnoid, concolorous. *Cauline leaves* 6–16; *middle cauline leaves* 7.2–18 cm long, 1.2–4.2 cm wide, alternate, lanceolate to broadly lanceolate (ratio middle leaf width / middle leaf length = 0.12–0.43), acute, rarely obtuse, sessile, sometimes attenuate into a petiole up to 8 cm long, entire to slightly dentate, rarely irregularly pinnatipartite (lobes 9–21 mm deep), glabrescent to weakly arachnoid, tertiary venation inconspicuous; *upper cauline leaves* 2–7 cm long, 0.6–2.8 cm wide, ovate to broadly lanceolate (ratio upper leaf width / upper leaf length = 0.17–0.52), acute, sessile, rarely with a short petiole, entire to subentire, rarely pinnatipartite, glabrescent to arachnoid-tufted near margin. *Synflorescence* 3.5–23 cm long, corymbose, with ovate-lanceolate bracts similar to upper leaves. *Capitula* (2–)5–9(–16), 27.6–45 mm diam; *involucre* 11.4–19.6 mm diam, 8–13 mm long, bell-shaped; *involucral bracts* (20–)21–23(–24), 7.1–11.6 mm long, 1.4–2.2 mm wide, with scarious margin 0.4–0.7 mm wide, ensiform to subulate, attenuate, 0–2 keeled, apex often with a black spot, glabrescent to weakly arachnoid; *supplementary bracts* (8–)10–13(–17), 4.6–10.3 mm long, 0.6–2.1 mm wide, lanceolate to broadly lanceolate, rarely linear-oblong, sometimes with scarious margin up to 0.4 mm, a third to a two-thirds as long as involucral bracts, arachnoid to glabrescent, often slightly imbricate. *Ligulate florets* 11–21, 15.5–22.2 mm long, yellow; *tubular florets* 7.0–10.3 mm long, 0.7–1.4 mm diam, yellow. *Achenes* ca. 3.8 mm long, ca. 0.8 mm wide, subcylindrical, shorter than pappus, with ca. 10 ribs, with dense trichomes covering ± the whole surface 0.3–0.4 mm long; *pappus* 5.9–9.5 mm long, whitish.

Etymology. The epithet *macedonicus* refers to the ancient kingdom of Macedonia, geographical area where Frivaldszky von Frivald collected the original material, and later Grisebach used to describe the species.

Discussion. Senecio macedonicus is a robust plant characterized by bearing ovate-lanceolate synflorescence bracts, similar to the upper leaves, and supplementary bracts of the involucre lanceolate to linear-oblong, sometimes with scarious margin. It is a variable species mostly with regard to the abundance of indumentum, and the shape of leaves. It has to be noted that the septentrional populations tend to be more glabrescent than the meridional ones, which are considered here within the intraspecific variability. Regarding to the variability of the leaves shape, we recognize two subspecies.

Morphologically, the closest species to *S. macedonicus* are *S. castagneanus* from eastern Anatolia, *S. pseudoorientalis* from western Anatolia, and *S. lopezii* from southern Iberian Peninsula. Regarding to *S. castagneanus* the shape and size of synflorescence bracts are useful characters to discriminate between each other, ovate-lanceolate in *S. macedonicus* vs. linear-oblong to narrowly lanceolate, and usually smaller, in *S. castagneanus*. In the case of *S. pseudoorientalis*, which sometimes displays similar synflorescence bracts, the achenes indumentum is used to differenciate them (glabrous in *S. pseudoorientalis* vs. hairy in *S. macedonicus*). In addition, *S. pseudoorientalis* usually is more glabrescent and shows smaller capitula. Regarding to *S. lopezii*, see comments under it.

Senecio macedonicus does not overlap with *S. castagneanus*. According to Matthews (1975), Ascherson missidentified the specimen *Sintenis 628* of the exsiccata "Iter trojanum 1883" as *S. macedonicus*, which actually corresponds to *S. castagneanus*. On the other hand, Orphanides identified as *S. tmoleus* (synonym of *S. castagneanus*) the number 109 of the exsiccata "Flora Graeca 1852" from Ziriae mountains (Mount Kyllini - Peloponnese), which we identify as *Senecio macedonicus*. Likewise, Boissier and Heldreich invalidly described in schedule the name *Senecio tmoleus* var. *longifolia* based on a Heldrich collection, dated on July 1844, from the "regione superiori Taygeti" (Peloponnese). Oddly, Boissier later included this name in the synonymy of *S. macedonicus*.

Halácsy in Schiffner (1904) described *S. longipedunculatus* from Mount Parnassus (Delphi, Greece), characterized to bear each capitulum on a long pedicel (up

to 20 cm), involucre 8–9.5 × 10–12.9 mm, glabrescent, and linear-oblong supplementary bracts. In addition, the cauline leaves decrease strongly in size up the stem. According to Kadereit (1991) it may be related to *S. macedonicus* since they grow in the same region, but the synflorescence bracts are not foliose and the upper cauline leaves are not well-developed. Also, the supplementary bracts of the involucre are linear-oblong, in any case lanceolate or broadly lanceolate. On the other hand, the mentioned characters also might bring this taxon close to *S. castagneanus*. Unfortunatelly, *S. longipedunculatus* is only known from the type material (lectotypified here), and the achenes are not mature, essential character to compare it with *S. castagneanus*. Consequently, we prefer to include *S. longipedunculatus* under "Doubtful or excluded names". More collections and further investigation is needed to elucidate its taxonomic position.

Key to subspecies of *Senecio macedonicus*

1a. Basal and cauline leaves entire, crenate or slightly dentate.....**12a. *S. macedonicus* subsp. *macedonicus***

1b. Basal and cauline leaves irregularly pinnatipartite……..**12b. *S. macedonicus* subsp. *barckhausiaefolius***

12a. *Senecio macedonicus* subsp. *macedonicus*

Senecio macedonicus var. *glaber* C. Regel, Candollea 8: 242. 1941. TYPE: Greece, Thessalonica, gipfel des Chortiatis, [40º35'N 23º06'E], 8 July 1939, *Regel s.n.* (lectotype, designated here, G-162759!; isolectotypes G-162760!, G-162761!).

Senecio bracteatus Boiss. & Orph., Diagn. Pl. Orient. ser. 2, 3: 36. 1856. *Senecio macedonicus* var. *brachyphyllus* Boiss., Fl. Orient. 3: 404. 1875. *Senecio macedonicus* var. *bracteatus* (Boiss. & Orph.) Nyman, Consp. Fl. Eur.: 354. 1879, nom. illeg (ICBN Art. 11.4). *Senecio macedonicus* var. *bracteatus* (Boiss. & Orph.) Halácsy, Consp. Fl.

Graec. 2: 80. 1902, nom. illeg. comb. superfl. TYPE: Greece, Peloponnese, montis Ziriae supra Trikala, [37º55'N 22º24'E], June 1852, *Orphanides 109* (lectotype, designated here, G-150323 image!; isolectotypes BR-505719!, FI!, LE!, S!, UPS!, WU!).

Basal leaves 9–21 cm long, 2.9–6.6 cm wide (ratio basal leaf width / basal leaf length = 0.17–0.47), entire to slightly dentate (teeth 1.3–2.8 mm deep), with a petiole 5–18 cm long. *Middle cauline leaves* 7.2–18 cm long, 1.2–4.1 cm wide (ratio middle leaf width / middle leaf length = 0.12–0.30), sessile, sometimes attenuate with a petiole up to 8 cm long, entire to slightly dentate; *upper cauline leaves* 2–7 cm long, 0.6–2.8 cm wide (ratio upper leaf width / upper leaf length = 0.23–0.52), sessile, entire. Chromosome number: 2*n*=40 (Kuzmanov & Georgieva, 1983: 665; Constantinidis & al., 1997: 126). Figure 21.

Iconography. Stojanov & Stefanoff (1948: 1172 n.º 1223); Lafranchis & Sfikas (2009: 216, 217, as photo).

Distribution and habitat. Bulgaria, Greece, Macedonia?; grassy subalpine meadows, rocky outcrops, woods of *Quercus*, *Pinus*, *Fagus*, on calcareous soil, rarely siliceous; altitude 900–1800 m (Fig. 20).

Phenology. Flowering from June to August.

Discussion. Euro+Med **(**2006-) also recorded this taxon from Macedonia, although we did not find any material from this region. Therefore this country appear with a question mark in the distribution of this species.

Selected specimens examined. BULGARIA. **Blagoevgrad**: Alibotuschgebirge, in bul. N-O Mazedonien, 41º24’N, 23º36’E, 20 July 1936, *A.K. Drenowski s.n.* (M). **Kyustendil**: in subalpinis mt. Rila, 42º10’N, 23º15’E, July 1903, *O. Bierbach s.n.* (LE). BULGARIA. **Plovdiv**: Dobrostan, senda hacia el pico Chervenata stena, 41º54’N, 24º52’E, 1 July 2004, *A. Herrero & al. 2337* (MA); in submontanis m. Rhodope supra Staminaka, 41º59’N, 24º51’E, 10 July 1898, *V. Střibrny s.n.* (B, WU); in submontanis ad Staminaka, 41º59’N, 24º51’E, July 1894, *V. Střibrny s.n.* (G, K, WU). **Smolyan**: in dumosis m. Stara-Planina ad vicum Ginei (prope Sophia), 43º4’N, 23º6’E, June 1886, *T. Gheorghieff 138* (WU); in m. Rhodope prope Leskovo, 41º36’N, 25º2’E, 5 July 1896, *V. Střibrny s.n.* (B, F, K, M, S); in m. Rhodope prope Leskovo, 41º36’N, 25º2’E, 4 Aug 1895, *V. Střibrny s.n.* (B, L, LE, S, US WU). **Sofia**: Vitosha-Sofia, 42º34’N, 23º16’E, 1937, *R. Baschant s.n.* (B); m. Cepan, prope vicum Dragoman, 42º57’N, 22º59’E, 29 June 1930, *N. Stojanoff & T. Georgieff s.n.* (LE, S). GREECE. **Central Greece**: in m.

Parnassi reg. sylvatica loco dicto Drako, 38º32'N, 22º33'E, *G. Guicciardi 192* (FI, G); Peloponnes, Achaia, Kallifoni, 39º8'N, 21º42'E, 28 June 1991, *F. Krendl & W. Burri s.n.* (E). **East Macedonia and Thrace**: prov. Kavala, distr. Pangeo, in latere orientali montis Pangeo, 40º54'N, 24º8'E, 5 July 1973, *W. Greuter 11364* (G); Dramas, SE slopes of mt. Orvilos (Ali Botus), WNW of the village of Katafyton, 41º21'N, 23º38'E, 25 July 1977, *A. Strid & E. Georgiadou 13319* (C, G); Dramas, Mt. Menikion (Boz Dagh of Serre), 14 km from village Mikropolis, 41º12'N, 23º44'E, 5 July 1981, *A. Strid & al. 18602* (B, G). **Peloponnese**: Achaia, m. Kyllenes faucibus Phlamburitza, 37º53'N, 22º26'E, 28 June 1887, *T. Heldreich 939* (BR, F, G, K, LE, M, S, UPS, WU); in regione superiori Taygeti, 36º55'N, 22º20'E, July 1844, *T. Heldreich s.n.* (G, LE); in monte Malevo Laconiae prope Camalus, 37º15'N, 22º34'E, July 1850, *T.G. Orphanides 1139* (G, K, UPS, WU). **Thessaly**: in m. Olympo Thessaliae, 40º1'N, 22º18'E, July 1857, *T.G. Orphanides s.n.* (E, WU). **West Greece**: Peloponnes, Achaia, Chelmos S-Teil, Fraga, Gipfelbereich, 37º52'N, 22º0'E, 14 July 1991, *F. Krendl & W. Burri s.n.* (E).

12b. *Senecio macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo, Novon (submitted). *Senecio barckhausiaefolius* Boiss. & Heldr., Diagn. Pl. Orient. ser. 2, 6: 101. 1859. TYPE: Greece, Attica Periphery, Sterea Ellas, Patéras Óros [m. Patéras Atticae], [38º07'N 23º18'E], 27 May 1856, *Guicciardi 3197* (lectotype, designated by Calvo & al. (2013a), G-150319 image!).

Senecio macedonicus var. *pinnatilobatus* Halácsy, Verh. K.K. Zool.-Bot. Ges. Wien 54: 484. 1904. *Senecio macedonicus* f. *pinnatilobatus* (Halácsy) Hayek, Repert. Spec. Nov. Regni Veg. Beih. 30(2): 675. 1931. TYPE: Grecce, Peloponnese, Laconia, mt. Taygetus pr. Anavryti, [37º06'N 22º17'E], 1 June 1902, *Leonis 123* (lectotype, designated here, WU!; isolectotypes, B-10-0094730 image!, G-DC!, G-162753!, G-162750!, JE-5721 image!, M-152077!, WU!).

Basal leaves 10–13 cm long, 4–5.5 cm wide (ratio basal leaf width / basal leaf length = 0.35–0.53), irregularly pinnatipartite (lobes 15–25 mm deep), with a petiole 8–19 cm long. *Middle cauline leaves* 7.5–12.5 cm long, 3.2–4.2 cm wide (ratio middle leaf width / middle leaf length = 0.34–0.43), attenuate with a petiole 3.5–7.5 cm long, irregularly pinnatipartite; *upper cauline leaves* 3.5–6.8 cm long, 0.8–1.4 cm wide (ratio upper leaf width / upper leaf length = 0.17–0.29), sessile, rarely with a petiole up to 0.6 cm, pinnatipartite. Chromosome number: unknown.

Distribution and habitat. Greece; habitat unknown; altitude ca. 1000 m (Figure 20).

Phenology. Flowering from May to June.

Discussion. This taxon is only known from few localities in Attica and Peloponnese. The subspecific epithet *barckhausiaefolius*, leaves of *Barckhausia*, probably refers to the pinnatifid leaves that display several species of the genus *Barckhausia* DC., ascribed within *Crepis*.

Selected specimens examined. GREECE. **Attica**: ad radices mt. Parnethis pr. Limico, 38º9'N, 23º49'E, 25 May 1909, *B. Tuntas 124* (B, FI); Limiko prope Salesi, 38º14'N, 23º41'E, 4 May 1908, *B. Tuntas 283* (WU).

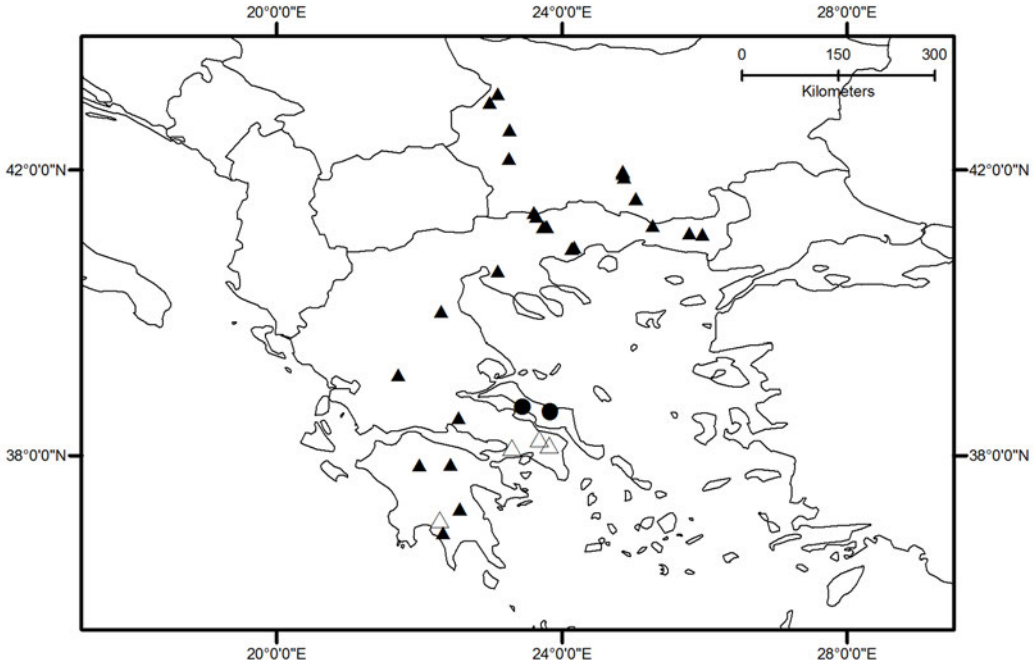


Figure 20. Distribution map for *Senecio macedonicus* Griseb. subsp. *macedonicus* (▲), *S. macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo (Δ), and *S. eubaeus* Boiss. & Heldr. (●).

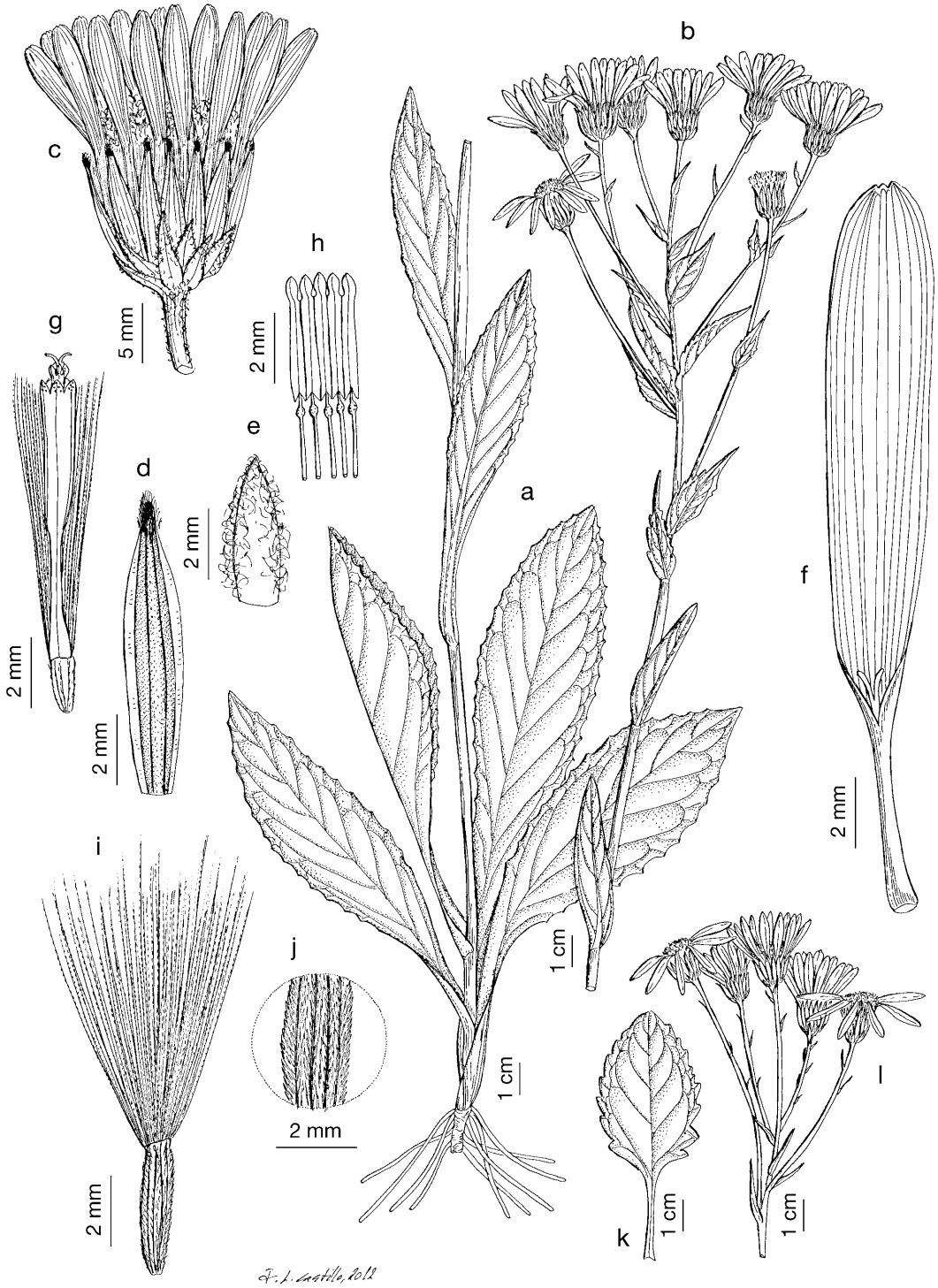


Figure 21. A-J. *Senecio macedonicus* Griseb. subsp. *macedonicus* —a, b. Habit (drawn from *Univ. Copenhagen Excurs. 75*, C). —c. Capitulum (drawn from *Heldreich 939*, S). —d. Involucral bract (drawn from drawn from *Heldreich 939*, S). —e. Supplementary bract (drawn from drawn from *Heldreich 939*, S). —f. Ligulate floret (drawn from drawn from *Heldreich 939*, S). —g. Tubular floret (drawn from *Heldreich 939*, S). —h. Stamens (drawn from *Heldreich 939*, S). —i. Achene (drawn from *Greuter 15973*, B). —j. Indumentum of achene (drawn from *Greuter 15973*, B). K-L. *Senecio castagneanus* DC. (drawn from *Nemetz s.n.* 27 June 1897, WU) —k. Basal leaf. —l. Synflorescence.

13. *Senecio castagneanus* DC., Prodr. 6: 354. 1838. TYPE: Turkey, Constantinople, [41º10'N 28º50'E], 1822, *Castagne s.n.* (lectotype, designated by Matthews (1975: 158), G-DC-204945 image!).

Senecio tmoleus Boiss., Diagn. Pl. Orient. ser. 1, 4: 13. 1844. TYPE: Turkey, Izmir, Alaşehir, Tmoli cacumina supra Philadelphiam [Boz Dağ, 38º19'N 28º05'E], June 1842, *Boissier s.n.* (lectotype, designated here, G-Boiss-150444 image!; isolectotype, G-DC!).

Perennial herb. *Rhizome* 1.3–4.5 cm long, 0.4–1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 28–99 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid to glabrescent, base usually with tufts of hairs and without remnants of old leaves. *Basal leaves* 3.1–14.5 cm long, 1.3–4.5 cm wide, persistent, sometimes caducous, lanceolate to ovate (ratio basal leaf width / basal leaf length = 0.21–0.57), obtuse, attenuate to cuneate, with a petiole 1.3–14 cm long, dentate to shallowly sinuate (teeth 0.7–2.7 mm deep), more pronunced at lower third, sometimes slightly revolute, glabrescent, concolorous. *Cauline leaves* 6–13; *middle cauline leaves* 1.9–10.5 cm long, 0.2–1.5 cm wide, alternate, oblong to narrowly lanceolate (ratio middle leaf width / middle leaf length = 0.08–0.30), acute, sessile, rarely attenuate into a petiole up to 2 cm long, entire to slightly dentate (teeth 0.5–1.7 mm deep), glabrescent to weakly arachnoid, tertiary venation inconspicuous; *upper cauline leaves* 1–6 cm long, 0.1–0.8 cm wide, linear to narrowly lanceolate (ratio upper leaf width / upper leaf length = 0.10–0.33), acute, sessile, sometimes semi-amplexicaul, entire to subentire, weakly arachnoid to glabrescent. *Synflorescence* 3–30 cm long, corymbose, with linear-oblong bracts, rarely narrowly lanceolate. *Capitula* (1–)4–10(–18), 24.1–41.6 mm diam; *involucre* 9.4–15.8 mm diam, 8–12 mm long, bell-shaped to obconical; *involucral bracts* (19–)20–22(–28), 5.5–9.1 mm long, 0.8–1.7 mm wide, with scarious margin 0.3–0.6 mm wide, ensiform to subulate, attenuate, 1-keeled to smooth, apex often with a black spot, glabrescent; *supplementary bracts* (10–)12–15(–18), 3.2–6.9 mm long, 0.4–1.3 mm wide, subulate, sometimes with scarious margin up to 0.2 mm, a half to a three-quarters as long as involucral bracts, weakly arachnoid, not imbricate. *Ligulate florets* 12–16, 12.2–20.7 mm long, yellow; *tubular florets* 5.8–9.7 mm long, 0.8–1.5 mm diam, yellow. *Achenes* ca. 3.8 mm long, ca. 0.9 mm wide, subcylindrical, shorter than pappus, with ca. 10 ribs, with intercostal trichomes 0.1–0.3

mm long; *pappus* 5.5–8.3 mm long, whitish. Chromosome number: unknown. Figure 21.

Distribution and habitat. Turkey (mainly western Anatolia); subalpine meadows, woods of *Quercus*, *Pinus*, unless on siliceous soil; altitude 1250–2100 m (Figure 22).

Phenology. Flowering from April to July.

Etymology. Senecio castagneanus is named in honor of Jean Louis Martin Castagne, (1785- 1858), French merchant and amateur botanist, who sent some specimens to Candolle.

Discussion. Senecio castagneanus is a species characterized by bearing 12–15 supplemetary bracts a three-quarters as long as involucral bracts, weakly arachnoid, hairy achenes, and basal leaves usually dentate to shallowly sinuate on the lower part. Nonetheless, this species presents a high variability with regard to the habit, number of capitula, and shape and size of basal leaves. It was described at the sorroundings of Constantinopla. In this area the specimens tend to be smaller, with thin ± ovate basal leaves, shallowly sinuate towards the base and with a thicked margin. The southern populations, described by Boissier as *S. tmoleus*, are more robust and are characterized by bearing thicker and lanceolate basal leaves. The indumentum of the leaves and the involucre is also variable. Nonetheless, the lack of a clear distribution of both forms, and the existence of intermediate specimens lead us to consider it as intraspecific variability.

There are three species morphologically similar to *S. castagneanus*, i.e. *S. macedonicus, S. olympicus, S. tauricola* (see comments under respective species), and *S. pseudoorientalis*. From the latest it differs in the achenes indumentum: glabrous (rarely some trichomes near the top) in *S. pseudoorientalis* vs. covered with intercostal trichomes in *S. castagneanus*. In addition, the number of supplementary bracts is higher in *S. castagneanus*, and *S. pseudoorientalis* tends to be more glabrescent on stem, leaves and involucre. Another character to differenciate both species is the shape of the synflorescence bracts, usually broadly lanceolate in *S. pseudoorientalis* vs. linear-oblong to narrowly lanceolate in *S. castagneanus*. Their ranges do not overlap, being the populations from Konya the eastern limit of *S. castagneanus*. Among the *Crociseris*

species, it overlaps with *S. cilicius*, *S. inops*, and *S. tauricola*, although it only might be confused with *S. tauricola* (see comments under it).

Selected specimens examined. TURKEY. **Afyon**: Afyon Bayat, 39º1'N, 30º57'E, 27 June 1975, *M. Vural 266* (G). **Balikesir**: m. Ida, mt. Szu-Szus-Gagh, 39º42'N, 26º49'E, July 1883, *P. Sintenis 628* (BM, BR, C, G, LE, S, WU). **Bursa**: in Olÿmpo Bÿthinico, 40º4'N, 29º12'E, 1844, *C.G.D. Nees s.n.* (K); Uludağ-Soğukpinar, a continuación de Yayla oh Soğukpinar, 40º4'N, 29º7'E, 5 July 1980, *M. Nydegger 15128* (G). **Eskişehir**: Sündiken dagi, 39º58'N, 31º6'E, 30 June 1970, *T. Ekim 16* (E). **Istanbul**: Alemdagh, près Elmaly, 41º4'N, 29º17'E, 24 May 1891, *G.V. Aznavour s.n.* (G); Karlidagh, 41º7'N, 29º8'E, 21 May 1899, *G.V. Aznavour s.n.* (G); flanc oriental de Benyuk-Tchamlidja, 41º8'N, 28º26'E, 22 May 1908, *G.V. Aznavour s.n.* (G, M, S); prope Ciamlicia ultra Scutarim, 41º1'N, 29º1'E, 1850, *Clement s.n.* (G). **Izmir**: Izmir, Göztepe, near top, 38º23'N, 27º5'E, 18 Apr 1937, *B. Post s.n.* (G); Tmolos occidentalis, supra Armutlu, 38º21'N, 27º33'E, 14 July 1933, *O. Schwarz 931* (B). **Konya**: Phrygia, Akscheher, in regione alpina montis Sultandagh, 38º19'N, 31º20'E, 25 June 1899, *J. Bornmüller 4624* (B, WU); Bozkir-Kuruçay, 37º11'N, 32º9'E, 18 June 1968, *R. Çetik 301* (G); Hadim-Taschkent, 4 km südlich Hadim, 36º57'N, 32º28'E, 15 June 1948, *A. Huber-Morath 8543* (G). **Kütahya**: Murat Dağ (above Gediz) above Kesik Söğüt, 38º57'N, 29º38'E, 5 July 1962, *P.H. Davis & M.J.E. Coode 36762* (K). **Manisa**: l'Yaïla de Bozdagh (Tmoleus occidental), 38º20'N, 28º23'E, 20 July 1854, *B. Balansa s.n.* (G, LE).

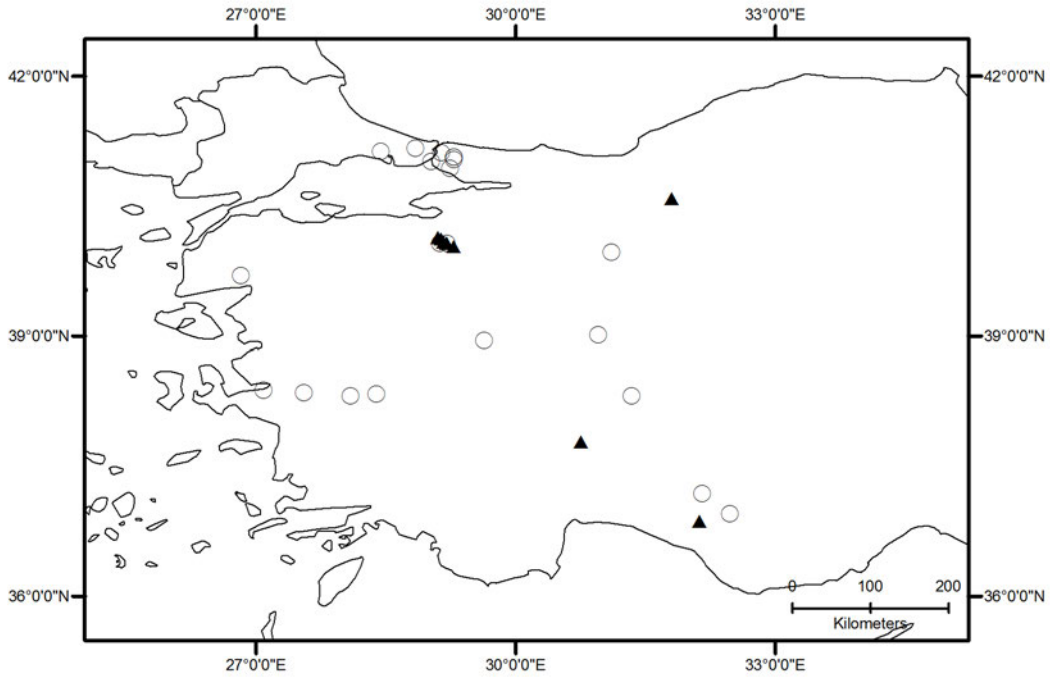


Figure 22. Distribution map for *Senecio castagneanus* DC. (○) and *S. olympicus* Boiss. (▲).

14. *Senecio olympicus* Boiss., Diagn. Pl. Orient. ser. 1, 4: 13. 1844. TYPE: Turkey, Bursa, Olympus Bithynus [Uludağ, 40º05'N 29º12'E], Aug 1842, *Boissier s.n.* (lectotype, designated here, G-150306 image!; isolectotypes, G-162737!, G-DC!, GOET-2388 image!, JE-5728 image!, L-794086!, LE!, P-3729612 image!, P-3729607 image!, P-3729608 image!, P-3729609 image!, P-3729610 image!, P-3729611 image!, UPS!, W-Rchb-285614 image!).

Senecio pisidicus Boiss. & Heldr., Diagn. Pl. Orient. ser. 2, 3: 35. 1856. TYPE: Turkey, Isparta, Eğirdir, Mt. Stavros [Davraz Dağı, 37º47'N 30º45'E], 10 Aug 1845, *Heldreich 1258* (lectotype, designated here, G-150445!).

Perennial herb. *Rhizome* ca. 4 cm long, ca. 1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 22–65 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid to glabrescent, base without remnants of old leaves or tufts of hairs. *Basal leaves* 7.5–10.5 cm long, 2.1–5.6 cm wide, persistent, sometimes caducous, lanceolate to broadly elliptic (ratio basal leaf width / basal leaf length = 0.28–0.53), obtuse, attenuate to cuneate, with a petiole 2.8–12.5 cm long, entire to slightly dentate (teeth 1–1.3 mm deep), sparsely arachnoid to ± glabrescent (trichomes ca. 0.3 mm long), concolorous. *Cauline leaves* 6–18; *middle cauline leaves* 8.7–15.1 cm long, 2.2–6.4 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.18–0.66), obtuse to acute, sessile, sometimes attenuate into a petiole up to 8.5 cm long, entire to slightly dentate, sometimes crenate (teeth 0.2–1.5 mm deep), sparsely arachnoid to ± glabrescent (trichomes 0.2–0.8 mm long), tertiary venation inconspicuous; *upper cauline leaves* 1.2–11.5 cm long, 0.2–2.3 cm wide, lanceolate (ratio upper leaf width / upper leaf length = 0.12–0.41), acute, sessile, entire to slightly dentate (teeth ca. 1 mm deep), sparsely arachnoid to glabrescent. *Synflorescence* 5–34.5 cm long, corymbose, with broadly lanceolate to ovate bracts, sometimes with fimbriate scarious margin. *Capitula* 1–3(–5), 27.8–44.3 mm diam; *involucre* 13.6–22.8 mm diam, 10–14 mm long, cupuliform; *involucral bracts* (18–)22–26(–33), 8.5–11.9 mm long, 1.4–2.7 mm wide, with scarious margin 0.33–0.74 mm wide, ensiform, acute, 0–3 keeled, apex usually with a black spot, glabrescent, sometimes weakly arachnoid; *supplementary bracts* (10–)15–20(–22), 6–10.8 mm long, 1.3–4 mm wide, lanceolate to ovate, usually with fimbriate scarious margin up to 0.55 mm, a half to as long as involucral bracts, weakly arachnoid, ± imbricate. *Ligulate florets* 13–15, 14.5–23.9 mm long, yellow; *tubular florets* 6.8–10.9 mm long, 0.9–1.7 mm diam, yellow. *Achenes* ca. 7 mm long, ca. 1.3 mm wide, subcylindrical (ratio achene width / achene length = ca. 0.18), shorter than pappus (ratio achene length / pappus length = ca. 0.80), with ca. 12 ribs, with trichomes 0.1–0.3 mm long covering ± the whole surface, rarely glabrescent; *pappus* 7.4–11.6 mm long, whitish. Chromosome number: unknown. Figure 23.

Iconography. Güleryüz & Kirmizi (1999: 94 fig. 2, as photo).

Distribution and habitat. Turkey (endemic of eastern Anatolia); subalpine meadows, rocky slopes, accompained at Uludağ on granitic soil by *Juniperus communis* L., *Vaccinium myrtillus* L., *Astragalus angustigolius* Lam., *Festuca cyllenica* Boiss. & Heldr., etc. (Rehder & al, 1994); altitude 1600–2550 m (Figure 22).

Phenology. Flowering from June to August.

Etymology. The epithet *olympicus* refers the ancient Mysian Olympus, mountain in Bursa province, Turkey. Nowadays it is called Uludağ.

Discussion. Senecio olympicus differs from the other *Crociseris* species by its broad supplementary bracts, with scarious margin (often fimbriate), and ± imbricate confering an aspect of pluriseriate supplementary bracts. It is a variable species regarding to the capitula number, reduced to a solitary capitulum or up to 5. The achenes are usually hairy, except for two specimens from Bolu province that display glabrescent achenes, although they are not completly developed. Mature achenes from this region are needed to collect in order to know this state character. The similar species is *S. macedonicus* (see comments under it). Also, it has been confused with *S. castagneanus*, specifically those specimens from Aladağ (Bolu). Mainly the number and shape of supplemetary bracts are useful to distinguish each other. *Senecio olympicus* bears (10–)15–20(–22) supplemetary bracts, lanceolate to ovate, and with a scarious margin up to 0.55 mm, fimbriate, while those of *S. castagneanus* are less numerous [(10–)12–15(–18)], subulate, sometimes with scarious margin not broader than 0.15 mm, and not fimbriate. Moreover, *S. olympicus* usually has lower number of capitula [1–3(–5) vs. (1–)4–10(–18)], and larger involucre (14–23 × 10–14 vs. 9–16 × 8–12 mm). Their ranges are only overlapping at Uludağ (Bursa).

Senecio olympicus presents a scarce and scattered distribution through the eastern Anatolia, only known from Bursa, Bolu, Antalya, and Isparta provinces. It was hitherto considered endemic from Uludağ [Matthews (1975), Güleryüz & Kirmizi (1999)].

In the protologue of *S. pisidicus*, Boissier commented that it corresponds to a species between *S. olympicus* and *S. tmoleus* (synonym of *S. castagneanus*), almost

intermediate. Subsequently, Boissier (1875) included *S. pisidicus* as a synonym of *S. castagneanus*, criterion also held by Matthews (1975). After study the type material kept at G, we realised that it actually corresponds to *S. olympicus*. The low number of capitula (1-2 capitula), well developed upper cauline leaves, entire, synflorescence bracts similar to the upper cauline leaves, and the ovate-lanceolate supplementary bracts with a conspicuous scarious margin (right hand specimen) fits perfectly with *S. olympicus* characters. Certainly, it has to be noted that the left hand specimen and the central one do not show the typical supplementary bracts, which may lead to confusing interpretations.

The collection labelled on yellow paper and dated on July 1842 is considered original material (isolectotypes), although the month cited in the protologue and the field label (lectotype) is August. In fact, specimens look from the same collection (same phenology, size, aspect, etc.). It might be a Boissier's mistake when he did the labels to distribute the material.

Selected specimens examined. TURKEY. **Antalya**: Geyik Dağlari, Kar in der Nordflanke des Geyik Dağ, N-exponiert, 36º52'N, 32º7'E, 20 July 1992, *P. Hein 49* (B); **Bolu**: Ala dag on Kartal Kaya tepe, 40º35'N, 31º48'E, 12 July 1962, *P.H. Davis & M.J.E. Coode 37377* (E). **Bursa**: Alpes Olym Byth, 40º4'N, 29º12'E, 1837, *P.M.R. Aucher-Eloy 3425* (G-DC); Uludag, 40º4'N, 29º12'E, Aug 1945, *M. Basarman s.n.* (G); Asia minor, near Bursa, ascent to Uludag (Mysian Olympus), alpine belt, 40º4'N, 29º12'E, 25 July 1912, *B.A. Fedtschenko 172* (LE); Uludağ bei Bursa, W-Seite, vom Ende der Straβe in Richtung Gipfel, 40º5'N, 29º10'E, 24 Aug 1992, *E. Hörandl & F. Hadaček 4775* (WU); Ulu dağ, alpwiden ob dem Hôtel Ulu Dağ, 40º8'N, 29º6'E, 27 June 1954, *A. Huber-Morath 13254* (G); Olympus Bithynus, 40º4'N, 29º12'E, 1857, *R. Lenormand s.n.* (MO); Uludağ, zw. Hotel und Camping, 40º8'N, 29º6'E, 1 Aug 1976, *M. Nydegger 11541* (G); Uludağ, zwischen Hotel und Camping, 40º8'N, 29º6'E, 6 July 1979, *M. Nydegger 14050* (G); Bursa, 28 km oberhalb Bursa, 1km vor Telestation, 40º7'N, 29º8'E, 2 July 1980, *M. Nydegger 15059* (E, G); auf der südseite des Mte. Olymp., 40º2'N, 29º17'E, June 1874, *T. Pichler 104* (G).

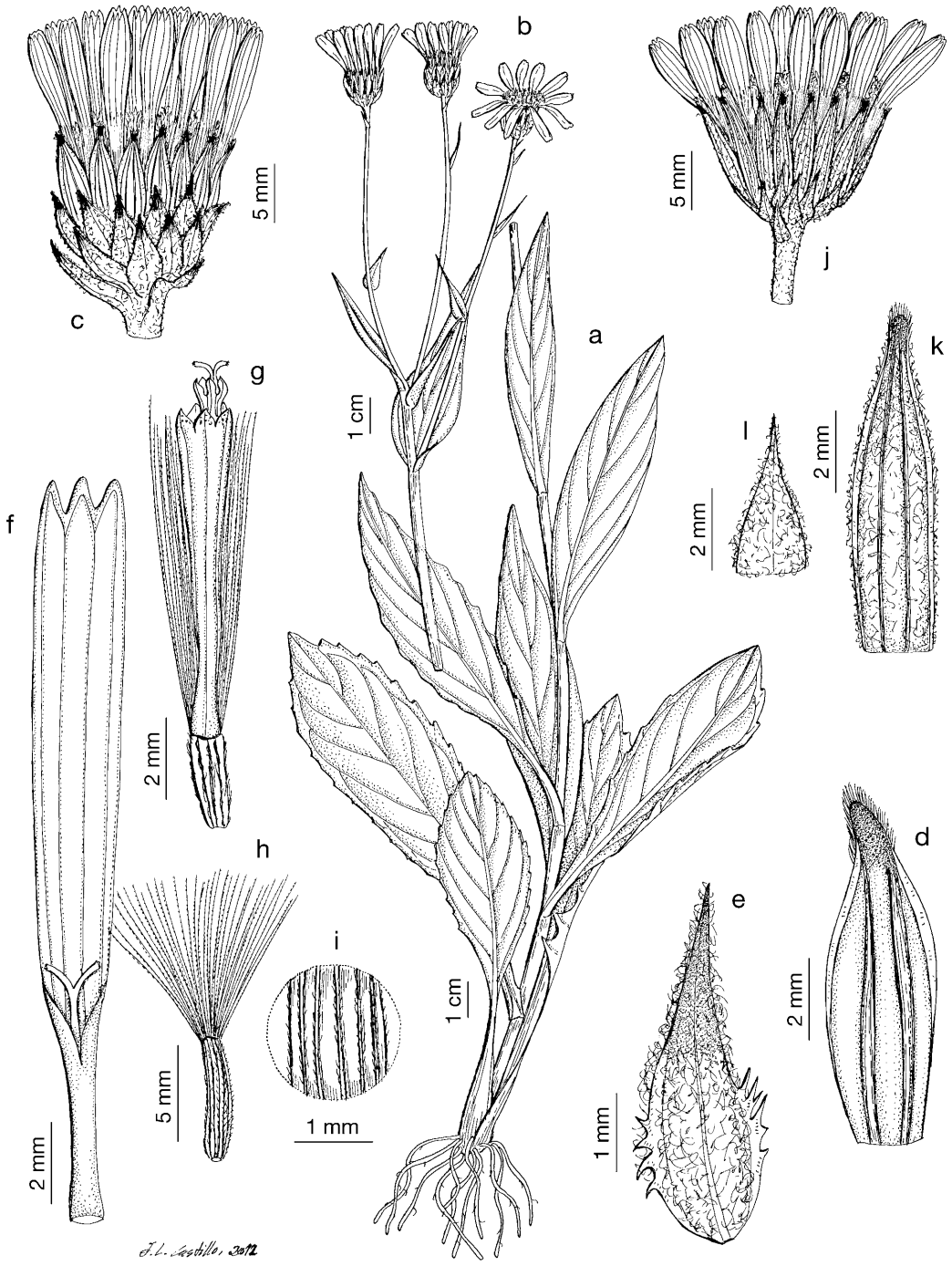


Figure 23. A-I. *Senecio olympicus* Boiss. —a. Habit (drawn from *Boissier s.n.* July 1842, L). —b. Habit (drawn from *Davis 37377*, E). —c. Capitulum (drawn from *Davis 37377*, E). —d. Involucral bract (drawn from *Davis 37377*, E). —e. Supplementary bract (drawn from *Davis 37377*, E). —f. Ligulate floret (drawn from *Davis 37377*, E). —g. Tubular floret (drawn from *Davis 37377*, E). —h. Achene (drawn from *Nydegger 14050*, G). —i. Indumentum of achene (drawn from *Nydegger 14050*, G). J-L. *Senecio joharchii* F. Ghahrem., Ezazi, Rahch. & Attar (drawn from *Rahchamani 4692 & Ezazi*, FAR, as image) —j. Capitulum. —k. Involucral bract. —l. Supplementary bract.

15. *Senecio pseudoorientalis* Schischk. in Schischk. & Bobrov, Fl. URSS 26: 727. 1961, nom. nov. *Senecio orientalis* Willd., Sp. Pl. ed. 4, 3(3): 2006. 1803, [nom. subst.], nom. illeg. non Mill. 1768 (ICBN, Art. 53.1). *Senecio kolenatianus* subsp. *pseudoorientalis* (Schischk.) V.E. Avet., Biol. Zhurn. Armenii 24: 45. 1971. TYPE: Armenia, habitat in Oriente, *Willdenow s.n.* (lectotype, designated by Nordenstam (1989: 63), B-W-15799!).

Senecio orientalis var. *straussii* Hausskn. ex Bornm., Beih. Bot. Centralbl. 20(2): 156. 1906. TYPE: Iran, Hamadan, montes Karagan, [35º27'N 49º15'E], July 1899, *Strauss s.n.* (lectotype, designated here, B-10-0325079!; isolectotype, JE-5743 image!).

Perennial herb. *Rhizome* 2–5 cm long, 0.7–1.6 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 45–104 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to covered with scattered trichomes, base with tufts of hairs and usually without remnants of old leaves. *Basal leaves* 6.5–18.5 cm long, 1.5–3.2 cm wide, caducous, sometimes persistent, oblanceolate to lanceolate (ratio basal leaf width / basal leaf length = 0.09–0.35), obtuse, rarely acute, attenuate to cuneate, with a petiole 2.5–12.5 cm long, entire to denticulate, sometimes finely dentate (teeth ca. 0.4 mm deep), glabrescent to covered with scattered trichomes (trichomes 0.1–0.2 mm long), concolorous. *Cauline leaves* 7–22; *middle cauline leaves* 5.6–17 cm long, 0.7–4.1 cm wide, alternate, lanceolate to narrowly lanceolate (ratio middle leaf width / middle leaf length = 0.09–0.28), acute to obtuse, sessile, sometimes attenuate into a petiole up to 5 cm long, entire to denticulate, sometimes finely dentate (teeth ca. 0.4 mm deep), covered with scattered trichomes to glabrescent, tertiary venation inconspicuous; *upper cauline leaves* 1.5–6.7 cm long, 0.2–2.5 cm wide, linear to narrowly lanceolate (ratio upper leaf width / upper leaf length = 0.13–0.37), acute, sessile, entire to denticulate, covered with scattered trichomes to glabrescent. *Synflorescence* 4–24 cm long, corymbose, with linear-lanceolate to broadly lanceolate bracts. *Capitula* (4–)8–16(–24), 24.2–42.8 mm diam; *involucre* 7.4–17 mm diam, 7–10 mm long, cupuliform; *involucral bracts* (18–)21–22(–24), 5.7–8.2 mm long, 0.9–1.9 mm wide, with scarious margin 0.24–0.56 mm wide, ensiform, acute, 0–2 keeled, apex with a black spot, glabrescent; *supplementary bracts* (6–)9–12(–14), 3.1–7 mm long, 0.5–1.1 mm wide, subulate, without scarious margin, a half to a three-quarters as long as involucral bracts, with

scattered trichomes on the margin (trichomes 0.1–0.2 mm long), rarely slightly arachnoid, not imbricate. *Ligulate florets* 10–15, 13.9–25.8 mm long, yellow; *tubular florets* 6.5–8.7 mm long, 0.6–1.7 mm diam, yellow. *Achenes* 3.8–6.2 mm long, 0.7–1.2 mm wide, subcylindrical (ratio achene width / achene length = 0.17–0.27), shorter than pappus (ratio achene length / pappus length = 0.46–0.85), with 10–14 ribs, glabrous, rarely some trichomes near the top ca. 0.1 mm long; *pappus* 5.2–8.5 mm long, whitish. Chromosome number: 2*n*=40 (Ghaffari, 1999: 97). Figure 25.

Iconography. Nordenstam (1989, tab. 38); Avetisyan (1995: 473 tab. 183, sub *S. kolenatianus* subsp. *pseudoorientalis*).

Distribution and habitat. Armenia, Azerbaijan, Iran, Iraq?, Turkey; subalpine and alpine meadows, streamsides, banks of marshes, steppes, on calcareous and volcanic soil; altitude 1400–2850 m (Figure 24).

Phenology. Flowering from May to August.

Etymology. The new epithet *pseudoorientalis* replace the illegitime epithet *orientalis* of Willdenow.

Discussion. Senecio pseudoorientalis is a species characterized to be glabrescent, with synflorescence bracts usually broadly lanceolate and achenes glabrous. In Anatolia there are two species morphologically similar to *S. pseudoorientalis*: *S. kolenatianus* and *S. castagneanus*. All of them have a similar habit (middle size, usually several capitula, and involucre with supplementary bracts shorter than involucral ones). Moreover, *S. kolenatianus* overlaps partially their area of distribution with *S. pseudoorientalis*. The differences between *S. pseudoorientalis* and *S. castagneanus* are commented under the latest, while the characters used to distinguish *S. pseudoorientalis* and *S. kolenatianus* are the morphology of the cauline leaves, and the achenes indumentum. In *S. kolenatianus* the cauline leaves usually do not decrease strongly in size up the apex, the lower ones are usually shortly petiolated with the base of the leaf abruptly attenuate, and with the tertiary venation usually slightly conspicuous. Regarding to *S. pseudoorientalis*, the cauline leaves decrease strongly in size up the apex, becoming sessile quickly up the stem, and the tertiary venation is unconspicuous, rarely slightly

marked. The achenes are usually glabrous in *S. pseudoorientalis* vs. sparsely hairy in the upper part (rarely glabrous) in *S. kolenatianus*. In addition, *S. pseudoorientalis* usually presents the base of the stem with tufs of hairs, while *S. kolenatianus* sometimes presents remnants of old leaves, and rarely tufs of hairs. In the northeastern of Turkey these species overlap their ranges, and sometimes is difficult to identify some specimens (i.e., *Sintenis 6274*, *Watson 3219*). In these populations mature achenes are required to differenciate them from *S. kolenatianus*. Likewise, the populations from Taurus Mountains, which represent the western limit of *S. pseudoorientalis*, display larger capitula and supplementary bracts slightly broader than the eastern populations (i.e., *Kotschy 312*).

The type is a Willdenow's collection kept at B (B-W-15799-00, B-W-15799-01). It is worthwhile to mention that the third sheet (B-W-15799-02) is excluded because it corresponds to *S. kolenatianus*. The specimen shows ± abruptly attenuate cauline leaves not decreasing strongly up to the stem, with leaves showing slightly conspicuous tertiary venation. Although the synflorescence is lacking in the voucher, it seems to bear a solitary capitula or up to 2. All these characters lead us to identify the mentioned sheet as *S. kolenatianus* instead of *S. pseudoorientalis*.

With regard to the paratypes of *S. orientalis* var. *straussii*, it is noteworthy that the iranian collection from "montibus Tefresch" (Sultanabad, Markazi Province) is excluded because it clearly corresponds to *S. paulsenii* subsp. *khorasanicus* (B-10-0325086!, JE-5739 image!).

According to Qaisi (in litt.) this species probably occurs in the northeastern Iraq. The collection *Kotschy 269*, which has not been possible to be studied, seems to be from this region.

Selected specimens examined. ARMENIA. **Gegharkunik**: ad lacus Goktschai, 40º25'N, 45º3'E, 3 July 1871, *G.I. Radde 192* (LE); Gokča, in mont. prope Zagalu, prat. Semendolan, 40º7'N, 45º19'E, 29 July 1928, *A.B. Schelkovnikov & E. Kara-Murza s.n.* (LE). **Kotayk**: Caucasus, Suchoi fantan, 40º23'N, 44º41'E, *Bayern s.n.* (LE). **Shirak**: Amasiyskiy raion, valley of the Akhuryan river, right bank of the Akhuryan river, 40º58'N, 43º47'E, 29 June 1960, *N.N. Tsvelev & C. Cherepanov 487* (LE); Aginskiy rayon, between Ani and Bagravan, 2-3 km to the south of Bagravan, 40º28'N, 43º39'E, 5 July 1960, *N.N. Tsvelev & C. Cherepanov 886* (LE). **Vayots Dzor**: Dasalagez, near the village Koduch-vank, 39º55'N, 45º30'E, 16 Aug 1931, *I. Karjagin & B. Safiev s.n.* (S). AZERBAIJAN. **Lankaran**: Caucas, prope custodiam Germisch, districtus Swant [Suvant- Zuvand], 38º42'N, 48º18'E, 30 June 1880, *G.I. Radde 226* (LE); Baku Governorate, Lenkoran uyezd, Zuvant, mount Mara-yurt, 38º45'N, 48º22'E, 15 July 1906, *A.B. Schelkovnikov s.n.* (LE). **Nakhchivan**: Alagez, the Dali-chay river, Magarin track, in valley of Dali-chay river, 39º33'N, 45º43'E, 21 July 1932, *E. Busch & N. Busch s.n.* (LE); Shakhbuz rayon, above Bichenakh village, 39º30'N, 45º45'E, 17 June 1947, *A.A. Grossheim, M.I. Kirpichnikov & I.A. Il'inskaya s.n.* (LE). **Yukhari Garabagh**: ad fluvium Bazartschai in prov. Karabagh, 39º44'N, 46º27'E, June 1829, *A.J. Szovits s.n.* (LE). IRAN. **East Azerbaijan**: Rezaiyeh, Margevar, 38º37'N, 46º7'E, 13 June 1972, *H. Foroughi 4247* (LE); Kiyamaki Protected Region, Kiyamaki Dagh ad boreo-orientem a pago Miab,

38º47’N, 45º51’E, 17 June 1977, *K.H. Rechinger 56847* (B, M). **Hamadan**: Nehawend, 34º12’N, 48º23’E, 15 July 1895, *T. Strauss s.n.* (JE). **Kurdistan**: Sanandaj, 35º17’N, 46º58’E, 17 June 1963, *M. Jacobs 6929* (LE); W Kurdistan, ad versuras 33 km NW Divandarreh versus Saqqez, 36º7’N, 46º48’E, 29 June 1974, *K.H. Rechinger 48587* (B). **West Azerbaijan**: Rezaiyeh, Gardaneh Ghoshchi, 38º3’N, 44º59’E, 16 June 1972, *H. Foroughi 4278* (LE); 26 km W of Rezaiyeh towards Serow, 37º43’N, 44º51’E, 14 June 1971, *J. Lamond 4131* (B, E). TURKEY. **Adana**: Südl. Türkei, prov. Seghan, bei Saimbeyli (Haçin, Hadjin), 37º59’N, 36º5’E, *A. Manissadjian 208* (B, LE, S, UPS). TURKEY. **Ağri**: Ağri, E side of Tahir pass, 19 km from Eleşkirt to Horasan, 39º48’N, 42º28’E, 24 July 1966, *P.H. Davis 47104* (MO); Tendürek Dagh, 39º25’N, 43º59’E, 21 July 1981, *T. Raus 4391* (B). **Amasya**: Amasia, in montis Ak-dagh, 40º52’N, 35º54’E, 10 Aug 1889, *J. Bornmüller 1105* (B, LE, WU). **Bitlis**: Turkish Armenia, Sanjak of Mush, Sekavi-Charborkh, 38º29’N, 41º46’E, 4 June 1916, *B.K. Schischkin s.n.* (LE). **Erzincan**: Anatolien, Gümüşhane, Sipikör Daĝ, zwischen Gümüşhane und Erzincan, 39º52’N, 39º35’E, 20 July 1981, *M. Nydegger 16993* (B, BR, MA); Armenia turcica, Egin, Koschneden-baschi, 39º13’N, 38º30’E, 18 June 1890, *P. Sintenis 2693* (B, FI, LE, S, Z). **Erzurum**: montagne près Ispir, 40º30’N, 40º59’E, 5 July 1862, *E. Bourgeau s.n.* (UPS, WU); Turkish Armenia, Sanjak of Erzerum, Mechitli, 39º34’N, 41º23’E, 7 July 1916, *B.K. Schischkin s.n.* (LE). **Gümüşhane**: Armenia turcica, Szandschak Gümüschkhane, Stadodopi, 40º32’N, 39º27’E, 14 July 1894, *P. Sintenis 6274* (BR, L, LE, S, WU, Z); Erdschias-dagh (Argaeus), 38º27’N, 35º27’E, July 1902, *E. Zederbauer s.n.* (WU). **Kahramanmaraş**: Maraş, distr. Göksun, Binboga dağ, in ravine on N.E. side of Isak dağ, 38º16’N, 36º33’E, 16 July 1952, *P.H. Davis, J.G. Dodds & R. Çetik 20080* (E, K, M). **Kars**: Sarikamiş, 40º19’N, 42º36’E, 7 July 1957, *P.H. Davis & I.C. Hedge 30766* (M); Sanjak of Bayezit, near Sandjan, 40º11’N, 42º42’E, 1 July 1916, *B.K. Schischkin s.n.* (LE). **Kastamonu**: Hakkari, Nehil Çayi, 10 km from Yüksekova to Hahhari, 37º33’N, 44º8’E, 2 July 1966, *P.H. Davis 45852* (C, K); Paphlagonia, Wilajet Kastambuli, Tossia, Giaurdagh, 41º3’N, 33º58’E, 29 July 1892, *P. Sintenis 4815* (FI, Z). **Kayseri**: in cacumine Karadagh, 38º31’N, 35º27’E, June 1845, *T. Heldreich s.n.* (LE). **Mersin**: Tauri Alpes, BulgarDagh, in valle Karli Boghas, 37º9’N, 34º27’E, 13 July 1853, *T. Kotschy 121* (B, BR, S, WU); Cilicien, Bulghar Magara lehmige Orte, 37º15’N, 34º20’E, 1896, *W. Siehe 616* (G, LE, S, WU). **Niğde**: Cilicien, Bulghar Maaden, Thalsohle, 37º27’N, 34º34’E, 1896, *W. Siehe 616a* (G). **Van**: 14 km from Van to Gürpinar (Hacasor), 38º25’N, 43º23’E, 9 June 1966, *P.H. Davis 44618* (K); 5 km NE of Başkale, 38º5’N, 44º2’E, 3 July 1966, *P.H. Davis 45940* (E, K).

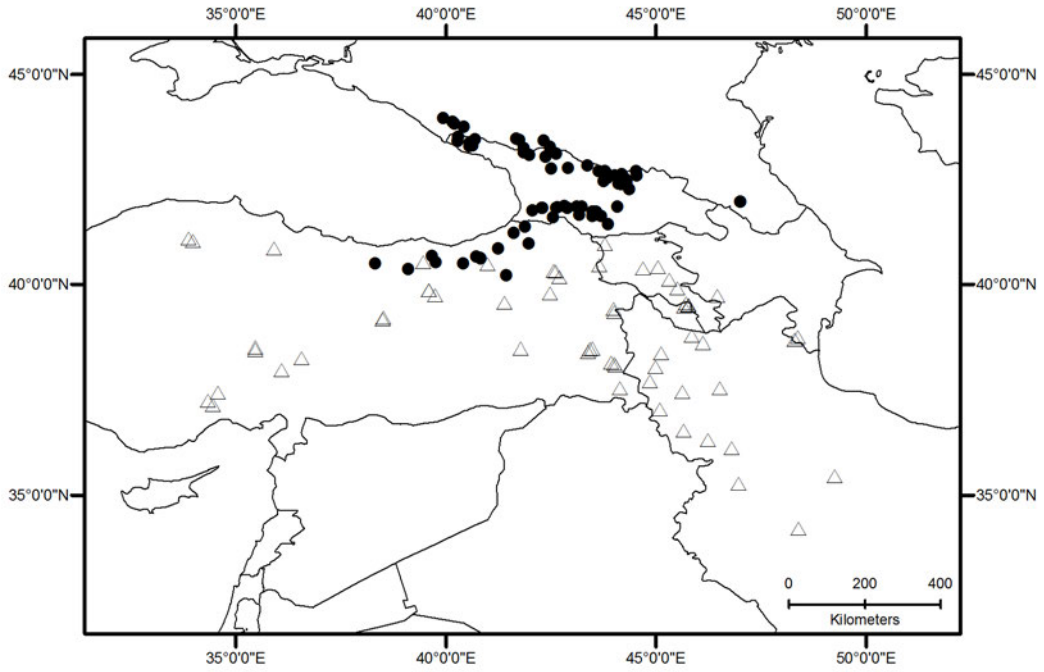


Figure 24. Distribution map for *Senecio pseudoorientalis* Schischk. (Δ) and *S. kolenatianus* C.A. Mey. (●).

16. *Senecio kolenatianus* C.A. Mey., Beitr. Pflanzenk. Russ. Reiches 6: 34. 1849. TYPE: Georgia, Mtskheta-Mtianeti, monte Kasbek, [42º42'N 44º31'E], 13 Aug 1844, *Kolenati 2151* (lectotype, designated by Avetisyan (1995: 472), LE!; isolectotypes, MO-5509714!, TU!).

Senecio amphibolus K. Koch, Linnaea 24: 361. 1851. TYPE: "Orientes", *Koch s.n.* (not found).

Senecio longiradiatus Trautv., Index Sem. Hort. Petrop.: 37. 1865. TYPE: Georgia, Racha, Rion quellen, [42º50'N 43º23'E], 22 Aug to 3 Sep 1864, *Radde s.n.* (lectotype, designated here, LE!).

Senecio ovatifolius Boiss. , Fl. Orient. 3: 406. 1875. TYPE: Jardins de Valeyres, ex Armenia (Turkey), June 1862, *Kotschy s.n.* (lectotype, designated here, G-162745!).

Senecio orientalis var. *glacialis* Freyn & Sint., Bull. Herb. Boissier 3: 352. 1895. TYPE: Turkey, Gümüşhane, Armenia turcica, Szandschak Gümüschkhane, Karagvelldagh, [40º22'N 39º06'E], 31 July 1894, *Sintenis 7212* (lectotype, designated here, Z-65110!; isolectotypes, B-10-0325082!, W-3869 image!, WU!).

Perennial herb. *Rhizome* 1.4–4.8 cm long, 0.4–1.1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 20–78 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to slightly arachnoid towards the lower part, base without remnants of old leaves or tufts of hairs, sometimes violet coloured. *Basal leaves* 4.7–12.5 cm long, 1.2–2.9 cm wide, caducous, rarely persistent, ovate to oblanceolate (ratio basal leaf width / basal leaf length = 0.10–0.60), obtuse, attenuate to cuneate, with a petiole 2–13.5 cm long, dentate (teeth 2 mm deep), sometimes subentire, glabrescent to covered with scattered trichomes, sometimes weakly arachnoid through the petiole and midrib (trichomes 0.1–0.2 mm long), concolorous. *Cauline leaves* 6–20; *middle cauline leaves* 5.7–14.9 cm long, 1.1–5.5 cm wide, alternate, ovate to lanceolate, sometimes oblanceolate (ratio middle leaf width / middle leaf length = 0.09–0.54), obtuse to acute, cuneate-rounded to abruptly attenuate into a petiole up to 4.3 cm long, sometimes sessile to semi-amplexicaul, dentate (teeth 0.8–1.9 mm deep), rarely subentire,

glabrescent to covered with scattered trichomes (trichomes 0.1–0.3 mm long), tertiary venation usually slightly conspicuous; *upper cauline leaves* 1.4–10 cm long, 0.2–2.4 cm wide, ovate to lanceolate (ratio upper leaf width / upper leaf length = 0.07–0.54), acute, sessile to amplexicaul, slightly dentate (teeth 0.4–0.6 mm deep) to entire, glabrescent to covered with scattered trichomes. *Synflorescence* 3.5–38.5 cm long, corymbose, with linear-lanceolate bracts. *Capitula* (1–)3–6(–15), 27.5–43.5 mm diam; *involucre* 10.7–16.9 mm diam, 7–12 mm long, cupuliform; *involucral bracts* (17–)20–21(–25), 6.7–10.1 mm long, 1–2 mm wide, with scarious margin 0.2–0.6 mm wide, ensiform, attenuate, 0–2 keeled, apex with a black spot, glabrescent; *supplementary bracts* (6–)8–10(–16), 4–8.6 mm long, 0.5–1.1 mm wide, subulate, without scarious margin, a half to almost as long as involucral bracts, with scattered trichomes on the margin, usually weakly arachnoid near the top (trichomes 0.1–0.2 mm long), not imbricate. *Ligulate florets* 11–17, 12.1–24.3 mm long, yellow; *tubular florets* 6.1–10.1 mm long, 0.7–1.6 mm diam, yellow. *Achenes* 3.9–4.9 mm long, 0.8–1.2 mm wide, subcylindrical (ratio achene width / achene length = 0.19–0.30), shorter than pappus (ratio achene length / pappus length = 0.52–0.64), with 10–13 ribs, with scattered intercostal trichomes 0.1–0.3 mm long along the upper half to glabrescent; *pappus* 5.9–9.3 mm long, whitish. Chromosome number: 2*n*=40 (Afzelius, 1951: 68, sub *S. amphibolus*). Figure 25.

Distribution and habitat. Georgia, Russia, Turkey; subalpine and alpine damp meadows, screes, bushwoods of *Rhododendron caucasicum* Pall., woods of *Abies*, *Picea*, *Fagus*, on granitic and calcareous soil; altitude 1200–3050 m (Figure 24).

Phenology. Flowering from June to September.

Etymology. Senecio kolenatianus is named in honor of Friedrich August Rudolf Kolenati (1812-1864), Bohemian zoologist and botanist that travelled in Russia during 1842-1845.

Discussion. Senecio kolenatianus is characterized by usually displaying broadly lanceolate cauline leaves, the upper ones sometimes amplexicaule, with ± conspicuous tertiary veins. The achenes often have some trichomes on the upper part, but specimens with glabrous achenes are also found. It presents a high variability regarding the

capitula number and cauline leaves width. However, the abruptly attenuate lower cauline leaves not decreasing strongly up to the stem, and the mentioned slightly conspicuous tertiary venation are useful characters to discriminate from the similar species: *S. pseudoorientalis*, *S. lagascanus*, and *S. castagneanus.* The differences between *S. pseudoorientalis* are commented under it. *Senecio kolenatianus* overlaps its range with *S. pseudoorientalis* (see comments under it). With regard to *Senecio lagascanus*, from southwestern Europe, the lower stem indumentum is a useful character to distinguish each other: ± patent long pluricelular trichomes in *S. lagascanus* vs. glabrescent to slightly arachnoid in *S. kolenatianus*. It differs from *S. castagneanus* from western Anatolia in its more glabrescent achenes.

Senecio ovatifolius was described by Boissier on the base of material cultivated in the Jardins de Valeyres (Switzerland) from seeds collected by Kotschy at Turkey (Armenia on the label). According to Boissier, Matthews (1975) included it as an endemic element from Rize (northeastern Turkey). These specimens fit perfectly with the diagnostic characters of *S. kolenatianus*, although they certainly show broader leaves than the typical form, probably due to the cultivation conditions.

Selected specimens examined. GEORGIA. **Abkhazia**: Gagra mountain, Sandripsh river basin, near Gyuzlya village, 12 km N-E of Gagra, 43º24'N, 40º16'E, 27 June 1989, *D.V. Geltman & al. 3028* (LE); Sochi okrug, mount Chkho, 43º27'N, 40º41'E, 28 July 1912, *G. Woronow 9069* (LE). **Adjara**: West Transcaucasia, Adjara, Kobuleti rayon, Kintrish river basin, west slope of mount Chanchakh, 41º45'N, 42º3'E, 28 July 1948, *V.B. Soczava & V.F. Semenov s.n.* (LE). **Ayaria**: Khulo district, village of Beshumi, 41º36'N, 42º33'E, 7 July 2003, *D.E. Atha & al. 3977* (MO, NY). **Guria**: Georgia, Adzhar-Imereti Range, Zekara pass, 41º49'N, 42º37'E, 24 July 1969, *Y. Menitsky 197* (LE); distr. Chokhatauri, montes Meskhetski khrebet, in declivibus montis Grdzeli-vake, 41º49'N, 42º17'E, 22 July 1979, *V. Vašák & G. Esvandzhia s.n.* (BR, G, M). **Imereti**: Adzhar-Imereti Range, Abastuman-Zekari, 41º49'N, 42º53'E, 12 Aug 1914, *E.I. Kikodse s.n.* (LE); Transcaucasia, Cartalinia, Borshom, Zchza-Zcharo, 41º51'N, 43º7'E, 15 July 1909, *I.V. Kuznetzow s.n.* (TU). **Mtskheta-Mtianeti**: in alpe Kasbek, 42º35'N, 44º32'E, Aug 1881, *A.H. Brotherus & V.F. Brotherus 492* (H); The Caucasus, Tiflis Governorate, Gori uyezd, mount Tskhra-Tskharo, 42º16'N, 44º22'E, 1 June 1916, *P.N. Krylov s.n.* (LE). **Racha-Lechjumi**: distr. Ratscha, Glola, 42º42'N, 43º38'E, 27 Aug 1965, *R. Gagnidze & I. Mikeladze s.n.* (K, LE, MA); Svanetia, in monte Tetenar supra pagum Ciolur ad flumen Hippum (Tzkhenis-Tzkhali), 42º46'N, 42º54'E, 1 Aug 1890, *S. Sommier & E. Levier 717* (G). **Samegrelo-Zemo Svaneti**: Megrelia, upper Megrelia, along the road from Labarde to Svaneti mountain pass, 42º45'N, 42º30'E, *L. Kemularia-Natadze, S. Kuthatheladze & A. Schchian s.n.* (MA); Kutais governorate, Verknyaya Svanetia, mount Ushba, foot of Gul' glacier, 43º7'N, 42º37'E, 21 July 1911, *A.B. Schelkovnikov s.n.* (LE). **Samtskhe-Javakheti**: ad lacum Tabistchuri, 41º39'N, 43º36'E, Aug 1877, *A.H. Brotherus & V.F. Brotherus s.n.* (H); Kartli district, Borjomi district, Bakuriani, environs Tskhratskaro, 41º41'N, 43º31'E, 4 Aug 2004, *R. Gagnidze 1035* (MA). **Shida Kartli**: South Ossetia, Khodzinskaya gully, Khodze-feten, 42º32'N, 44º14'E, 8 Aug 1929, *E. Busch & N. Busch s.n.* (LE, K); South Ossetia, Ermani, left slope of Srednee Ermani canyon, 42º29'N, 44º16'E, 19 Aug 1939, *N.I. Miloshevich s.n.* (LE, MO). RUSSIA. **Adygea**: West Caucasus, Caucasian State Nature Reservation, source of the Teplyak river, 43º52'N, 40º9'E, 24 July 1929, *A.I. Leskov & A.P. Rusaleev s.n.* (LE). **Dagestan**: Caucasus orient. Dagestania australis, ad Djulti Tschai, confluvium Samuri, 41º58'N, 47º0'E, 18 July 1860, *F.J. Ruprecht 131c* (H, LE); Djulti Tschai, 41º58'N, 47º0'E, *F.J. Ruprecht s.n.* (LE). **Kabardia-Balkaria**: Caucasus, prov. Terek m. Elbrus, ad Donguzorun, 43º13'N, 42º29'E, 18 July 1896, *T. Alexeenko 12483* (LE); Kaukasus, Elbrus-Gebiet, Tscheget, zwischen

Zwischenstation des Sessellifts und Dongusorun-See, 43º16'N, 42º28'E, 25 July 1967, *I. Quasdorf 328* (B). **Karachay-Circasia**: The Caucasus, Kuban province, Teberda, springs by Klukhor pass, 43º15'N, 41º51'E, 13 July 1905, *D.I. Litvinov 553* (LE); upper reach of the Kuban river, near Khurzuk lake, left slope of the Uzunkol river, ascent to Myrdy, 43º25'N, 42º19'E, 6 Aug 1989, *Y. Menitsky & al. 107* (LE). **Krasnodar**: West Caucasus, Caucasian State Nature Reservation, source of the Chelepsa river, 43º45'N, 40º25'E, 2 Aug 1930, *A.I. Leskov 259* (LE); West Caucasus, Caucasian State Nature Reservation, on S-W slope of mount Guzerepl', 43º49'N, 40º12'E, 12 Aug 1929, *A.I. Leskov & A.P. Rusaleev 638* (LE). **North Ossetia-Alania**: Mammillon Pass, 42º39'N, 43º49'E, Aug 1864, *G.I. Radde 308* (LE); Caucasus, distr. Alagir et Radscha, m. Mammillon supra Kalaki, 42º39'N, 43º49'E, 7 Sep 1861, *F.J. Ruprecht 130* (G, LE). TURKEY. **Artvin**: vallée de Djimil (Lazistan), 40º40'N, 39º40'E, July 1866, *B. Balansa 1474* (FI, LE, Z, ZT); prov. Batumi, distr. Artvin, Mons Ekuter, 40º58'N, 41º58'E, 29 July 1911, *G. Woronow 6127* (B). **Bayburt**: Haldizan Dagi, N of Baiburt, 40º30'N, 40º24'E, 27 July 1934, *E.K. Balls & W.B. Gourlay 1870* (K). **Erzurum**: Yusufeli-Tortum road, 10 km N. of Tortum Gavur above and W of Kizilkilise (Guzelyayla) 35 km N. of Erzurum, 40º13'N, 41º26'E, 12 July 1967, *J.M. Watson, Albury & M.J. Cheese 3219* (K). **Giresun**: Balabandaglari (Kilinc Tepe) above Tamdere, 40º30'N, 38º19'E, 7 Aug 1952, *P.H. Davis 20580* (M). **Gümüşhane**: c. 4 km. del puerto de Kostandagi, vertiente S, 40º31'N, 39º45'E, 25 June 2001, *A. Herrero & al. 1585* (MA). **Rize**: Cimil-Gebiet (40 km Luftlinie südl. von Rize), Şeytan Dağ Matten, 40º38'N, 40º48'E, 13 July 1958, *F. Markgraf 10865* (Z); 8 km. antes do Porto Ovit Dagi Geçidi, vertente N, 40º39'N, 40º43'E, 29 June 2001, *S. Nisa & al. 917* (MA, O).

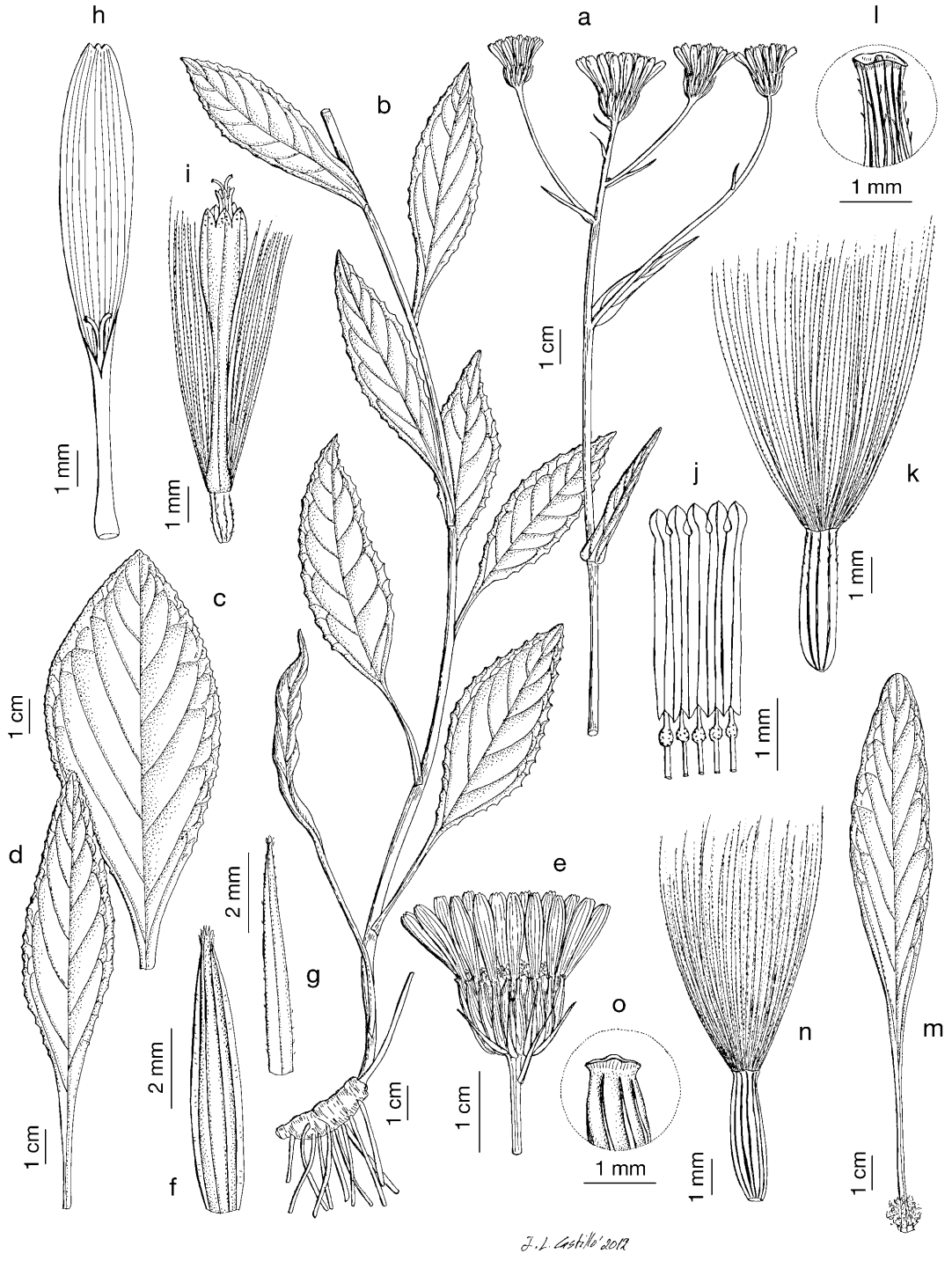


Figure 25. A-L. *Senecio kolenatianus* C.A. Mey. —a, b. Habit (drawn from *Balansa 1474,* FI). —c. Basal leaf (drawn from *Kotschy s.n.* June 1865, G). —d. Basal leaf (drawn from *Herrero 1585 & al.*, MA). —e. Capitulum (drawn from *Woronow 6127,* B). —f. Involucral bract (drawn from *Woronow 6127,* B). —g. Supplementary bract (drawn from *Woronow 6127,* B). —h. Ligulate floret (drawn from *Woronow 6127,* B). —i. Tubular floret (drawn from *Woronow 6127,* B). —j. Stamens (drawn from *Woronow 6127,* B). —k. Achene (drawn from *Davis 20580,* M). —l. Indumentum of achene (drawn from *Davis 20580,* M). M-O. *Senecio pseudoorientalis* Schischk. —m. Basal leaf (drawn from *Strauss s.n.* July 1899, B). —n. Achene (drawn from *Rechinger 43132,* M). —o. Indumentum of achene (drawn from *Rechinger 43132,* M).

17. *Senecio eubaeus* Boiss. & Heldr., Diagn. Pl. Orient. ser. 2, 3: 36. 1856. TYPE: Greece, Euboea, montis Xirovouni (i.e. cacuminis merid. m. Delphi), [38º37'N 23º50'E], 18 Aug 1848, *Heldreich 2072* (lectotype, designated here, G-150322 image!; isolectotypes, BM-1025980 image!, BM-1025979 image!, C!, G-96298!, GOET-2039 image!, H-1440338!, L-794088!, L-794090!, LE!, WAG-4106 image!).

Perennial herb. *Rhizome* 2.5 cm long, 0.5–1.1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 27–68 cm, erect, leaved, corrugated, solid, not ramificated, floccose, base with remnants of old leaves or tufts of hairs. *Basal leaves* 9.5–10.6 cm long, 1.9–3 cm wide, caducous, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = 0.20–0.28), obtuse, cuneate, with a petiole 7.5–10.5 cm long, entire to slightly denticulate (denticles ca. 0.3 mm long), arachnoid (not persistent), concolorous. *Cauline leaves* 7–15; *middle cauline leaves* 5.8–12 cm long, 1.2–2.9 cm wide, alternate, widely lanceolate (ratio middle leaf width / middle leaf length = 0.14–0.32), acute to obtuse, usually sessile to semi-amplexicaul, sometimes attenuate into a petiole up to 2.2 cm long, entire to slightly denticulate (denticles 0.2–1.2 mm long), arachnoid to floccose (not persistent), tertiary venation inconspicuous; *upper cauline leaves* 2.5–6.5 cm long, 0.7–2.3 cm wide, lanceolate to ovate (ratio upper leaf width / upper leaf length = 0.21–0.44), acute, sessile to semi-amplexicaul, entire to slightly denticulate (denticles ca. 0.3 mm long), floccose. *Synflorescence* 6.5–14 cm long, corymbose, with ovate-lanceolate bracts similar to upper leaves. *Capitula* (2–)3–6(–7), 32.7–42.3 mm diam; *involucre* 15.8–27 mm diam, 13–21 mm long, cupuliform; *involucral bracts* (18–)19–22(–27), 9.9–15.3 mm long, 1.8–2.9 mm wide, with scarious margin 0.5–0.9 mm wide, ensiform, attenuate, 0–2 keeled, apex without a black spot, lanate to floccose; *supplementary bracts* (10–)12–14(–15), 6.7–10.4 mm long, 0.8–2.1 mm wide, subulate, without scarious margin, a half to a three-quarters as long as involucral bracts, lanate to floccose, not imbricate. *Ligulate florets* 11–22, 16.8–24.3 mm long, yellow; *tubular florets* 7.5–12.3 mm long, 0.8–1.6 mm diam, yellow. *Achenes* 6.4–7.5 mm long, 0.9–1.5 mm wide, subcylindrical (ratio achene width / achene length = 0.12–0.23), shorter than pappus (ratio achene length / pappus length = 0.58–0.94), with 11–17 ribs, glabrescent or with scattered, intercostal trichomes 0.1–0.2 mm long; *pappus* 7.6–11.3 mm long, whitish. Chromosome number: unknown. Figure 26.

Distribution and habitat. Greece, endemic from Euboea; rocky slopes, open formations of *Abies cephalonica* Loudon, on calcareous soil; altitude 600–1550 m (Figure 20).

Phenology. Flowering from June to August.

Etymology. The epithet *eubaeus* refers to the Euboea island.

Discussion. Senecio eubaeus could be recognized by its lanate large capitula arranged in lax corymb or reduced to a solitary capitulum, and because the synflorescence bracts are foliose. This species is apparently endemic to the mountains of Euboea island, Greece. It has some morphological affinities with *S. tauricola* from Turkey, but it differs in its larger capitula and its foliose synflorescence bracts.

Selected specimens examined. GREECE. **Central Greece**: Euboea, Kandilion gebergte, ten zuiden van Troupion, 38º41'N, 23º26'E, 24 June 1969, *A. Fokkinga s.n.* (L); Insula Euboea, montis Delphi, 38º37'N, 23º50'E, July 1901, *C. Leonis 4344* (B, E, FI, G, H, LE, M, O, WU); Euboea, in monte Candyli, 38º41'N, 23º27'E, 26 July 1871, *T.G. Orphanides s.n.* (K); in insula Euboea, in monte Kandyli, 38º41'N, 23º27'E, 7 Aug 1871, *T.G. Orphanides s.n.* (WU); in monte Xirovuni Eubaea supra Steni, 38º36'N, 23º50'E, 30 July 1871, *T.G. Orphanides s.n.* (FI, WU); in insula Euboea, mt. Candyli, 38º41'N, 23º27'E, 7 Aug 1886, *T.G. Orphanides s.n.* (G, S, UPS, WU); Euboea, montis Dirphys, 38º37'N, 23º50'E, 11 July 1965, *D. Phitos 3955* (M); insula Euboea septentrionalis: montes Kandili, 38º41'N, 23º27'E, 30 May 1955, *K.H. Rechinger 16732* (G, M).

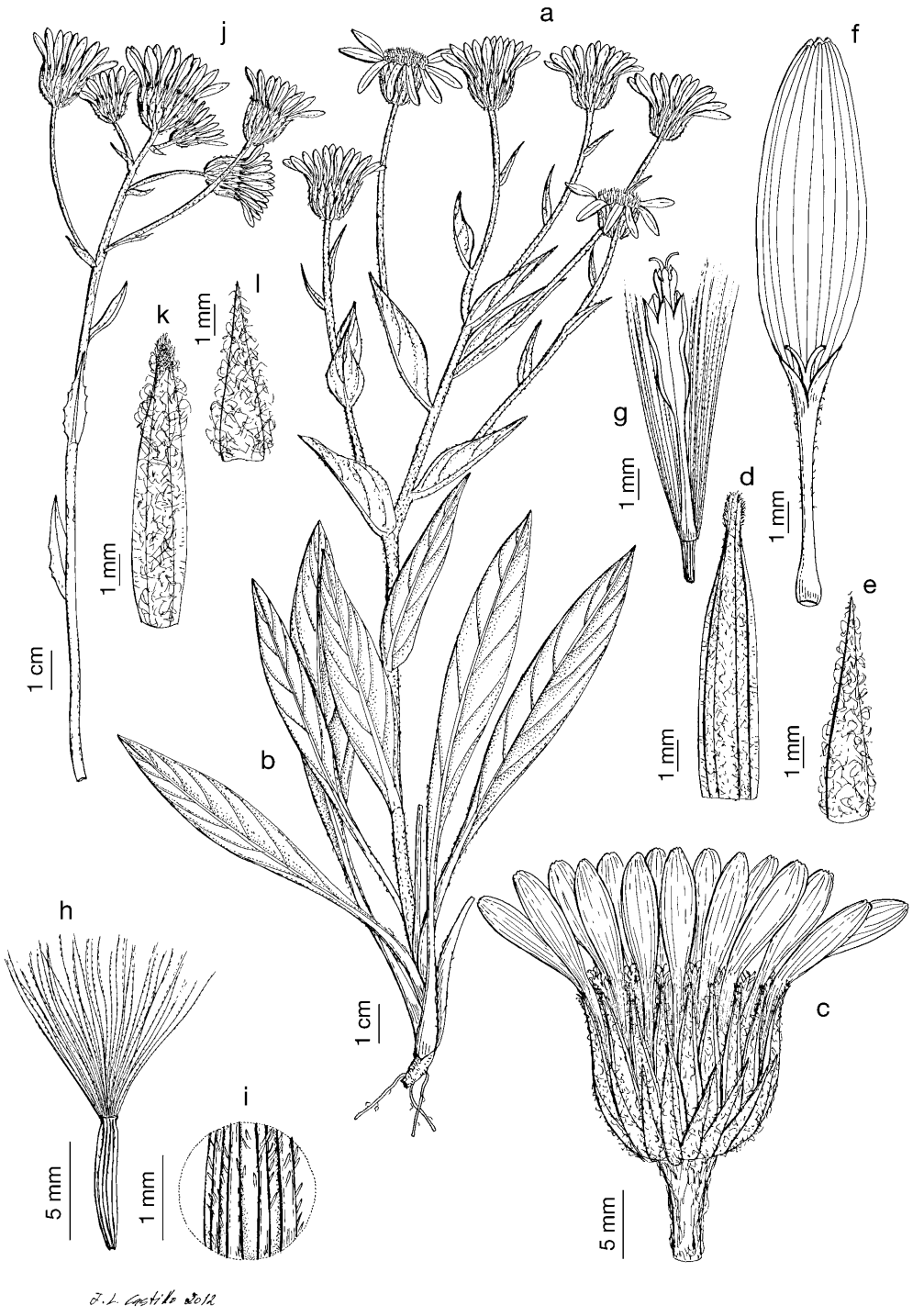


Figure 26. A-I. *Senecio eubaeus* Boiss. & Heldr. —a. Habit (drawn from *Leonis 4344*, E). —b. Habit (drawn from *Fokkinga s.n.* 24 June 1969, L). —c. Capitulum (drawn from *Leonis 4344*, E). —d. Involucral bract (drawn from *Leonis 4344*, E). —e. Supplementary bract (drawn from *Leonis 4344*, E). —f. Ligulate floret (drawn from *Leonis 4344*, E). —g. Tubular floret (drawn from *Leonis 4344*, E). —h. Achene (drawn from *Heldreich 2072*, L). —i. Indumentum of achene (drawn from *Heldreich 2072*, L). J-K. *Senecio tauricola* V.A. Matthews (drawn from *Bisby 92*, E). —j. Synflorescence. —k. Involucral bract. —l. Supplementary bract.

18. *Senecio tauricola* V.A. Matthews, Notes Roy. Bot. Gard. Edinburgh 33: 258. 1974 ["tauricolus"]. TYPE: Turkey, Konya, Ermenek-Karaman, 13 km nördlich ob Ermenek, [36º46'N 32º52'E], 7 July 1964, *Huber-Morath 17303* (holotype, G-96258 image!).

Perennial herb. *Rhizome* ca. 4 cm long, 0.9–1.2 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 32–43 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid to floccose, base without remnants of old leaves or tufts of hairs. *Basal leaves* 5.5–13 cm long, 1.7–3.8 cm wide, persistent, rarely caducous, elliptic to lanceolate (ratio basal leaf width / basal leaf length = 0.21–0.31), acute to obtuse, attenuate to cuneate, with a petiole 7.5–12 cm long, entire to widely-spaced denticles, sparsely floccose, rarely glabrescent, concolorous. *Cauline leaves* 7–10; *middle cauline leaves* 5.9–11.4 cm long, 1.6–3.1 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.20–0.28), acute to obtuse, attenuate into a petiole up to 5.4 cm long, entire to slightly dentate (teeth ca. 0.7 mm deep), sparsely floccose to weakly arachnoid, tertiary venation inconspicuous; *upper cauline leaves* 0.9–5.7 cm long, 0.1–2.4 cm wide, narrowly lanceolate to oblong (ratio upper leaf width / upper leaf length = 0.12–0.42), acute, sessile, entire to subentire, floccose. *Synflorescence* 5.5–16.5 cm long, pseudocorymbose, with linear-oblong bracts. *Capitula* (1–)2–5(–8), 31.7–36.4 mm diam; *involucre* 12.2–18.5 mm diam, 9–11 mm long, cupuliform; *involucral bracts* (17–)20–22(–22), 6.6–9.8 mm long, 1.0–1.6 mm wide, with scarious margin 0.32–1.5 mm wide, ensiform, attenuate, 0–2 keeled, apex usually with a black spot, floccose to lanate; *supplementary bracts* (6–)9–10(–16), 3.8–7.8 mm long, 0.5–2 mm wide, subulate, without scarious margin, a half to a three-quarters as long as involucral bracts, floccose to lanate, not imbricate. *Ligulate florets* ca. 13, ca. 19 mm long, yellow; *tubular florets* 8–10.2 mm long, 1–1.3 mm diam, yellow. *Achenes* 2–4 mm long (Matthews in Davis, 1974), with ca. 10 ribs, with intercostal trichomes ca. 0.1 mm long, denser towards the apex; *pappus* ca. 9.7 mm long, whitish. Chromosome number: unknown. Figure 26.

Distribution and habitat. Turkey, endemic from southern-central Anatolia; rocky slopes, steppes, forest of *Quercus*, *Juniperus*; on calcareous soil; altitude 1200–2200 m (Figure 27).

Phenology. Flowering from June to July.

Etymology. The epithet *tauricola* refers to the Taurus Mountains, southern-central Anatolia.

Discussion. The lanate-floccose involucre and the caducous arachnoid indumentum of the leaves are useful characters to distinguish *Senecio tauricola* from the other *Crociseris* members. It is variable regarding the capitula number and the density of leaves indumentum.

This species has been often confused with *S. castagneanus*, with which partially overlaps its area of distribution, but the indumentum lanate-floccose of the involucre in *S. tauricola* allows separate each other easily. Another character that helps to discriminate them are the number of supplementary bracts [(6–)9–10(–16) in *S. tauricola* vs. (10–)12–15(–18) in *S. castagneanus*]. The distribution range of *S. tauricola* also overlaps with *S. inops*, being the number of involucral bracts a distinctive characters between them (17–22 in *S. tauricola* vs. 13–14 in *S. inops*). Although the ranges are not strictly overlapping, *S. tauricola* has also been confused with *S. cilicius*. They basically differ in the leaves indumentum (arachnoid, caducous in *S. tauricola* vs. ± lanate, persistent in *S. cilicius*), and in the number of involucral bracts (17–22 in *S. tauricola* vs. 10–16 in *S. cilicius*). Another morphological close species is *S. eubaeus* (see comments under it).

Selected specimens examined. TURKEY. **Adana**: Karanfil [dagi], 37º36’N, 35º2’E, 15 July 1966, *F.A. Bisby 92* (E); Ala-dag, 37º43’N, 35º13’E, 23 Sep 1938, *H. Ellenberg 161* (B); Seyhan, Karaisali, Asmancik Yaylâ NW ob Pozanti, 37º31’N, 34º58’E, 28 June 1959, *A. Huber-Morath 15841* (G). **Karaman**: Sara près Ermenek, 36º37’N, 32º54’E, July 1872, *L. Péronin s.n.* (P); bei Korasch im Lykaonischen Taurus, 37º6’N, 33º49’E, June 1912, *W. Siehe 553* (BM, LE, Z). **Konya**: Bozkir-Kücüksu menkii, 37º9’N, 32º9’E, 13 June 1968, *R. Çetik 289* (G); Kleinasien, Isaurien, Hadim-Taschkent, beim Dorf Kongul, 36º57’N, 32º29’E, 16 June 1948, *A. Huber-Morath 8544* (G). **Mersin**: Anamur, Gülnar-Ermenek, 61 km nach Gülnar, 36º31’N, 32º43’E, 11 June 1950, *A. Huber-Morath 15839* (G). **Niğde**: Ala dağ; by Arpalik Cave, 37º52’N, 35º8’E, 28 June 1963, *E. Parry 184* (E).

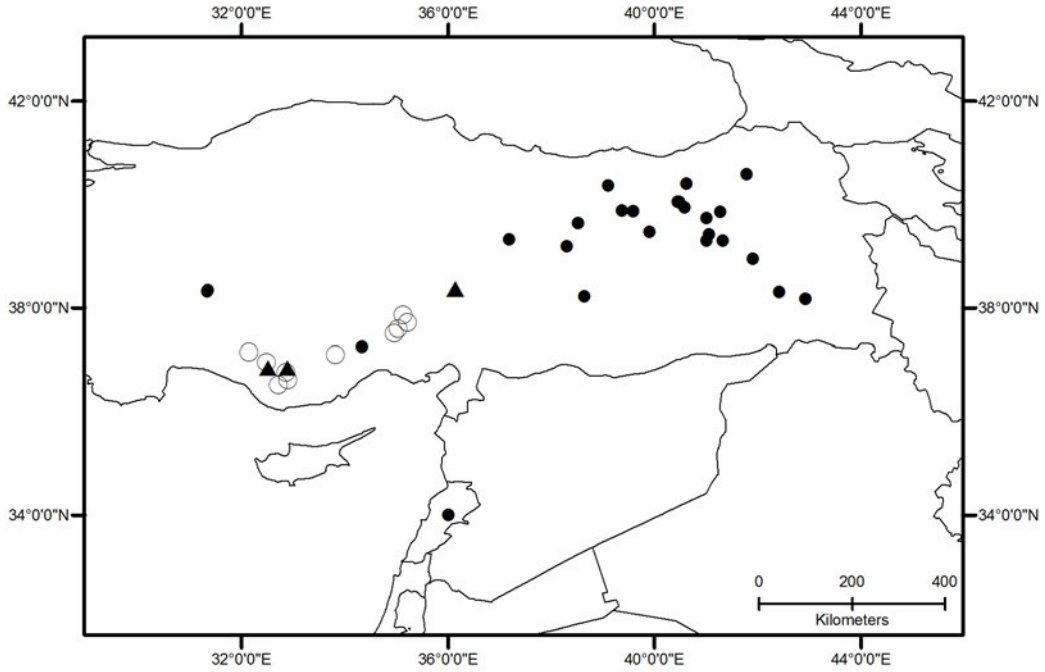


Figure 27. Distribution map for *Senecio tauricola* V.A. Matthews (○), *S. cilicius* Boiss. (●), and *S. inops* Boiss. & Balansa (▲).

19. *Senecio cilicius* Boiss., Diagn. Pl. Orient. ser. 2, 3: 37. 1856. *Jacobaea cilicia* (Boiss.) B. Nord., Willdenowia 37: 181. 2007. TYPE: Turkey, Mersin, Tauri alpes, Bulgar Dagh, Deve Deppe et Güllek Magara, [37º15'N 34º20'E], 13 Aug 1853, *Kotschy 257*[b] (lectotype, designated here, G-150304 image!; isolectotypes, G-96254 image!, LE!, S!, UPS!, WAG-645 image!).

Senecio bertramii Post, Mém. Herb. Boissier 18: 95. 1900 [“Bertrami”]. TYPE: Lebanon, Cedars of Libanon, [34ºN 36'E], 23 Aug 1898, *Post 907* (lectotype, designated here, G-96304 image!; isolectotype, G-162684!).

Perennial herb. *Rhizome* 2.1–4.2 cm long, 0.4–1.1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 25–72 cm, erect, leaved, sulcate, solid, not ramificated, floccose to lanate, base without remnants of old leaves or tufts of hairs. *Basal leaves* 5.5–20.2 cm long, 1.4–4.2 cm wide, persistent, sometimes caducous, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = 0.15–0.36), obtuse, rarely acute, attenuate to cuneate, with a petiole 2–7.2 cm long, entire to widely-spaced teeth (teeth 0.5–2.5 mm deep), ± lanate, concolorous. *Cauline leaves* 5–12; *middle cauline leaves* 3.4–13 cm long, 0.4–3.4 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf

width / middle leaf length = 0.09–0.31), obtuse to acute, sometimes apiculate, semi-amplexicaul, sometimes attenuate into a petiole up to 2.1 cm long, entire to widely-spaced teeth (teeth 0.3–2.2 mm deep), ± lanate, tertiary venation inconspicuous; *upper cauline leaves* 1.4–9.5 cm long, 0.2–1.8 cm wide, narrowly lanceolate to oblong (ratio upper leaf width / upper leaf length = 0.07–0.30), acute to apiculate, sessile to semi-amplexicaul, entire to slightly denticulate (denticles 0.3–1.5 mm long), ± lanate. *Synflorescence* 3–32 cm long, corymbose to corymbose paniculate, with linear-oblong bracts. *Capitula* (3–)5–11(–15), 20.2–37.3 mm diam; *involucre* 10.6–23.8 mm diam, 7–14 mm long, bell-shaped to obconical; *involucral bracts* (10–)14–15(–16), 5.7–10.6 mm long, 1.6–3 mm wide, with scarious margin 0.3–1 mm wide, ensiform, acute, 2–3 dark-keeled when they are visible, apex without a black spot, floccose to lanate; *supplementary bracts* (5–)6–8(–10), 4.3–11.9 mm long, 0.3–0.8 mm wide, subulate, without scarious margin, two-thirds to as long as involucral bracts, rarely slightly longer, floccose to lanate, not imbricate. *Ligulate florets* 11–14, 11.8–22.1 mm long, deep yellow to orange; *tubular florets* 5.6–8.2 mm long, 0.7–1.6 mm diam, deep yellow to orange. *Achenes* 3.3–4 mm long, 0.9–1.2 mm wide, subcylindrical to fusiform (ratio achene width / achene length = 0.25–0.29), shorter than pappus (ratio achene length / pappus length = 0.58–0.59), with 10–12 ribs, with scattered intercostal trichomes 0.1–0.2 mm long; *pappus* 5.1–7.2 mm long, whitish. Chromosome number: unknown. Figure 28.

Distribution and habitat. Lebanon, Turkey (mainly eastern Anatolia); subalpine meadows, rocky slopes, steppes, woods of *Cedrus libani*; usually on calcareous soil; altitude 1650–2450 m (Figure 27).

Phenology. Flowering from June to August.

Etymology. The epithet *cilicius* refers to the ancient region called Cilicia, the southern coastal region of Asia Minor, south of the central Anatolian plateau.

Discussion. Senecio cilicius can be recognized by its lanate indumentum on stem, leaves, and involucre, confering a withish aspect to the whole plant. It is similar to *S. inops* and *S. tauricola* (see comments under it). Regarding to *S. inops*, it differs in the

indumentum type (± lanate, persistent in *S. cilicius* vs. arachnoid-floccose, usually caducous in *S. inops*). In fact, the latter is a greenish plant while *S. cilicius* is whitish. These species do not overlap their areas of distribution.

The populations from Cedars of Libanon (Lebanon) were described by Post as *S. bertramii*. Despite an apparently slight difference in the colour of the ligulate flowers, it fits perfectly with the diagnostic characters of *S. cilicius*, and therefore, it is considered herein as a synonym. According to Post (1900) and Dinsmore (1933) the Lebanon populations have the corollas orange, whereas the Turkish ones are deep yellow (Matthews, 1975). This character can not been confirmed on the base of the dried material studied.

It is important to clarify that the two numbers indicated on the label of the type material correspond to different collections in the same locality. We lectotypify on *Kotschy 257*^{b}, collected on 13 Aug 1853. *Kotschy 66*^{a} was collected on 9 July 1853, becoming a paratype (G-150305 image!). The other paratype is a Huet de Pavillon's collection from Maimansour (Erzurum) collected on August 1853. We have located duplicates at G, O, and P.

Selected specimens examined. LEBANON. Liban, 34º0'N, 36º0'E, *Monllard s.n.* (G). TURKEY. **Bayburt**: Kop Dag Pass, 40º3'N, 40º27'E, 9 Aug 1962, *P. Furse 3797* (G, K); Aşkale-Bayburt, Kop Geçidi, Hügel gegen W, 40º3'N, 40º28'E, 13 July 1988, *M. Nydegger 43751* (G); montes Kop Dagh inter Askale et Bayburt, 40º3'N, 40º28'E, 4 Aug 1965, *K.H. Rechinger 32891* (G). **Bingöl**: Bingöl Da. above Karliova, 39º18'N, 41º0'E, 10 July 1966, *P.H. Davis 46189* (K); Karliova-Çat, 26 km N Karliova, 39º25'N, 41º3'E, 20 July 1982, *M. Nydegger 17293* (G). **Bitlis**: dist. Kotum, Karz Dag, above Kamer, 38º18'N, 42º25'E, 24 Aug 1954, *P.H. Davis & O. Polunin 24585* (E, K, MO). **Erzincan**: Kurutschai, in montosis ad Nerskiep, 39º38'N, 38º31'E, 28 June 1889, *P. Sintenis 1024* (S); Armenia turcica, Hassanova ad Kurutschai, versus Nerskiep, 39º38'N, 38º31'E, 15 July 1890, *P. Sintenis 2922* (B, G, K, LE, WU); Armenia turcica, Sipikordagh, 39º52'N, 39º35'E, 29 July 1890, *P. Sintenis 3271* (C, G, S). **Erzurum**: Cappadocia bor.: in summo monte Ak-dagh, 40º35'N, 41º47'E, 2 Aug 1889, *J. Bornmüller 1121* (B, LE, WU); in collibus inter Baibout et Ispir, 40º24'N, 40º37'E, 24 July 1862, *E. Bourgeau 125* (C, FI, LE); Palandöken Da., 20-30 km from Çat to Erzurum, 39º51'N, 41º16'E, 27 July 1966, *P.H. Davis 47342* (C, E, K). **Gümüşhane**: Karagoelldagh: Alask-Sasvesi, 40º22'N, 39º6'E, 29 July 1894, *P. Sintenis 7219* (B, E, FI, G, LE, M, S, WU). **Konya**: Phrygia, Akscheher (Wilajet Konia), in regione alpina montis Sultandagh, 38º19'N, 31º20'E, 21 June 1899, *J. Bornmüller 4619* (B); above Akşehir, NE of Karliktepe, 38º20'N, 31º21'E, 28 Aug 1976, *C. Dökmeci 35570* (G). **Malatya**: Kube Dag Malatya - Pötürge, beim Karakol 36 km von M., 38º13'N, 38º38'E, 15 June 1949, *A. Huber-Morath 9161* (G). **Mersin**: in Monte Tauro, 1836, *T. Kotschy 314* (B, H, LE, S); Tauri alpes, Bulgar Dagh, Deve Deppe et Güllek Magara, 37º15'N, 34º20'E, 9 July 1853, *T. Kotschy 66* (G). **Muş**: Bulanik-Muş, Weiden 3 km nach Hasangüran, 38º57'N, 41º54'E, 14 July 1951, *A. Huber-Morath 11255* (G); Bimgoell montis, ad Gumgum in districtu Warto, in valle amoena Merga Sauk, 39º18'N, 41º19'E, 23 Aug 1859, *T. Kotschy 399* (G, LE, S, UPS, US). **Sivas**: Kangal, Kangal-Tecer, 12 km südl. Tecer, 39º19'N, 37º11'E, 28 June 1955, *A. Huber-Morath 13258* (G); 46 km südlich Divriği, zwischen Divriği und Arapgir, 39º11'N, 38º18'E, 15 July 1982, *M. Nydegger 17168* (B, BR, FI, G, H, MA). **Tunceli**: Pülümür-Mutu, 2 km N der Passhöhe, 39º28'N, 39º54'E, 26 June 1951, *A. Huber-Morath 11256* (G). **Van**: dist. Satak, Kavussahap Däg, 38º10'N, 42º55'E, 22 July 1954, *P.H. Davis & O. Polunin 23036* (K); Kavussahap Daglari, S of Pisvanik, N side above Arpit, 38º10'N, 42º55'E, 14 Aug 1967, *J.M. Watson, Mitchell & M.J. Cheese 3600* (E, K).

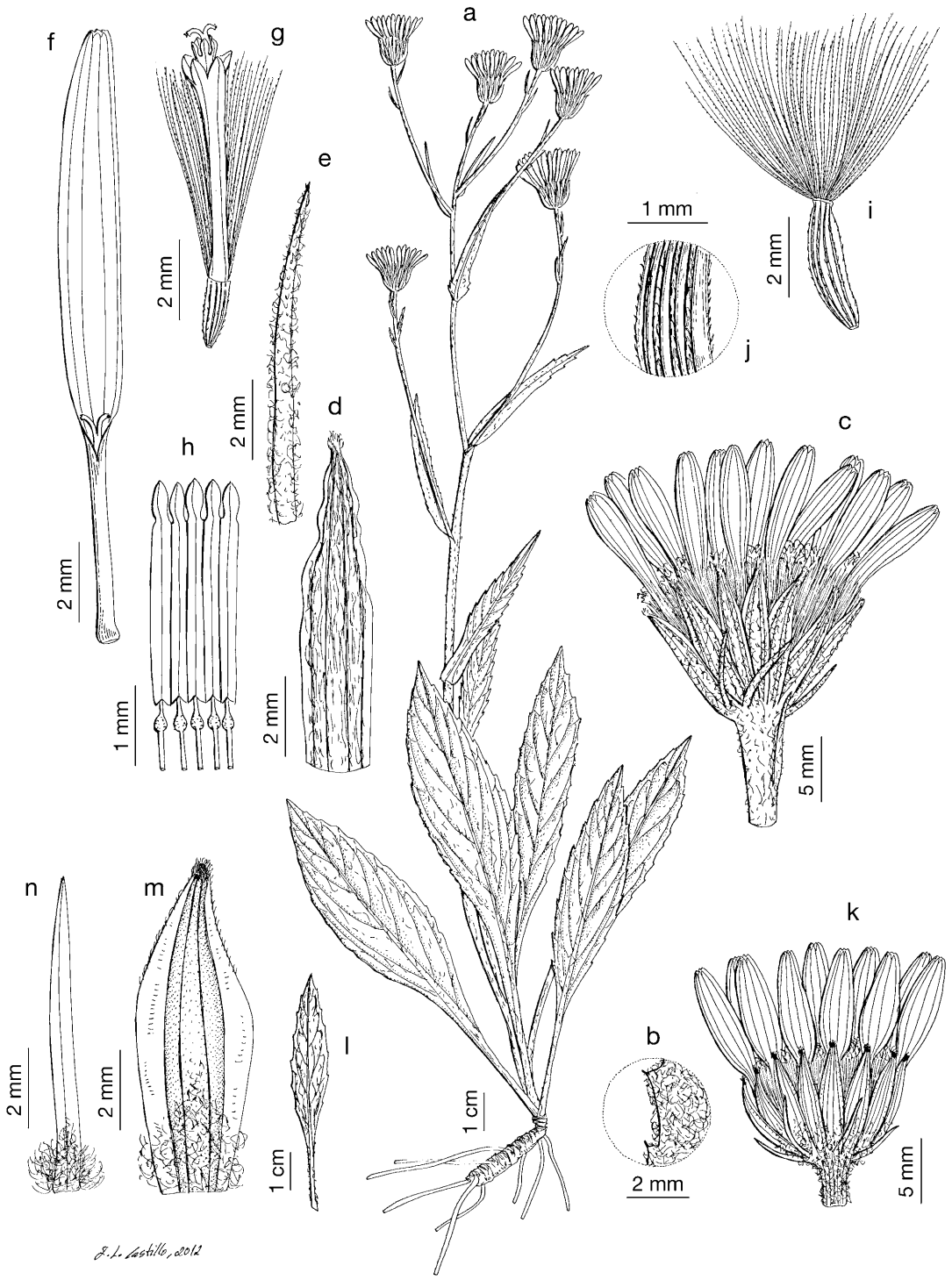


Figure 28. A-J. *Senecio cilicius* Boiss. —a. Habit (drawn from *Bornmüller 1121*, B). —b. Indumentum of a leave (drawn from *Furse 3797*, G). —c. Capitulum (drawn from *Furse 3797*, G). —d. Involucral bract (drawn from *Furse 3797*, G). —e. Supplementary bract (drawn from *Furse 3797*, G). —f. Ligulate floret (drawn from *Furse 3797*, G). —g. Tubular floret (drawn from *Furse 3797*, G). —h. Stamens (drawn from *Furse 3797*, G). —i. Achene (drawn from *Kotschy 399*, US). —j. Indumentum of achene (drawn from *Kotschy 399*, US). K-N. *Senecio inops* Boiss. & Balansa —k. Capitulum (drawn from *Bani 6560*, MA). —l. Basal leaf (drawn from *Bani 6560*, MA). —m. Involucral bract (drawn from *Budak 2066*, MA). —n. Supplementary bract (drawn from *Budak 2066*, MA).

20. *Senecio inops* Boiss. & Balansa, Diagn. Pl. Orient. ser. 2, 6: 101. 1859. *Jacobaea inops* (Boiss. & Balansa) B. Nord., Willdenowia 37: 181. 2007. TYPE: Turkey, Kayseri, Tomarza, Arslantaş, montis Aslan-Dach, à l'ESE du mont-Argée, [38º22'N 36º08'E], 5 Aug 1856, *Balansa s.n.* (lectotype, designated here, G-150311!).

Senecio inops subsp. *karamanicus* Hamzaoğlu & Budak, Turk. J. Bot. 33: 286. 2009. TYPE: Turkye, Karaman, Başyayla-Taşkent arası, 7-9 km, [36º48'N 32º35'E], 21 June 2006, *Hamzaoğlu, Budak & Aksoy 2066* (holotype, BOZOK not seen; isotypes, ANK not seen, BOZOK not seen, Erciyes Hb. not seen, GAZI image!, HUB image!, MA!).

Perennial herb. *Rhizome* 3.0–4.5 cm long, 0.7–1.0 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 16–58 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid, base usually with remnants of old leaves and without tufts of hairs. *Basal leaves* 5–10.5 cm long, 0.8–2 cm wide, caducous, sometimes persistent, lanceolate to oblanceolate (ratio basal leaf width / basal leaf length = 0.12–0.24), acute, attenuate to cuneate, with a petiole 0.5–5 cm long, widely-spaced teeth (teeth 0.5–3 mm deep), ± arachnoid to covered with scattered trichomes, concolorous. *Cauline leaves* 4-9; *middle cauline leaves* 2.5–9.5 cm long, 0.2–1.3 cm wide, alternate, lanceolate to oblong (ratio middle leaf width / middle leaf length = 0.08–0.20), acute, sessile, sometimes attenuate into a petiole up to 2.3 cm long, widely-spaced teeth (teeth 0.3–2.5 mm deep), ± arachnoid to covered with scattered trichomes, tertiary venation inconspicuous; *upper cauline leaves* 0.9–4.4 cm long, 0.1–0.5 cm wide, linear to oblong (ratio upper leaf width / upper leaf length = 0.06–0.17), acute, sessile, subentire to slightly denticulate (denticles ca. 0.6 mm long), ± arachnoid to covered with scattered trichomes. *Synflorescence* 14.5–18 cm long, reduced to a solitary capitulum or corymbose, with scarce linear-oblong bracts. *Capitula* (1–)2–8(–27), 23.7–33 mm diam; *involucre* 11–19 mm diam, 8.5–10 mm long, bell-shaped to obconical; *involucral bracts* 13–14, 6.4–9.4 mm long, 1.8–2.7 mm wide, with scarious margin 0.43–0.86 mm wide, ensiform, acute, 2–3 keeled, apex usually with a faint black spot, glabrescent, sometimes weakly arachnoid near the base; *supplementary bracts* 4–8, 3.5–8.5 mm long, 0.4–0.7 mm wide, subulate, without scarious margin, a half to a three-quarters as long as involucral bracts, glabrescent to weakly arachnoid, not imbricate. *Ligulate florets* 12–14, 12–18 mm long, yellow; *tubular florets* 6.3–8 mm long, 0.8–1.3 mm

diam, yellow. *Achenes* 1.5–2.5 mm long (Hamzaoğlu & al., 2009), with trichomes covering the whole surface ca. 0.1 mm long; *pappus* ca. 6 mm long, whitish. Chromosome number: unknown. Figure 28.

Iconography. Hamzaoğlu & al. (2009: 287 fig. 1).

Distribution and habitat. Turkey (endemic of central Anatolia); rocky slopes, on calcareous soil; altitude 1800–2250 m (Figure 27).

Phenology. Flowering from June to August.

Etymology. The epithet *inops* means weak or helpless, probably refering the modest size of the type material. However, this species may reach larger size.

Discussion. Senecio inops is a distinctive species characterized to bear small capitula with low number of involucral and supplementary bracts. This species is so far known from few collections. It is apparently only recorded from Karaman and Kayseri, which are about 335 km away. It is variable with regard to the indumentum of the involucre, being almost glabrescent (in those populations from Kayseri) to floccose towards the base (populations from Karaman). On this base, it was described *S. inops* subsp. *karamanicus*, including the populations from Karaman, which certainly are more floccose. The remainder diagnostic characters discussed by Hamzaoğlu & al. (2009) are not useful for taxonomic purposes because they are not consistent: auriculate base of upper cauline leaves, number of capitula, length of involucral bracts, as well as the length of the supplementary bracts, ligulate flowers, style branches, and achenes. Both subspecies are known only from the type locality and surroundings, and no intermediate populations are known, therefore, it is necessary to find more populations to study the variability of the mentioned characters. For the meantime, we include them within the variability of *S. inops*.

Senecio inops is morphologically similar to *S. cilicius* (see comments under this species).

It is worthwhile to mention that the length of the achenes provided by Hamzaoğlu & al. (2009) probably corresponds to immature achenes. Further material are needed to describe them.

Selected specimens examined. TURKEY. **Karaman**: Mittlerer Taurus, E. side of Oyuklu Dağ, c. 30 km N Ermenek, 36º51'N, 32º53'E, 24 July 1992, *P. Hein 56* (B). **Kayseri**: Kayseri, Tomarza, Aslantaş over the village, Kizilgöl hill, 38º22'N, 36º8'E, 12 July 2008, *B. Bani 6560* (MA); Kayseri, Tomarza, Aslantaş village, Kurubel highland, 38º22'N, 36º8'E, 20 July 2006, *E. Hamzaoğlu, Ü. Budak & A. Aksoy 4370* (BOZOK).

21. *Senecio racemosus* (M. Bieb.) DC., Prodr. 6: 358. 1838. *Cineraria racemosa* M. Bieb., Tabl. Prov. Mer Casp.: 119. 1798. *Cineraria caspica* Pers., Syn. Pl. 2: 439. 1807, nom. illeg. (ICBN Art. 11.4). *Senecio caspicus* (Pers.) Less., Linnaea 9: 170, 193. 1834, nom. illeg. (ICBN Art. 11.4). *Branicia insignis* Andrz. ex Trautv., Trudy Glavn. Bot. Sada 8: 476. 1883, nom. illeg. (ICBN Art. 11.4). *Jacobaea racemosa* (M. Bieb.) Pelser, Taxon 62(1): unpaged. TYPE: Azerbaijan, Xizi, Altiaghach, ex montibus Schirvanicis, [40º52'N 48º58'E], 1796, *Bieberstein s.n.* (lectotype, designated by Menitsky & Konechnaya (2001: 95), LE!).

Perennial herb. *Rhizome* 3.4–6 cm long, 0.7–1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 32–94 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to weakly arachnoid, base with fibrous remnants of old leaves and without tufts of hairs, sometimes violet coloured. *Basal leaves* 7–25 cm long, 1.9–5.2 cm wide, persistent, sometimes caducous, elliptic to oblanceolate (ratio basal leaf width / basal leaf length = 0.15–0.45), obtuse to acute, attenuate to cuneate, with a petiole 2.5–17.5 cm long, irregularly dentate (teeth 0.6–2.4 mm deep, increasing in size towards base), rarely subentire, glabrescent above and covered with scattered trichomes beneath (trichomes 0.1–0.9 mm long), concolorous. *Cauline leaves* 4–18; *middle cauline leaves* 4.2–19.6 cm long, 0.6–5.2 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.05–0.31), acute to obtuse, semi-amplexicaul auriculate to sessile, rarely attenuate into a petiole up to 5.5 cm long, dentate (teeth 0.5–4.7 mm deep), glabrescent to covered with scattered trichomes (trichomes 0.2–1 mm long), tertiary venation sometimes slightly marked; *upper cauline leaves* 1.2–15.5 cm long, 0.2–2.4 cm wide, lanceolate (ratio upper leaf width / upper leaf length = 0.09–0.42), acute, semi-amplexicaul auriculate, subentire to dentate (teeth 0.4–2 mm deep), glabrescent to covered with scattered trichomes. *Synflorescence* 7.5–50 cm long, racemose to narrowly paniculate, with oblong-lanceolate bracts, often auriculate. *Capitula* (7–)10–24(–77), 24.4–46.2 mm diam; *involucre* 10.4–25 mm diam, 9–14 mm long, obconical; *involucral bracts* (10–)12–13(–18), 6.9–11 mm long, 2–4

mm wide, with scarious margin 0.4–1.2 mm wide, sometimes slightly fimbriate, lanceolate to oblong, attenuate, 1–3 weakly keeled, apex often with a black spot, glabrescent to weakly arachnoid near the base (trichomes 0.2–0.4 mm long); *supplementary bracts* (5–)8–10(–12), 3.2–7.7 mm long, 0.6–1.3 mm wide, subulate, without scarious margin, a third to a three-quarters as long as involucral bracts, glabrescent to weakly arachnoid (trichomes 0.3–0.6 mm long), not imbricate. *Ligulate florets* 7–13, 14–22.1 mm long, yellow; *tubular florets* 6–8.9 mm long, 0.8–2.1 mm diam, yellow. *Achenes* 3.4–6.2 mm long, 0.8–1.4 mm wide, subcylindrical (ratio achene width / achene length = 0.17–0.28), shorter than pappus (ratio achene length / pappus length = 0.47–0.9), with 9–12 ribs, glabrescent to covered with trichomes along ribs 0.1–0.4 mm long; *pappus* 5–9 mm long, whitish.

Etymology. The epithet *racemosus* refers to the synflorescence architecture.

Discussion. Senecio racemosus is readily distinguishable for displaying a racemose to racemose-paniculate synflorescence, semiamplexicaul cauline leaves, and the stem base covered with brown fibrous remnants of old leaves. It is variable in capitula number, leaves indumentum, and achenes indumentum. This last character holds the two subspecies recognized in the present treatment.

It may be confused with *S. buschianus* because both species have similar habit, obconical involucre and fibrous remnants of old leaves at stem base. The characters to differenciate between each other are the number of capitula (lower in *S. buschianus*), the indumentum of involucre (glabrescent to weakly arachnoid near the base in *S. racemosus* vs. tomentose to arachnoid, denser towards the base in *S. buschianus*), and the synflorescence architecture (racemose to racemose-paniculate in *S. racemosus* vs. corymbose to pseudoracemose in *S. buschianus*). Their ranges of distribution do not strictly overlap, but both species grow in northeastern Azerbaijan, where *S. racemosus* subsp. *racemosus* is scarce.

Key to subspecies of *Senecio racemosus*

1a. Achenes glabrous or sparsely hairy near the top; synflorescence racemose or broadly paniculate.....**21a. *S. racemosus* subsp. *racemosus***

1b. Achenes with trichomes along ribs; synflorescence racemose or narrowly paniculate.....**21b. *S. racemosus* subsp. *kirghisicus***

21a. *Senecio racemosus* subsp. *racemosus*

Senecio racemosus var. *glaber* DC., Prodr. 6: 358. 1838. TYPE: Iran: Perse, 1832, *Bélanger 688* (lectotype, designated here, G-DC-204956 image!).

Senecio cyri K. Koch, Linnaea 24: 362. 1851. TYPE: Turkey, Artahan [Ardahan, 41ºN 42ºE], *Koch s.n.* (not found).

Senecio thyrsophorus K. Koch, Linnaea 24: 362. 1851. TYPE: Armenia, Daratschitschak, 13 July 1829, *Szovits s.n.* (not found).

Senecio racemosus var. *araxina* Trautv., Trudy Imp. S.-Peterburgsk. Bot. Sada 2: 550. 1873. TYPE: Armenia, Araxem, Dawalu, [40º25'N 44º24'E], *Radde s.n.* (TB?, not found).

Senecio racemosus var. *latronum* Boiss. & Hausskn. ex Boiss., Fl. Orient. 3: 402. 1875. TYPE: Turkey, Diyarbakir, Devegetschid, [38º07'N 39º58'E], 23 Oct 1865, *Haussknecht s.n.* (lectotype, designated here, G-150324 image!; isolectotypes JE-6949 image!, JE-6950!, JE-6951 image!, JE-6952!, LE!, P-3729808 image!, W-32015 image!, W-Rchb-101002 image!).

Senecio racemosus var. *schelkovnikovii* Grossh. in Schischk. & Grossh., Sched. Herb. Pl. Orient. Exsicc. 1: 44. 1924 ["shelkovnikovi"]. TYPE: Georgia, Shida Kartli, Transcaucasia, pr. Tiflis dist. Gori, in jugo Tzchra-Tzkaro, [41º52'N 44º55'E], 17 July 1923, *Kozlowsky 173* (lectotype, designated here, LE!; isolectotypes, B-10-0325010!, G-162795!, LE!, NY!, P-4121567 image!, S!, Z-65113!).

Senecio delbesianus Arènes, Notul. Syst. (Paris) 14: 197. 1951. TYPE: Syria, Dayrik, lit d'un ruisseau au S. de Derik ("Bec de Canard"), [37º07'N 42º08'E], Sep 1939, *Delbès 168* (holotype, G-177895 image!; isotypes, G-177894 image!, G-177896 image!).

Synflorescence racemose or broadly paniculate. *Achenes* glabrous or with trichomes near the top. Chromosome number: 2*n*=40 (Afzelius, 1951: 68). Figure 31.

Iconography. Arènes (1951: 195 pl. 3 fig. 4-5); Schischkin (1961: 737 tab. 34 fig. 1); Nordenstam (1989, tab. 41); Avetisyan (1995: 474 tab. 184).

Distribution and habitat. Armenia, Azerbaijan, Georgia, Iran, Iraq?, Syria, Turkey; meadows, mountain steppes, rocky places, damp banks, cereal fields, rubble slopes; altitude 1400–2500 m (Figure 29).

Phenology. Flowering from June to September.

Discussion. According to Nordenstam (1989), the specimen *Kotschy 669* from southwestern Iran, although with unusual pubescent leaves, seems to belong to *S. racemosus* subsp. *racemosus*. Nonetheless, it has not been included in the distribution map because the synflorescence and capitula are not well developed in all the studied duplicates (H, LE, P, WU). More collections are required to accurately identify it.

The name *S. delbesianus* was described from northern Syria by Arènes. The racemose-paniculate synflorescence, the obconical involucre, and the semiamplexicaul cauline leaves lead us to consider it the same entity that *S. racemosus* subsp. *racemosus*. It has to be noted that the size of the achenes (ca. 1 mm long) described in the protologue corresponds to immature achenes.

Lotfi & al. (2010) cite *S. racemosus* (sub *S. thyrsophorus*) from the Kurdistan Province (Iran). Likewise, Qaisi (in litt.) and Rechinger (1964) recorded this species from northern Iraq, along the Tigris river nearby Mosul (*Hand.-Mazz. 1259*, *Low 409*; herbaria unknown). Unfortunately, any of these vouchers have been revised by us, thus, the presence of this taxon in Iraq apper with a question mark.

Selected specimens examined. ARMENIA. **Aragatsotn**: ad Araxen in Armenia, 40º25’N, 44º24’E, 21 Sep 1828, *A.J. Szovits 29* (G, H, K, LE). **Gegharkunik**: circ. lac. Gokca, in mont. prope Taskend, 40º14’N, 45º5’E, 20 Aug 1927, *A.B. Schelkovnikov & E. Kara-Murza s.n.* (LE). **Lori**: Transcaucas, Trialethi pr. Lori, 41º0’N, 44º30’E, 1843, *Wittmann 280* (LE). AZERBAIJAN. **Daghlig Shirvan**: Transcaucasia, Azerbajdzhan, distr. Chizy, prope p. Alty-agatsch, 40º51’N, 48º56’E, 13 Aug 1938, *V. Petrov & M. Shevljakov s.n.* (LE). **Nakhchivan**: Nakitschiwan, rarior in montibus altioribus Alagez, 39º32’N, 45º41’E, 13 July 1829, *A.J. Szovits 523* (G, K, LE). GEORGIA. **Samtskhe-Javakheti**: Javakheti, mount Samsar, 41º31’N, 43º38’E, 2 Sep 1964, *R. Gagnidze s.n.* (LE). **Shida Kartli**: Caucasus, Zalka, 42º20’N, 43º58’E, *Frick 344* (BR, G, LE, S, US, WU). IRAN. **Chaharmahal and Bakhtiari**: Perse, KousKezerd [Kuhzerd] et Imamzadeh, 32º20’N, 50º10’E, 1829, *C.P. Bélanger s.n.* (P). SYRIA.

Al-Hasakah: vallée au S. de Deirik, Bec de Canard, près de l'eau, 37º7'N, 42º8'E, 25 June 1956, *H. Pabot 753* (G). TURKEY. **Bayburt**: ad Caracoche prope Baibout, 40º15'N, 40º14'E, 24 July 1862, *E. Bourgeau 128* (K, LE, UPS, WU). **Erzincan**: Armenia turcica, Koesoe, ad ripas Szadagh-Kshai, 39º52'N, 39º35'E, 25 July 1890, *P. Sintenis 3272* (LE, S); Armenia turcica, Sipikordagh, 39º52'N, 39º35'E, 26 July 1890, *P. Sintenis & Hedge 3273* (B, G, LE, S, WU). **Erzurum**: 29 km from Hinis to Pasinler, 39º35'N, 41º45'E, 12 July 1966, *P.H. Davis 46408* (E, K); Palandöken Da., 20-23 km from Çat to Erzurum, 39º51'N, 41º16'E, 27 July 1966, *P.H. Davis 47347* (C, K); Erzurum-Tortum, Quellfluren 39 km NO Erzurum, 40º11'N, 41º27'E, 16 July 1958, *A. Huber-Morath 15845* (G); ca. 23 km N of Askale on the road to Trabzon, 40º2'N, 40º30'E, 22 Aug 1972, *P. Uotila 19630* (E). **Iğdır**: Igdir, Exp. Farm, Karasu stream, 39º54'N, 44º6'E, 10 Sep 1960, *K.M. Guichard s.n.* (K). **Kars**: Kars-Susuz, 8 km. from Kars, 40º40'N, 43º9'E, 5 July 1957, *P.H. Davis 30623* (E, K); 6 km from Sarikamiş to Karakurt, 40º17'N, 42º39'E, 15 July 1966, *P.H. Davis 46558* (K); Ardahan-Ardanuç, 7 km W Ardahan, 41º5'N, 42º37'E, 28 July 1979, *M. Nydegger 14682* (G). **Muş**: prov. Musch ad radices australes Bimgoell montis ad Gumgum in districtu Warto, ad lacum Gestemert, 39º7'N, 41º43'E, 15 Aug 1859, *T. Kotschy 296* (G, K, L, LE, NY, S, UPS); prov. Musch ad radices australes Bimgoell montis ad Gumgum in districtu Warto, vallis Tscharbor Su, 39º7'N, 41º25'E, 29 Aug 1859, *T. Kotschy 428* (G, K, L, LE, S, UPS). **Tunceli**: Pülümür-Selepur, 39º31'N, 39º53'E, 23 July 1957, *P.H. Davis 31584* (K). **Van**: Havasor-Hosap, 38º22'N, 43º35'E, 30 July 1954, *P.H. Davis & O. Polunin 23304* (K); 6 km SE Bashkale, 38º0'N, 44º3'E, 23 July 1974, *K.H. Rechinger 49889* (G).

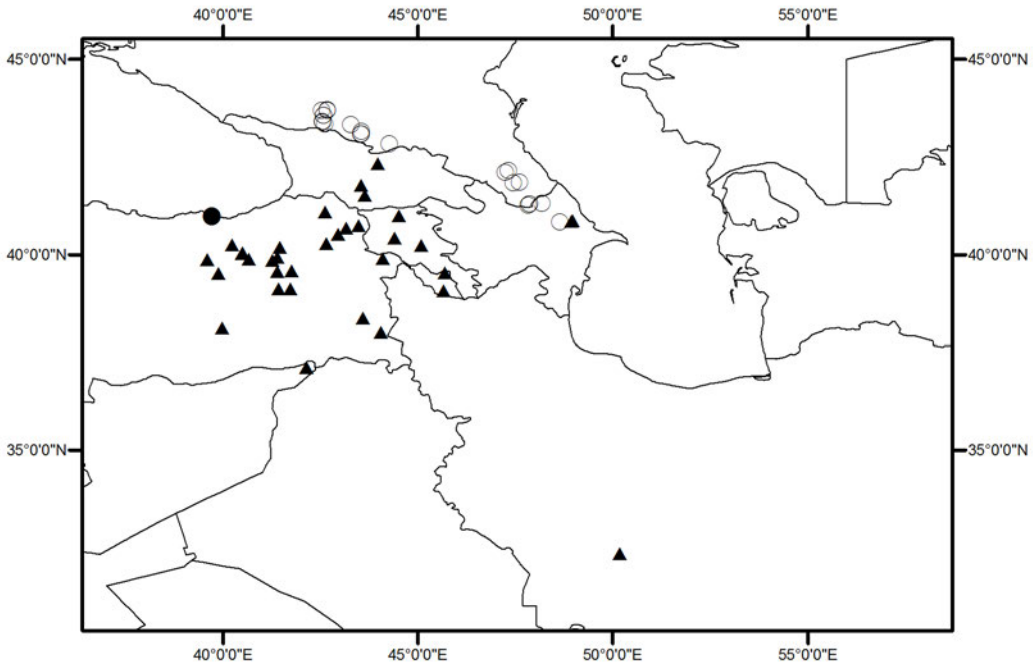


Figure 29. Distribution map for *Senecio racemosus* (M. Bieb.) DC. subsp. *racemosus* (▲), *S. buschianus* Sosn. (○), and *S. trapezuntinus* Boiss. (●).

21b. *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo, Novon (submitted). *Cineraria glabrata* Ledeb., Icon. Pl.: tab. 94. 1829, nom. illeg., non Sw. 1806 (ICBN, Art. 53.1). *Cineraria auriculata* Ledeb. nom. subst., Fl. Altaic. 4: 105. 1833. *Senecio kirghisicus* DC., nom. nov., non *S. auriculatus* Burm. f., Prodr. 6: 362. 1838. *Senecio doria* subsp. *kirghisicus* (DC.) Chater, Bot. J. Linn. Soc. 68: 276. 1974. *Jacobaea*

kirghisica (DC.) E. Wiebe, Turczaninowia 3: 62. 2000. TYPE: Kazakhstan, Altai [Kara-su stream according *ind. loc.*, 49º41'N 74º58'E], *Ledebour s.n.* (lectotype, designated by Calvo & al. (2013a), LE!).

Synflorescence racemose or narrowly paniculate. *Achenes* with trichomes along ribs. Chromosome number: unknown. Figure 31.

Iconography. Ledebour (1829: 22, tab. 94, sub *C. glabrata*); Wissjulina (1962: 376 fig. 71, sub *S. paucifolius*); Konechnaya (1994: 61 pl. 5 fig. 1, sub *S. paucifolius*).

Distribution and habitat. Kazakhstan, Ukraine, Russia; meadows, steppes, on solonchak and solonetz soil; altitude 20–700 m (Figure 30).

Phenology. Flowering from June to September.

Discussion. Since the proposal to conserve the name *S. paucifolius* S.G. Gmel. with a conserved type (Calvo & al., 2011c) was rejected (Applequist, 2012), such name should be subordinated to *S. nemorensis s.l.*, against its usage, on the base that the Gmelin's plate included in the description is the only available original material and it does not correspond to the current concept of *S. paucifolius*.

The epithet *kirguisicus* refers to the "deserti Kirguisorum" (Kazakhstan), cited in the protologue of *Cineraria glabrata* by Ledebour, and subsequently repeated by Candolle in the protologue of *S. kirguisicus*. For details on the lectotypification of *C. glabrata* see Calvo & al. (2013a).

The populations of *S. racemosus* subsp. *kirghisicus* represent the eastern limit of the *Crociseris* distribution, at eastern Kazakhstan.

Selected specimens examined. KAZAKHSTAN. **Akmola**: mouth of the Baypak river, 50º53'N, 72º9'E, 10 Aug 1955, *T.I. Isachenko, G.D. Samarina & G.N. Tsvetova 3551* (LE); Semipalatinsk oblast', Karakaly uyezd, 51º53'N, 66º13'E, 1 Aug 1907, *A. Sedelnikov s.n.* (LE). **Aktobe**: Aktyubinsk governorate, Khobda river basin, near Ilenskoe village, 49º58'N, 56º22'E, 11 July 1926, *M.M. Iljin & M.N. Avramchik 288* (LE); **Karagandy**: inter mont Karkaraly et Bajanaul, 50º12'N, 75º26'E, July 1843, *A.G. Schrenk 136* (LE, UPS). **Kostanay**: desertum trans fluv. Ural, Urkatsch-plateau, 51º20'N, 62º19'E, 21 Aug 1857, *E. Borszczow 270* (LE); near Smaylovka village, 52º7'N, 62º43'E, 4 Aug 1913, *M.F. Korotky & Z. Lebedeva 1161* (LE). **Pavlodar**: near Sabundy-kol' lake, 50º45'N, 75º41'E, 30 June 1913, *S.E. Kutscherovskaja 539* (LE); Bayanaul rayon, Kartal ravine 3 km to the west of Bayanaul, 50º48'N, 75º46'E, 1 Aug 1955, *N.N. Tzvelev & al. 1553* (LE, MO). RUSSIA. **Bashkortostan**: Bashkiria, Tam'yano-Katay kanton, 5,5 km to the east of Surtanty-kul' lake, 53º2'N, 56º34'E, 29 July 1930, *O.E.*

Knorring & V.M. Smirnova 148 (LE); Ufa, Chishmy station, 54º34'N, 55º22'E, 18 July 1915, *I.V. Novopokrovskiy & V.N. Yakovlev 1240* (LE, S). **Chelyabinsk**: Ploskoe Zaymishche tract, to the south-west of Verkhnyaya village, 54º43'N, 59º14'E, 15 Aug 1916, *N.I. Kuznetsow 254* (LE); between Ozyornoe and Proryvnoe, valley of the Tovol river, 53º4'N, 60º55'E, 17 Aug 1916, *M.D. Spiridonova 399* (LE). **Orenburg**: Kvarkenskiy rayon, in Sukhaya Kamenka ravine, 52º12'N, 59º18'E, 24 July 1930, *K.S. Afanasiev 476* (LE); desertum trans fluv. Ural, prope Ilezkaja, 51º7'N, 55º0'E, 6 Aug 1857, *E. Borszczow 139* (LE). **Rostov**: aus der Steppe der Donschen Kosaken, 47º5'N, 40º26'E, *C. Koch s.n.* (LE); Terra cosacorum Tanaiticorum, pr. Milerowo, 48º54'N, 40º24'E, 19 Aug 1889, *D.I. Litvinov s.n.* (LE). **Samara**: prov. Samara (Sergewsk), 53º55'N, 51º9'E, 28 July 1848, *R. Pabo s.n.* (LE); Nikolaevsk uyezd, bank of the Tarshilki river near Avgustovka village, 52º15'N, 50º43'E, 23 July 1902, *D. Sofinsky s.n.* (LE). **Saratov**: Privolzhskiy rayon, 3 km away of Natal'ino village, in Malaya Maytuga track, 51º15'N, 49º12'E, 12 Oct 1932, *I.M. Ermolaeva 608* (LE); Elshaka station, 51º49'N, 46º12'E, 15 Aug 1927, *D. Yanishevsky s.n.* (LE). **Volgograd**: on the Ilovlya river, near Kamenniy brod, 48º58'N, 44º34'E, 12 Sep 1957, *M.M. Iljin & al. 663* (LE); prope Solodtscha, ad fluv. Jlovla, 49º39'N, 44º18'E, 17 Sep 1966, *A.K. Skvortsov s.n.* (MO). **Voronezh**: 20 km to the south-west Novokhopersk village, near Tykhovo village, 51º1'N, 41º30'E, 14 Aug 1970, *S.S. Ikonnikov & N.P. Litvinova 4128* (LE); Bobrobv uyezd, Kazakovka village, 50º49'N, 41º5'E, 19 Aug 1913, *T.I. Popov s.n.* (LE). UKRAINE. **Dnipropetrovsk**: Ekaterinoslav governorate, Pavlograd uyezd, Nikolaev khutor, near Ternovoe village, 48º30'N, 36º5'E, July 1894, *F.N. Alexeenko s.n.* (LE); Ekaterinoslav governorate, Aleksandrovsk uyezd, Aleksandrovka khutor, near Novogupolovka station, 47º39'N, 34º4'E, 22 Aug 1898, *F.N. Alexeenko s.n.* (LE). **Kharkiv**: Starobel'sk uyezd, Kuryachevka, 50º0'N, 36º4'E, 27 July 1904, *B.F. Kashmensky 28* (LE); Gorelaya Dolina, 18-20 km south-east of Zmiev (Gotval'dov) near Komsomol'skaya station, 49º35'N, 36º30'E, 24 July 1982, *N.N. Tsvelev 30* (LE). **Kiev**: circa Kiew, 50º28'N, 30º42'E, 1824, *M. Bieberstein s.n.* (LE). **Luhansk**: prov. Charkow, distr. Starobjelsk, 49º16'N, 38º56'E, *I. Schirajewsky s.n.* (LE); Khar'kov governorate, Starobel'sk uyezd, Belovodsk okrug, Baranikovka, 49º9'N, 39º51'E, Aug 1849, *B.M. Czernjaevi s.n.* (LE). **Mykolaiv**: Podolia australis, pr. Olviopol, 48º2'N, 30º51'E, 14 Aug 1882, *Scharolhowa s.n.* (LE). **Poltava**: Poltawa, 49º36'N, 34º35'E, *A.S. Rogowicz s.n.* (G, LE).

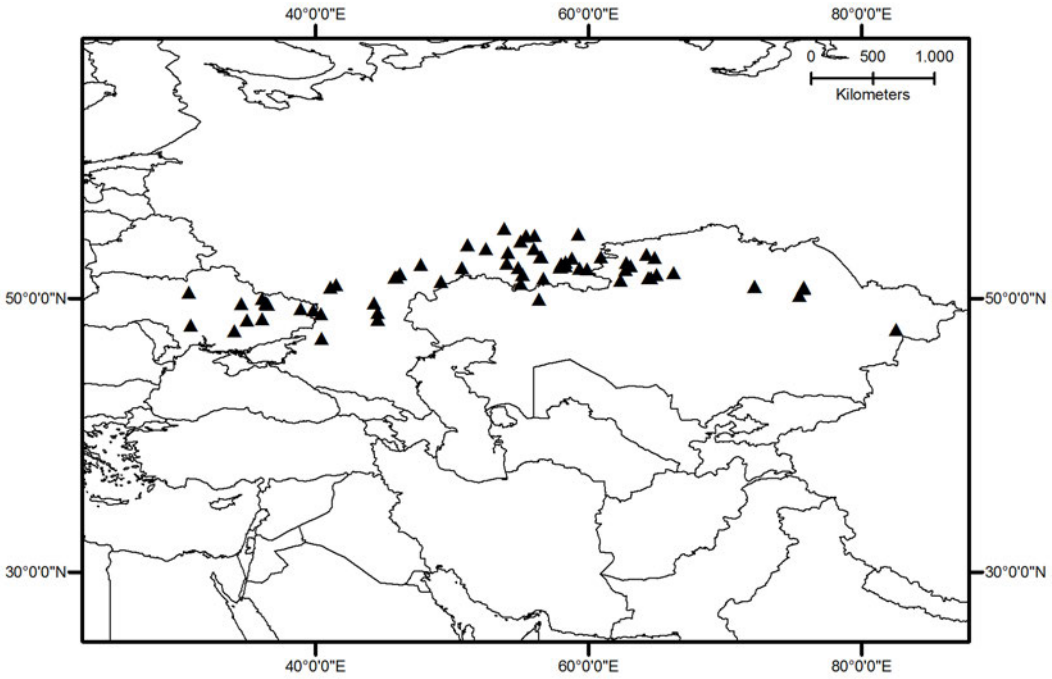


Figure 30. Distribution map for *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo (▲).

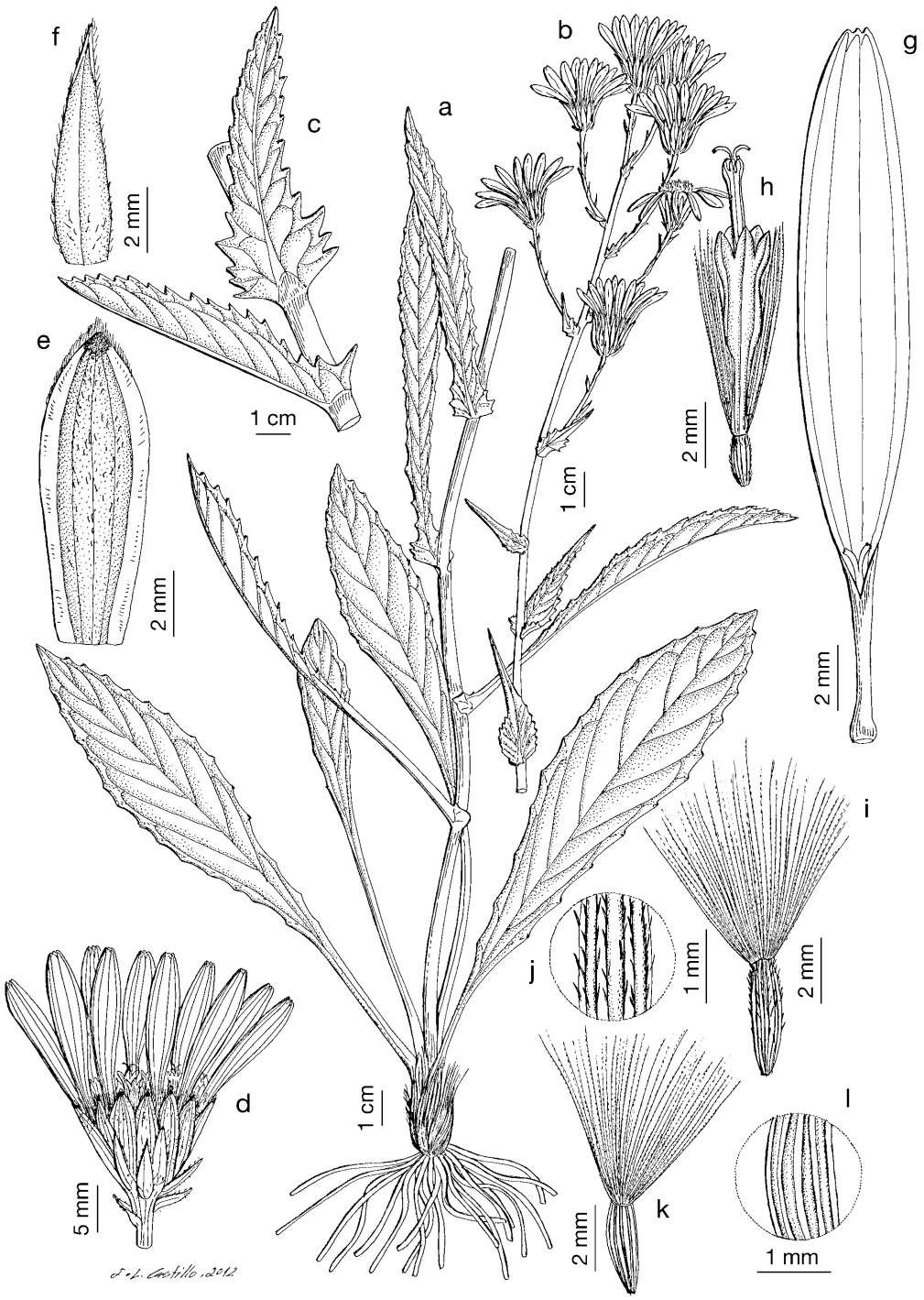


Figure 31. A-J. *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo —a, b. Habit (drawn from *Skvortsov s.n.* 15 Sep 1980, MO). —c. Cauline leaf (drawn from *Grebe s.n.* 1942, B). —d. Capitulum (drawn from H-1441955). —e. Involucral bract (drawn from H-1441955). —f. Supplementary bract (drawn from H-1441955). —g. Ligulate floret (drawn from H-1441955). —h. Tubular floret (drawn from H-1441955). —i. Achene (drawn from *Ermolaeva 608*, LE). —j. Indumentum of achene (drawn from *Ermolaeva 608*, LE). K-L. *Senecio racemosus* (M. Bieb.) DC. subsp. *racemosus* (drawn from *Davis 32649 & Hedge*, G) —k. Achene. —l. Indumentum of achene.

22. *Senecio buschianus* Sosn., Žurn. Russk. Bot. Obshch. Akad. Nauk S.S.S.R. 14: 84. 1929. *Jacobaea buschiana* (Sosn.) B. Nord. & Greuter, Willdenowia 36: 712. 2006. TYPE: Russia, Kabardino-Balkaria, declivio S montis Mekhtygen, in depressione Guzojlan-bau-baschi-këz, [43º06'N 43º31'E], 29 Aug 1927, *E. Busch & N. Busch 76* (lectotype, designated here, TBI image!; isolectotypes, LE!).

Senecio pseudoracemosus Grossh., Trudy Azerbaidzhansk. Otd. Zakavkazsk. Fil. Akad. Nauk S.S.S.R. 1: 60. 1933. SYNTYPES: "In Caucaso occidentali", *Meyer s.n.* (LE?, not found); Azerbajdzan, Kuba, prope p. Aput, 29 July 1930, *Sachokia s.n.* (TB?, not found).

Perennial herb. *Rhizome* unknown. *Stem* 16–62 cm, erect, scarcely leaved, corrugated, solid, not ramificated, ± tomentose to weakly arachnoid, base with fibrous remnants of old leaves and without tufts of hairs, sometimes violet coloured. *Basal leaves* 5.5–20.5 cm long, 1.6–6.2 cm wide, persistent, elliptic to oblanceolate (ratio basal leaf width / basal leaf length = 0.22–0.41), obtuse, rarely acute, attenuate to cuneate, with a petiole 2.5–14 cm long, irregularly dentate (teeth 0.8–3.7 mm deep, increasing in size towards base), ± tomentose to weakly arachnoid, sometimes glabrescent above (trichomes 0.3–1.1 mm long), concolorous. *Cauline leaves* 3-6; *middle cauline leaves* 4.2–16 cm long, 0.6–4.1 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.13–0.27), acute to obtuse, semi-amplexicaul auriculate to sessile, rarely attenuate into a petiole up to 4 cm long, dentate (teeth 0.6–3 mm deep), ± tomentose, sometimes glabrescent above (trichomes 0.6–1.2 mm long), tertiary venation usually inconspicuous; *upper cauline leaves* 0.9–10.5 cm long, 0.3–3 cm wide, lanceolate (ratio upper leaf width / upper leaf length = 0.16–0.36), acute, semi-amplexicaul auriculate to sessile, dentate to subentire (teeth 0.5–3 mm deep), ± tomentose to weakly arachnoid. *Synflorescence* 4–31 cm long, corymbose to pseudoracemose, with oblong-lanceolate bracts, often auriculate. *Capitula* (3–)4–7(–12), 41.2–50.8 mm diam; *involucre* 15.4–22.3 mm diam, 11–15 mm long, obconical; *involucral bracts* (13–)15–20(–22), 8.7–11.7 mm long, 2.4–4.8 mm wide, with scarious margin 0.4–1.2 mm wide, lanceolate to oblong, attenuate, 1–3 weakly keeled, apex often purplish coloured, tomentose to arachnoid, denser towards the base (trichomes 0.3–1.0 mm long); *supplementary bracts* (7–)8–10(–13), 4.3–7.9 mm long,

0.8–1.7 mm wide, subulate, without scarious margin, a half to a three-quarters as long as involucral bracts, tomentose to arachnoid, not imbricate. *Ligulate florets* ca. 13, 24.5–27.4 mm long, yellow; *tubular florets* 7.1–8.4 mm long, 1.1–1.5 mm diam, yellow. *Achenes* 4.2–4.5 mm long, 1.1–1.6 mm wide, subcylindrical (ratio achene width / achene length = 0.26–0.39), shorter than pappus (ratio achene length / pappus length = ca. 0.53), with 9–11 ribs, glabrous with some trichomes near the top 0.12–0.2 mm long; *pappus* ca. 7.9 mm long, whitish. Chromosome number: unknown.

Iconography. Sosnowsky (1929: 85 pl. 2).

Distribution and habitat. Azerbaijan, Russia; subalpine meadows, rocky slopes; altitude 1900–3650 m (Figure 29).

Phenology. Flowering from July to August.

Etymology. Senecio buschianus is named in honor of the brothers Nicolai Adolfowitsch Busch (1869-1941) and Elizaveta Aleksandrovna Busch (1886-1960), Russian botanists and explorers.

Discussion. Senecio buschianus is a species characterized by its large capitula, synflorescence corymbose to pseudoracemose, and its involucre tomentose to arachnoid, denser towards the base and the pedicels. The base of the stem usually bears fibrous remnants of old leaves (character shared with *S. racemosus*), and it is sometimes violet coloured. The similar species is *S. racemosus* (see comments under it).

The labels of the four isolectotypes kept at LE show slightly differences respect the lectotype label, which literally incorporates the protologue information. The collection date of the isolectotypes is 31 Aug 1927 instead 29 Aug 1927, and the collection number 76 is lacking. Despite it, all the sheets have the same revision label dated on Jan 1928 in Sosnowsky's handwriting where he wrote "Senecio buschianus m. sp. n." [mihi, species nova], confirming to be original material.

Selected specimens examined. AZERBAIJAN. **Daghlig Shirvan**: Gub. Baku, distr. Schemacha, in pascuis montis Dibrar, 40º50'N, 48º38'E, 25 July 1900, *F.N. Alexeenko 13408* (LE). **Guba-Khachmaz**: Daghestan Muruch, 41º19'N, 48º10'E, 1873, *A. Becker 229* (LE). RUSSIA. **Dagestan**: distr. Dargi prope m. Schunu (Cila), 42º6'N, 47º14'E, 20 July 1898, *F.N. Alexeenko 12533* (LE); distr. Samur

inter pagos Kurusch et Teki-Pir-Kent, 41º18’N, 47º51’E, 2 Aug 1898, *F.N. Alexeenko 12834* (LE); distr. Samur inter pagos Kurusch et Teki-Pir-Kent, 41º18’N, 47º51’E, 2 Aug 1898, *F.N. Alexeenko 12835* (LE); Agul’skiy district, near Kokhma-dag pass, alpine belt, 41º51’N, 47º36’E, 4 Aug 1940, *R. Elenevsky s.n.* (LE); Daghestania australis Kurusch, 41º16’N, 47º49’E, 1872, *F. Faust 48* (LE); Akushinski district DASSR, Tanti village, 42º9’N, 47º18’E, 29 Aug 1968, *Guseinov s.n.* (TBI); Agul’skiy district, near Chirag village, west slope, 41º50’N, 47º26’E, 19 Aug 1981, *Y. Menitsky, T. Popova & T. Gorlina 453* (LE). RUSSIA. **Kabardia-Balkaria**: Kabkaz, p. Malka, 43º34’N, 42º34’E, 9 Aug 1906, *I.J. Akinfiew s.n.* (LE); Sukan, under a mountain Mekhtigen, track Zilandilanbaulli, 43º6’N, 43º32’E, 31 Aug 1931, *E. Busch & N. Busch s.n.* (LE, TBI); Sukan, m. Kisirtsi-kaia, Kisirci-kiunkium pass, 43º9’N, 43º32’E, 30 July 1931, *E. Busch & N. Busch s.n.* (LE, TBI); descent to the valley of the Musht river, south subalpine meadow slope, 43º42’N, 42º40’E, 22 Aug 1939, *R. Elenevsky s.n.* (LE); Elbrus, the Malakskiy glacier, 43º21’N, 42º36’E, 14 July 1892, *V.I. Lipsky s.n.* (LE); north side of Elbrus, upper reaches of the Malka river, ridges of side range, 43º24’N, 42º33’E, 29 July 1981, *Y. Menitsky, T. Popova & T. Gorlina 430* (LE); in ripa fluvii Malka versus montem Elborus, 43º25’N, 42º32’E, 11 July 1829, *C.A. Meyer 686* (LE). **Karachay-Circasia**: Steppe south slope of rocky range down Khasaut village, 43º42’N, 42º31’E, 20 Aug 1939, *R. Elenevsky s.n.* (LE); Terskaya Governorate, near Kislovodsk, Epchik-kal, 43º43’N, 42º40’E, 15 Aug 1925, *Y.C. Frolov 200* (LE). **North Ossetia–Alania**: Vladikavkaz district, Kadat village, Khampaladag track, south exposure slope, 42º50’N, 44º15’E, 19 Aug 1958, *N.E. Vargina s.n.* (LE).

23. *Senecio perralderianus* Coss., Bull. Soc. Bot. France 9: 173. 1862, nom. nov. *Senecio atlanticus* Coss., Bull. Soc. Bot. France 3: 706. 1856, [nom. subst.], nom. illeg., non Boiss. & Reut. 1852 (ICBN, Art. 53.1). TYPE: Algeria, Tizi Ouzou, montagnes da Djurdjura près des pics de Tizi Tsennent and Tamegout, [36º28'N 04º06'E], 25 June – 3 July 1854, *Cosson s.n.* (lectotype, designated here, P-2685387 image!; isolectotype, P-2685382 image!). Epitype: Algeria, Tizi Ouzou, montagnes da Djurdjura près de Bordj Boghni, [36º28'N 04º00'E], 23 June 1854, *Cosson s.n.* (G-308021!).

Senecio perralderianus var. *hosmariensis* Pau & Font Quer in Font Quer, Sched. Iter Marocc. 1928 (1929), in sched. *Senecio perralderianus* subsp. *hosmariensis* (Pau & Font Quer) Blanca, Lagascalia 18: 309. 1996 [“hosmariense”]. TYPE: Morocco, Tetuán, montis Kelti (Yebala), [35º21'N 5º16'E], 18 June 1928, *Font i Quer 405* (lectotype, designated here, MA-130562!; isolectotypes, BC-29442 image!, G-308028!, MPU-6599 image!).

Perennial herb. *Rhizome* 5–10 cm long, 0.5–1.1 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 29–54 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to floccose, base without remnants of old leaves or tufts of hairs. *Basal leaves* 4.5–12.5 cm long, 5.3–10.3 cm wide, persistent, rarely caducous, reniform (ratio basal leaf width / basal leaf length = 0.82–1.22), obtuse, cordate, with a petiole 5.5–15 cm long, dentate to crenate (teeth 1–5.5 mm deep), glabrescent above,

covered with scattered scabrid-arachnoid trichomes to slightly lanate beneath, sometimes ± discolorous. *Cauline leaves* 4–5; *middle cauline leaves* 3.1–20 cm long, 3.1–12.7 cm wide, alternate, lyrate to ovate (ratio middle leaf width / middle leaf length = 0.47–1.23), obtuse, amplexicaul-auriculate to cordate-truncate with a petiole up to 7 cm long, dentate to crenate (teeth 1.3–6 mm deep), glabrescent above, covered with scattered scabrid-arachnoid trichomes to slightly lanate beneath, tertiary venation sometimes slightly marked; *upper cauline leaves* 1.8–7.5 cm long, 0.3–4.5 cm wide, ovate to lyrate (ratio upper leaf width / upper leaf length = 0.16–0.71), acute to obtuse, amplexicaul to sessile, entire to dentate (teeth 1–2 mm deep), glabrescent to arachnoid. *Synflorescence* 7.5–13.5 cm long, reduced to a solitary capitulum or corymbose, with scarce linear-oblong bracts. *Capitula* 1–3(–8), 35–47 mm diam; *involucre* 11.8–22 mm diam, 9.1–13 mm long, bell-shaped; *involucral bracts* (16–)21–24(–32), 8.2–11.3 mm long, 1.4–2.3 mm wide, with scarious margin 0.3–0.5 mm wide, lanceolate to oblong, attenuate, 0-2 keeled, apex sometimes with a faint black spot, glabrescent to covered with scattered arachnoid trichomes (trichomes 0.3–0.4 mm long); *supplementary bracts* 10–14(–16), 4.3–7.8 mm long, 0.4–1.3 mm wide, subulate, without scarious margin, a third to a two-thirds as long as involucral bracts, weakly arachnoid to floccose, rarely glabrescent, not imbricate. *Ligulate florets* 12–15, 23–27 mm long, yellow; *tubular florets* 6.5–9.6 mm long, 0.8–1.5 mm diam, yellow. *Achenes* 3.3–5.6 mm long, 0.7–0.9 mm wide, subcylindrical (ratio achene width / achene length = 0.15–0.24), shorter than pappus, with 9–11 ribs, with scattered intercostal trichomes ca. 0.1 mm long; *pappus* ca. 7.8 mm long, whitish. Chromosome number: unknown. Figure 32.

Distribution and habitat. Algeria, Morocco; woods of *Cedrus atlantica* (Endl.) Carrière, *Quercus ilex*, shady rocky places, on calcareous soil; altitude 700–2100 m (Figure 18).

Phenology. Flowering from April to May.

Etymology. Senecio perralderianus is named in honor of Henri René Le Tourneux de la Perraudière (1831-1861), French naturalist who travelled with Cosson through North Africa and, in 1855, with Bourgeau in the Canaries. Curiously, Cosson changed the root of the epithet *perrauder-* for *perralder-*.

Discussion. Senecio perralderianus is a distinctive plant among the *Crociseris* species by its reniform basal leaves, glabrescent above, covered with scattered scabrid-arachnoid trichomes to slightly lanate beneath, sometimes ± discolour. The indumentum beneath and the capitula number are variable. Font i Quer described *in schedule* the subsp. *hosmariensis* from northwestern Rif on the base of the more glabrescent indumentum, larger leaves and auricles, and longer than wide leaves lamina. All these characters have also been observed in specimens from Argelia, considering therefore that they fall in the variability encompassed by *S. perralderianus.*

It might be confused with *S. olgae* and *S. trapezuntinus* because the cordate basal leaves, and the often lyrate, amplexicaul-auriculated cauline leaves. Nonetheless, their ranges of distribution do not overlap and several characters differentiate them. It differs from *S. olgae* mainly in the number of supplementary bracts(10–14(–16) in *S. perralderianus* vs. (3–)4–6(–8) in *S. olgae*), and from *S. trapezuntinus* in the lower capitula number (1–3(–8) vs. 10–17), and the indumentum beneath the leaves (scabrid-arachnoid to slightly lanate in *S. perralderianus*, glabrescent in *S. trapezuntinus*).

Senecio perralderianus overlaps its range with *S. eriopus* in the northwestern Rif (Morocco), but it is unlikely to confuse each other because of differences on basal leaves shape, and the number and shape of supplementary bracts.

Taking into account that the type material kept at P are notably ruined (lacking any capitula), we consider appropriate to designate an epitype. We located another Cosson's collection from the same trip and near to the *locus classicus*, dated on 23 June 1854, that is best preserved and all the diagnostic characters are present. Thus, the sheet G-308021 is designated epitype for the name *S. atlanticus*.

Selected specimens examined. ALGERIA. **Béjaïa**: Djebel-Babor, 36º29'N, 5º27'E, 24 June 1880, *E. Cosson & V.C. Reboud 2931* (G); in sylvaticis et rupestribus montis Tababor Kabylia orientalis, 36º32'N, 5º27'E, 21 July 1861, *L. Kralik 125* (G, MPU); Petite Kabylie, Djebel Babor, pentes exposées à l'est du sommet occidental, 36º29'N, 5º27'E, 15 June 1984, *D. Podlech 39340* (G, MA); Kabylie, Monts Babors, 36º29'N, 5º27'E, July 1897, *E. Reverchon 210* (G). **Blida**: Atlas de Blida, sous les cèdres de Chréa, 36º25'N, 2º52'E, 21 June 1931, *L. Faurel s.n.* (P). **Bouira**: Djurdjura, près de Tikjda, sur le flanc S de Tigounatine, 36º27'N, 4º7'E, 28 June 1979, *A. Dubuis 9768* (MA); Djurdjura, mont Tigounatin, 36º26'N, 4º7'E, 8 June 1930, *R. Maire 2457* (P); Djurdjura, 3 km W Tikjda past Ain Allouane, 36º27'N, 4º6'E, 12 June 1984, *D. Podlech 39203* (G); Djurdjura, Azeron-n'Tirourda, 36º28'N, 4º14'E, 18 May 1904, *H.A. Romieux 273* (G). **Sétif**: montagne de Magris [Megriss], 36º20'N, 5º21'E, June 1898, *E. Reverchon 210* (MA). MOROCCO. **Tanger-Tétouan**: montis Gorgues (Beni Hosmar), 35º28'N, 5º21'W, 19 May 1930, *P. Font i Quer 680* (G, MA, MPU); Gorgues, 35º32'N, 5º22'W, 1 June 1930, *J. Mas Guindal s.n.* (MA); Beni Hosmar, 35º28'N, 5º21'W, 8 May 1921, *C. Pau s.n.* (MA).

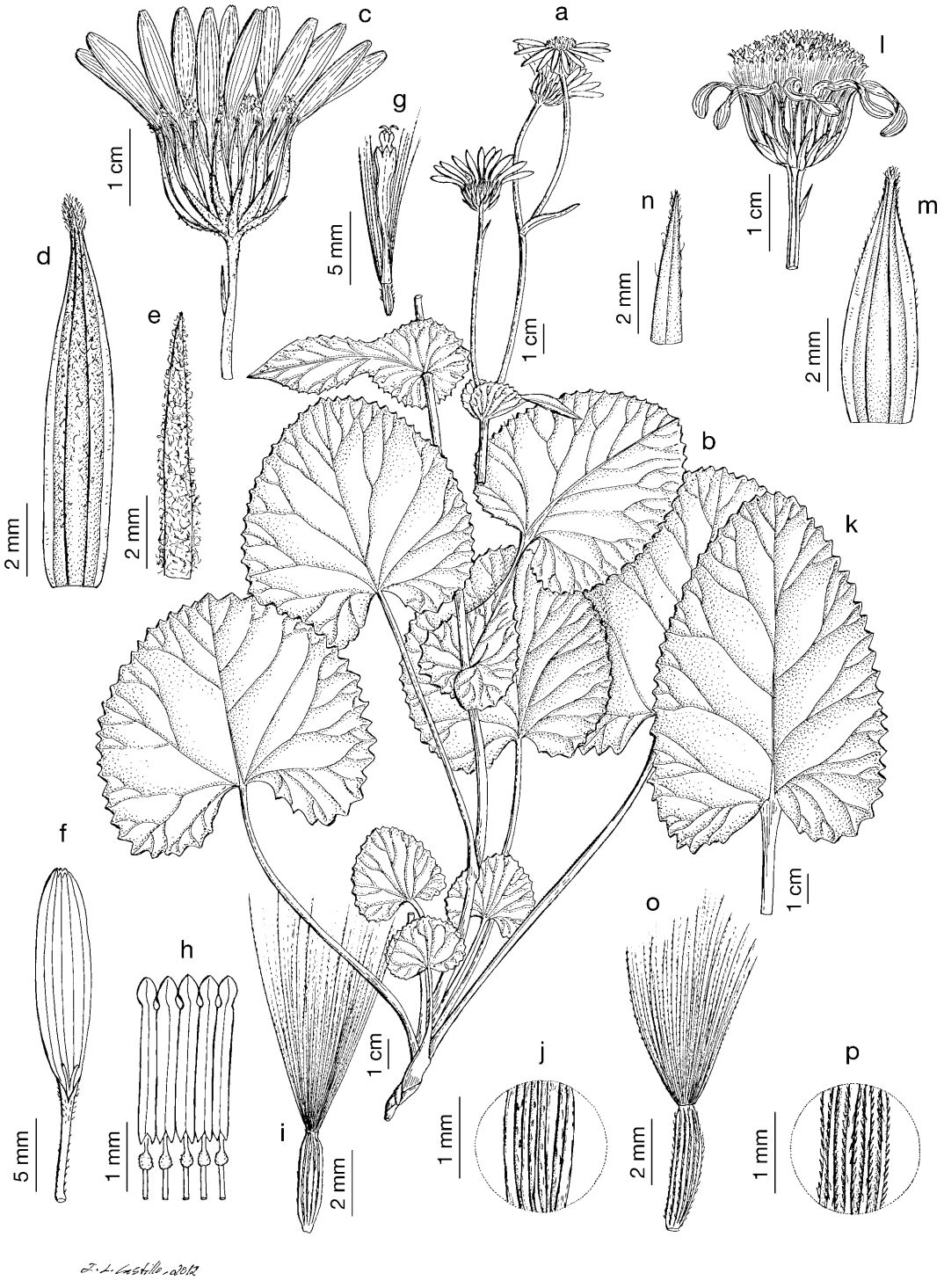


Figure 32. A-J. *Senecio perralderianus* Coss. —a. Habit (drawn from *Dubuis 9769*, MA). —b. Habit (drawn from *Podlech 39203*, G). —c. Capitulum (drawn from *Dubuis 9769*, MA). —d. Involucral bract (drawn from *Dubuis 9769*, MA). —e. Supplementary bract (drawn from *Dubuis 9769*, MA). —f. Ligulate floret (drawn from *Podlech 39203*, G). —g. Tubular floret (drawn from *Podlech 39203*, G). —h. Stamens (drawn from *Podlech 39203*, G). —i. Achene (drawn from *Dubuis 9768*, MA). —j. Indumentum of achene (drawn from *Dubuis 9768*, MA). K-P. *Senecio trapezuntinus* Boiss. —k. Lamina of basal leave (drawn from *Bourgeau 127*, G). —l. Capitulum (drawn from *Budak 2006*, MA). —m. Involucral bract (drawn from *Budak 2006*, MA). —n. Supplementary bract (drawn from *Budak 2006*, MA). —o. Achene (drawn from *Budak 2006*, MA). —p. Indumentum of achene (drawn from *Budak 2006*, MA).

24. *Senecio trapezuntinus* Boiss., Fl. Orient. 3: 393. 1875. TYPE: Turkey, Trabzon, Trebizonde, [40º59'N 39º43'E], 27 Apri 1862, *Bourgeau 127* (lectotype, designated here, G-150294 image!; isolectotypes, G-308018!, GOET-2420 image!, GOET-2421 image!, P-743133 image!, P-743134 image!, P-743135 image!, P-743136 image!, P-4115044 image!, P-4307008 image!, P-4307034 image!).

Perennial herb. *Rhizome* ca. 6 cm long, ca. 0.9 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 68–77 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent, base without remnants of old leaves or tufts of hairs. *Basal leaves* 9–12.5 cm long, 6.5–8.2 cm wide, persistent, ovate (ratio basal leaf width / basal leaf length = 0.66–0.72), obtuse, cordate, with a petiole 8–17 cm long, dentate, sometimes irregularly dentate or crenate (teeth 2–7 mm deep), glabrescent, concolorous. *Cauline leaves* 4–5; *middle cauline leaves* 9–10.4 cm long, 6.4–7 cm wide, alternate, lyrate to ovate (ratio middle leaf width / middle leaf length = 0.62–0.78), obtuse, sometimes acute, amplexicaul-auriculate to cordate-truncate with a petiole up to 13 cm long, dentate, sometimes irregularly dentate (teeth 3–4 mm deep), glabrescent, tertiary venation conspicuous; *upper cauline leaves* 6.5–13 cm long, 2.9–6 cm wide (ratio upper leaf width / upper leaf length = 0.45–0.46), acute, amplexicaul, dentate (teeth 2–8 mm deep), glabrescent. *Synflorescence* ca. 32 cm long, corymbose, with linear-lanceolate bracts, pinnatifid to entire. *Capitula* 10–17, 35–45 mm diam; *involucre* 15–16 mm diam, 7–9 mm long, cupuliform; *involucral bracts* 21–23, 6.1–6.9 mm long, 1.2–1.6 mm wide, with scarious margin 0.3–0.4 mm wide, ensiform, acute, 0–2 keeled, apex usually with a black spot, glabrescent; *supplementary bracts* 14–16, 2.9–3.9 mm long, 0.4–0.6 mm wide, subulate, without scarious margin, a third to a half as long as involucral bracts, rarely longer, weakly arachnoid, not imbricate. *Ligulate florets* 10–13, 17–22 mm long, yellow; *tubular florets* 8.2–8.5 mm long, 0.8–1 mm diam, yellow. *Achenes* 4–4.4 mm long, 0.8–1 mm wide, subcylindrical (ratio achene width / achene length = 0.19–0.23), shorter than pappus (ratio achene length / pappus length = 0.65), with 10–11 ribs, with dense intercostal trichomes 0.1–0.2 mm long; *pappus* ca. 6.6 mm long, whitish. Chromosome number: unknown. Figure 32.

Distribution and habitat. Turkey (endemic of Trabzon province); rocky places; altitude ca. 200 m (Figure 29).

Phenology. Flowering from April to May.

Etymology. The epithet *trapezuntinus* refers to the Trapezund city (also historically known as Trebizond, Tribisonde and Trapezus), actually known as Trabzon. It is a city on the Black Sea coast of northeastern Turkey and the capital of Trabzon Province.

Discussion. Senecio trapezuntinus is a distinctive plant by its ovate, cordate basal leaves, glabrescent and with a conspicuous tertiary venation, and the cauline leaves lyrate to ovate, usually amplexicaul-auriculate. To deepen in the variability that *S. trapezuntinus* embraces, such as the capitula number, the study of more collections are needed.

It might be confused with *S. perralderianus* from northwestern Maghreb (see comments under it), and *S. olgae* from Middle Asia. *Senecio trapezuntinus* differs mainly in the shape of the basal leaves (ovate vs. deltate to lyrate, sometimes broadly ovate in *S. olgae*), and the number of supplementary bracts [(3–)4–6(–8) in *S. olgae* vs. 14–16 in *S. trapezuntinus*].

The collector numbers of the lectotype and the isolectotypes do not match. Probably the number written on the lectotype label (n.º 360) corresponds to a field number, while the number on the isolectotypes (n.º 127) corresponds to the number of the exsiccata "Plantæ Armeniaca 1862" collected by Bourgeau. Moreover, Boissier wrongly recorded Balansa as the collector of the type material, instead of Bourgeau.

Selected specimens examined. TURKEY. **Trabzon**: Boztepe, 40º59'N, 39º43'E, 21 IV 2006, *Ü. Budak, E. Hamzaoğlu & A. Aksoy 2006* (MA).

25. *Senecio franchetii* C. Winkl., Dec. Comp. Turkest. 6: 5. 1889 ["Francheti"]. TYPE: Tajikistan, Hissar, montibus Taschbulak ad sptr. a Kabadian, [38º44'N 69º00'E], 28 Apr to 18 May 1883, *Regel s.n.* (lectotype, designated here, LE!; isolectotypes, G-162731!, LE!, P-3751790 image!).

Senecio bucharicus C. Winkl., Dec. Comp. Turkest. 6: 9. 1889. TYPE: Tajikistan, Hissar, Buchara orientalis, montis prope Chodschabulak k ad orientum a montibus Gasi-

Mailik, [38º44'N 69º00'E], 7 to 19 May 1883, *Regel s.n.* (lectotype, designated here, LE!; isolectotype, LE!).

Senecio farkharensis Podlech, Mitt. Bot. Staatssamml. München 7: 113. 1968. TYPE: Afghanistan, Nordost-Afghanistan, Takhar, unteres Farkhar-Tal, Hänge westlich von Farkhar, [36º34'N 69º49'E], 10 May 1965, *Podlech 10559* (holotype, M-30306 image!; isotype, M-30307 image!, MSB-3309 image!).

Perennial herb. *Rhizome* 1.4–6 cm long, 0.8–1.5 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 24–106 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid to arachnoid, sometimes floccose near the upper and lower part, base without remnants of old leaves or tufts of hairs. *Basal leaves* 12.6–32 cm long, 3.9–13 cm wide, caducous, sometimes persistent, lanceolate to broadly elliptic (ratio basal leaf width / basal leaf length = 0.24–0.65), obtuse to acute, attenuate to cuneate, with a petiole 6–27 cm long, rarely subcordate, irregularly dentate, more pronunced at lower third (teeth 1.4–10 mm deep), weakly arachnoid to glabrescent, concolorous. *Cauline leaves* 4–10; *middle cauline leaves* 14–32 cm long, 2.5–8.2 cm wide, alternate, lanceolate to oblanceolate (ratio middle leaf width / middle leaf length = 0.18–0.35), acute, semi-amplexicaul to attenuate into a petiole up to 7.5 cm long, irregularly dentate (teeth 0.8–6.0 mm deep), weakly arachnoid to covered with scattered trichomes, tertiary venation inconspicuous; *upper cauline leaves* 2–7.4 cm long, 0.2–2.3 cm wide, (ratio upper leaf width / upper leaf length = 0.05–0.45), acute, sessile to semi-amplexicaul auriculate, entire to slightly dentate (teeth 1–1.3 mm deep), weakly arachnoid to covered with scattered trichomes. *Synflorescence* 3–24 cm long, corymbose, rarelly pseudoumbelliform, with linear-oblong bracts. *Capitula* (1–)4–8(–15), 24.5–49.5 mm diam; *involucre* 11–22 mm diam, 11–15 mm long, cupuliform; *involucral bracts* (16–)19–21(–24), 9.1–13.9 mm long, 1.1–2.9 mm wide, with scarious margin 0.2–0.6 mm wide, ensiform, attenuate, 0–3 keeled, apex rarely with a faint black spot, weakly arachnoid to arachnoid; *supplementary bracts* 8–10(–11), 5–12.9 mm long, 0.5–1.1 mm wide, subulate, without scarious margin, a half to as long as involucral bracts, weakly arachnoid to arachnoid, not imbricate. *Ligulate florets* 10–13, 18.7–37.4 mm long, yellow; *tubular florets* 8.5–10.9 mm long, 0.9–1.8 mm diam, yellow. *Achenes* 6.6–9.2 mm long, 1.2–1.9 mm wide, subcylindrical (ratio achene width / achene length

= 0.13–0.27), shorter than pappus (ratio achene length / pappus length = 0.63–0.80), with 12–16 ribs, with trichomes covering ± the whole surface 0.2–0.4 mm long; *pappus* 10.3–12.9 mm long, whitish. Chromosome number: unknown.

Iconography. Nordenstam (1989, tab. 44).

Distribution and habitat. Afghanistan, Kyrgyzstan, Tajikistan, Uzbekistan; rocky slopes, clay slopes, steppe meadows, shrubs with *Juniperus* and *Pistacia*; altitude 750–3850 m (Figure 33).

Phenology. Flowering from April to July.

Etymology. Senecio franchetii is named in honor of Adrien Rene Franchet (1834-1900), French botanist who worked at the Museum d'Histoire naturelle at Paris.

Discussion. Senecio franchetii is a robust plant characterized by displaying large lanceolate basal leaves, usually caducous, and achenes notably larger than most of the *Crociseris* species. It is a variable species regarding to the involucre indumentum and capitula number. The large size of achenes is a character shared with *S. olgae* and *S. paulsenii*, which are all from Middle Asia, and representing the southeastern limit of the sect. *Crociseris*. They also usually have the lower half of stem and the basal leaves petioles violet coloured, that rarely appear to be in the remainder *Crociseris* species. It differs from *S. olgae* in the leaves shape and in characters concerning the capitulum. *Senecio franchetii* has basal leaves lanceolate to broadly elliptic, attenuate to cuneate, rarely subcordate, while those from *S. olgae* are deltate to lyrate, sometimes broadly ovate, truncate to cordate. The supplementary bracts tend to be numerous in *S. franchetii* [8–10(–11) vs. (3–)4–6(–8)], slightly longer, and more pubescent. The number of involucral bracts is also usually higher in *S. franchetii* [(16–)19–21(–24) vs. (13–)16–19(–22)], which are clearly keeled in blooming, while *S. olgae* bears smooth and wider involucral bracts. The capitula indumentum is slightly arachnoid in *S. franchetii*, while in *S. olgae* is rarely arachnoid, sometimes only on the capitula base. Both species partially overlap their ranges between southeastern Uzbekistan and western Tajikistan, where some specimens display intermediate morphology and

therefore the mentioned characters are not clear. *Senecio franchetii* also might be confused with *S. paulsenii* and *S. lopezii* (see comments under respective species).

It has to be noted that the collection year of the isolectotype kept at P should be 1883 instead 1833.

Selected specimens examined. AFGHANISTAN. **Badakhshan**: oestl. Seitental des Darya-e Mashad oberhalb Kangurchi, 36º44'N, 70º6'E, 22 May 1971, *O. Anders 6631* (KU); Kleines Seitental des Keshem-Tales östlich Kangurchi, 36º44'N, 70º9'E, 22 May 1971, *D. Podlech 21439* (G, LE, M). **Samangan**: Kotal-i-Mirza Atbili pass on the road from Pule-Khumri to Samangan (Aybak), 36º11'N, 68º18'E, 14 May 1972, *I. Kukkonen 6210* (H). **Takhar**: Kunduz, 5 km W Buyrak, an der Strasse nach Eshkamesh, 36º23'N, 69º15'E, 1 May 1971, *O. Anders 6057* (KU); Koh-i-Ishkamish, Gebirgsrand 7 km südöstlich von Ishkamish, 36º15'N, 69º33'E, 14 May 1965, *D. Podlech 10625* (E, M); Gebirgsrand 12 km SO von Eshkamesh, 36º19'N, 69º24'E, 24 May 1971, *D. Podlech 21572* (G, LE, M). KYRGYZSTAN. **Batken**: Fergana Oblast', Skobelev uyezd, Okhna, 40º2'N, 71º39'E, 21 May 1913, *G.I. Dolenko 431* (LE); Fergana Oblast', Skobelev uyezd, north slope of the Alay range, Shakhimardana river basin, Arpa ravine 32 versts to the south of Skobelev, 39º58'N, 71º49'E, 24 May 1916, *V.P. Drobow 1082* (LE); Fergana Oblast', Margelan uyezd, near Sary-Kamysh, north slopes, 40º7'N, 71º11'E, 24 Apr 1913, *N.A. Dessiatoff 304* (LE). **Osh**: Kirgizia, Osh Oblast', Frunze rayon, ridges of the Alay range, north-east slope, 40º14'N, 72º58'E, 6 May 1968, *N.V. Gorbunova & Ubukeeva s.n.* (LE). TAJIKISTAN. **Districts of Republican Subordination**: north slope of Peter the First Range, near Kchi-tupchok track, 39º2'N, 70º52'E, 3 Aug 1935, *J.S. Grigorjev 58* (LE); North slopes of the Babatag range opposite to Gissar, 38º26'N, 68º30'E, 29 May 1930, *G.L. Kudrjaschova 174* (LE); distr. Hissar: in decliv. orient. montium Boratag, 38º44'N, 69º0'E, 2 May 1883, *A. Regel s.n.* (LE). **Gorno-Badakhshan**: South Tajikistan, mountains near Bag qishlaq on the Pyandzh river, east of the qishlaq, north slopes, 37º59'N, 71º42'E, 31 May 1960, *T.V. Egorova & V.P. Bochantsev 730* (LE); South Pridarvazye, the Teray range, near Nikolaevskiy descent, 38º27'N, 70º47'E, 10 May 1986, *R.V. Kamelin, N. Sadarov & A. Khalimov 496* (LE); Turkestania, Darvaz, between Kala-i-khulmam and Sarydash, 38º33'N, 70º46'E, 16 June 1897, *S.I. Korshinsky 1637* (LE); Shughnan, canyon of the Bidzhun river, 37º32'N, 71º58'E, 31 May 1914, *N.N. Tuturin & P.I. Bessedin 679* (LE). **Khatlon**: South Tajikistan, Aruktau mountains, between Nayzabulak qishlaq and Sarykhalka qishlaq, 37º54'N, 68º29'E, 24 May 1959, *V.P. Botschantzev & S. Yunusov 84* (LE); South Tajikistan, near Tutkaul qishlaq, 38º17'N, 69º16'E, 12 June 1960, *T.V. Egorova & V.P. Bochantsev 1286* (LE); South Tajikistan, Imam-askari mount 3 km away form Darai-imam qishlaq, 37º55'N, 70º1'E, 4 June 1960, *T.V. Egorova & V.P. Bochantsev 940* (LE); South Tajikistan, the valley of the Tibalyay river, to the north-east of Kulyab, north slope, 37º55'N, 69º51'E, 23 May 1956, *J.S. Grigorjev 35* (LE); pass Kargisht, between Zagara and Hozratino ranges, 38º35'N, 70º12'E, 13 June 1986, *R.V. Kamelin, N. Safarov & Halipov 1078* (U); The Emirate of Bukhara, Baldzhuan principate, Guli-zindan pass, 38º14'N, 69º26'E, 6 May 1906, *R.Y. Roshevitz 575* (LE); the Aruktau range, to the south-west of Gandzhino qishlaq, by the crest, 37º57'N, 68º33'E, 10 May 1965, *A.L. Takhtajan s.n.* (LE). **Sughd**: Tadzhikistania, in clivis australibus jugi Zeravschan, ad fl. Tjurochot, 39º10'N, 68º37'E, 2 July 1935, *V. Nikitin 4198* (BM, C, F, G, H, LE, MO, NY, S, US). UZBEKISTAN. **Surxondaryo**: South-east end of the Babatag range opposite to Gissar, north-east slope, upper than Dzhanbulak qishlaq, 38º11'N, 68º17'E, 7 May 1938, *I.A. Linczevski 106* (LE); South-east slopes of the Babatag range opposite to Akmechet', lower than Charraga pass, north-east slopeI, 38º4'N, 68º18'E, 2 June 1938, *I.A. Linczevski 258* (LE).

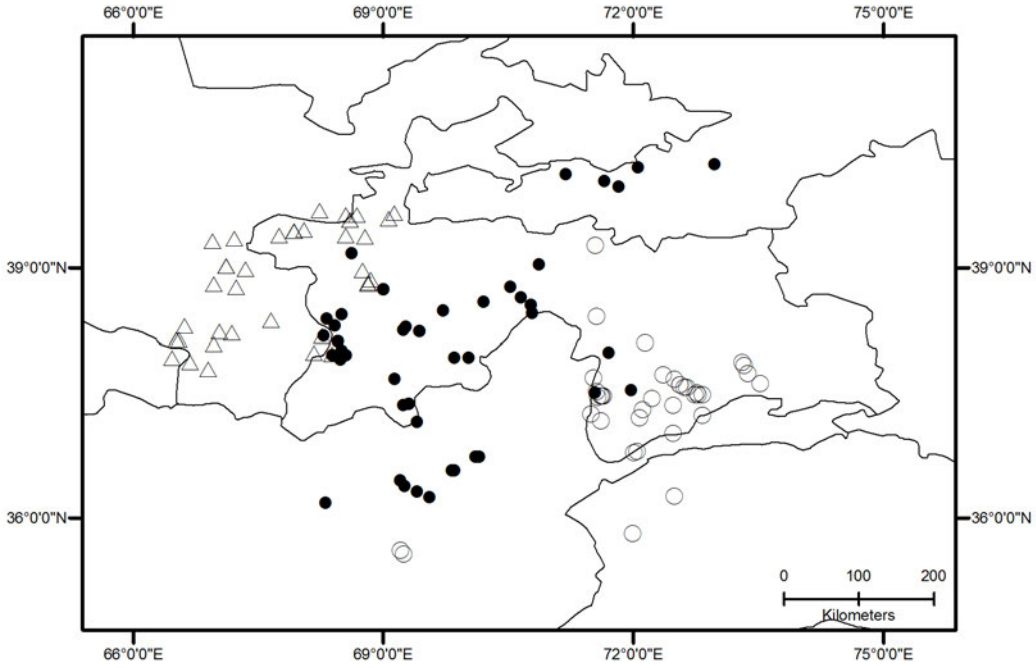


Figure 33. Distribution map for *Senecio franchetii* C. Winkl. (●), *S. olgae* Regel & Schmalh. (Δ), and *S. paulsenii* O. Hoffm. subsp. *paulsenii* (○).

26. *Senecio olgae* Regel & Schmalh., Izv. Imp. Obshch. Lyubit. Estestv. Moskovsk. Univ. 34: 45. 1882. TYPE: Tajikistan, Sughd, Basmanda ravine, [39º39'N 69º08'E], 1 June 1870, *Fedtschenko s.n.* (lectotype, designated here, LE!).

Senecio akrabatensis Franch., Ann. Sci. Nat., Bot. ser. 6, 16: 312. 1883. TYPE: Uzbekistan, passe d'Akrabat, [38º18'N 66º37'E], 24 Abr 1881, *Capus 649* (lectotype, designated here, P-3729618 image!; isolectotype, P-3729614 image!).

Senecio sarawschanicus C. Winkl., Trudy Imp. S.-Peterburgsk. Bot. Sada 14: 153. 1895. TYPE: Tajikistan, Sughd, Kschtut, [39º27'N 68º03'E], May 1892, *Komarow s.n.* (lectotype, designated here, LE!).

Perennial herb. *Rhizome* ca. 4 cm long, ca. 1.2 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 33–71 cm, erect, leaved, corrugated, solid, not ramificated, weakly arachnoid (increasing towards the base), sometimes glabrescent, base without remnants of old leaves or tufts of hairs. *Basal leaves* 6.5–12.3 cm long, 4.5–10 cm wide, caducous, sometimes persistent, deltate to lyrate, sometimes broadly ovate (ratio basal leaf width / basal leaf length = 0.56–1.18), obtuse, truncate to cordate,

with a petiole 5.8–17 cm long, irregularly dentate, often deeply lobed at base, glabrescent to covered with scattered trichomes, particularly beneath (trichomes 0.3–0.6 mm long), concolorous. *Cauline leaves* 4–8; *middle cauline leaves* 6.4–16.2 cm long, 4.3–9 cm wide, alternate, deltate to lyrate, rarely broadly lanceolate (ratio middle leaf width / middle leaf length = 0.28–0.88), acute to obtuse, amplexicaul-auriculated to cordate with a petiole up to 10 cm long, irregularly dentate, often deeply lobed at base, glabrescent to covered with scattered trichomes, particularly beneath, tertiary venation inconspicuous; *upper cauline leaves* 1.8–8.6 cm long, 0.8–4 cm wide, broadly lanceolate (ratio upper leaf width / upper leaf length = 0.16–0.88), acute, amplexicaul, rarely sessile, dentate (teeth 1–5 mm deep) to subentire, glabrescent to covered with scattered trichomes. *Synflorescence* 5–21 cm long, corymbose to pseudocorymbose, with linear-oblong bracts. *Capitula* (1–)4–6(–10), 37.2–38.8 mm diam; *involucre* 12.8–27.3 mm diam, 11–15 mm long, cupuliform; *involucral bracts* (13–)16–19(–22), 9.4–13.6 mm long, 1.7–4 mm wide, with scarious margin 0.4–0.9 mm wide, ensiform, attenuate, usually smooth or almost, apex rarely with a faint black spot, glabrescent to covered with scattered arachnoid trichomes (trichomes 0.2–0.8 mm long); *supplementary bracts* (3–)4–6(–8), 4.2–8.8 mm long, 0.4–0.6 mm wide, subulate, without scarious margin, a third to a two-thirds as long as involucral bracts, glabrescent to covered with scattered arachnoid trichomes (trichomes 0.2–0.8 mm long), not imbricate. *Ligulate florets* ca. 10, 22.4–32.5 mm long, yellow; *tubular florets* 8.9–11 mm long, 0.8–1.6 mm diam, yellow. *Achenes* 7.6–9.8 mm long, 1.4–1.8 mm wide, subcylindrical (ratio achene width / achene length = 0.17–0.21), shorter than pappus (ratio achene length / pappus length = 0.64–0.97), with 12–17 ribs, with trichomes 0.11–0.29 mm long covering ± the whole surface; *pappus* 9.8–13.6 mm long, whitish. Chromosome number: unknown.

Distribution and habitat. Tajikistan, Turkmenistan, Uzbekistan; rocky slopes, clay slopes, steppe meadows, shrubs with *Juniperus* and *Pistacia,* woods of *Acer*; altitude 900–2400 m (Figure 33).

Phenology. Flowering from April to July.

Etymology. Senecio olgae is named in honor of Olga Aleksandrovna Fedchenko (1845-1921), Russian botanist and explorer of Central Asia.

Discussion. Senecio olgae is a distinctive species because of its large deltate to lyrate basal leaves, and often amplexicaul-auriculated cauline leaves. It is variable in the leaves shape, and sometimes displays broadly ovate basal leaves, so it might be confused with *S. franchetii* (see comments under it). Another similar species from Middle Asia is *S. paulsenii*, which has basal leaves oblanceolate to lanceolate, subentire to sinuate increasing towards the base. As already commented, *S. olgae* usually bears characteristic deltate to lyrate leaves. Other useful characters to discriminate each other are the supplementary bracts [(5–)6–9(–14) in *S. paulsenii* vs. (3–)4–6(–8) in *S. olgae*], and the base of the stem (with tufts of hairs and remnants of old leaves in *S. paulsenii* vs. no remnants of old leaves in *S. olgae*). These species are allopatric.

The cordate basal leaves and the amplexicaul-auriculated cauline leaves are distinctive characters among the *Crociseris* species, only displayed by *S. olgae*, *S. trapezuntinus* and *S. perralderianus*, species geographically far away each other. The comments to distinguish among them are under the respective species.

Despite no isolectotypes have been located, there are four paratypes kept at LE and another one at US.

Selected specimens examined. TAJIKISTAN. **Districts of Republican Subordination**: the Varzob river, bridge to Puguz, 38º51’N, 68º51’E, 1932, *B.A. Fedtschenko 449* (LE); systema fluminis Varzob, right bank of the Varzob river, 35km to the north of Dushanbe, 38º49’N, 68º49’E, 23 May 1957, *J.S. Grigorjev 117* (LE); The Gissar Range, valley of the Varzob river, upper Khusher qishlaq, 38º58’N, 68º45’E, 20 May 1937, *A.I. Vvedensky 68* (LE); South Tajikistan, east slope of Baba-Tag, to the south of Aklav-Bulak, 37º58’N, 68º23’E, 29 May 1939, *Y. Yudin & O. Budyko s.n.* (LE). **Sughd**: north slope of the Turkestan Range, near source of the Kusavli-say, 39º34’N, 68º36’E, 19 June 1970, *R.V. Kamelin 196* (LE); Schink, 39º26’N, 67º56’E, 29 May 1892, *V.L. Komarov s.n.* (LE, US); Murgasar-kul, 39º26’N, 67º56’E, 1 June 1892, *V.L. Komarov s.n.* (LE); north slope of the Turkestan Range, Kusavli-say, lower part, west slope, 39º38’N, 68º41’E, 3 June 1958, *A. Konnov 1020* (LE); Kusavli-say canyon, 39º34’N, 68º36’E, 1 July 1955, *T. Zaprjagaev & L. Kozhura 846* (LE). TURKMENISTAN. **Lebap**: Road from Toychi to Kugitang qishlaq, near Kurgan-Tash lake, 37º55’N, 66º28’E, 13 Apr 1958, *A.I. Vvedensky, S.S. Kovalevskaya & O.V. Tscherneva 115* (LE). UZBEKISTAN. **Djizak**: The Turkestan Range, Sanzar river basin, Zaaminskaya forest dacha, source or the [Naychey] river, 39º38’N, 68º33’E, 17 July 1934, *I.G. Protopopov & P. Gomolitsky 228* (LE); The Pamir-Alay, the Turkestan Range, the Gurgalash river basin, pass to Zarafshan valley, on the way to [Urmitai] qishlaq, 39º41’N, 68º14’E, 18 June 1935, *V. Zakrzhevsky 465* (LE). **Qashqadaryo**: South Uzbekistan, low mountains to the south of Dekhkanabad–Derbent highway, Kuruk-dagana mountains, south slopes of Tally pas, 38º8’N, 66º33’E, 19 May 1967, *V.P. Botschantzev 128* (LE); south-east of Yakkabag, hills between Khusyn qishlaq and the Tynis-dara river, 38º48’N, 66º58’E, 15 May 1979, *R.V. Kamelin & Mamedov 147* (LE); Ak-su river, opposite Merake village, 39º1’N, 67º7’E, 15 May 1947, *E.E. Korotkova 296* (LE); Ak-su river, opposite Merake village, 39º1’N, 67º7’E, 15 May 1977, *E.E. Korotkova 327* (LE). **Samarqand**: near Urgut village, Alayaron mountains, Tash-issyk track, 39º21’N, 67º13’E, 13 May 1979, *R.V. Kamelin & Mamedov 53* (LE); north slope of the Zarafshan range, Aman-kutan, 39º19’N, 66º57’E, 25 Apr 1913, *A.I. Michelson*

1040 (LE). **Surxondaryo**: Chul'bair mountains, near Sina qishlaq, Kyzkurgan hill, 38º22'N, 67º39'E, 30 May 1973, *V.P. Botschantzev 145* (LE); South Tajikistan, Babatag mountains, near mount Zarkasa, 10 km from Akmechet', 37º59'N, 68º10'E, 27 Apr 1986, *R.V. Kamelin, B. Ganibal & L. Averyanov 230* (LE); Turkestania, The Emirate of Bukhara, Baysun Principalitie, Buzgala canyon, 38º13'N, 67º11'E, 30 Apr 1897, *S.I. Korshinsky 208* (LE); Turkestania, The Emirate of Bukhara, Baysun Principalitie, south-west ridge of the Gissar range by Derbent station, south slope, 38º14'N, 67º2'E, 4 May 1913, *A.I. Michelson 442* (LE); Turkestania, The Emirate of Bukhara, Kugitang mountains, by Khodzha-anka village, 37º47'N, 66º54'E, 9 May 1915, *M.G. Popov s.n.* (LE).

27. *Senecio paulsenii* O. Hoffm. in Paulsen, Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 152. 1903. TYPE: Pakistan Chitral, monte arido Pamir, prope lacŭs Jashil Kŭl, [35º49'N 71º59'E], *Paulsen 996* (lectotypus, designated by Nordenstam (1989: 68), C!; isotype, LE!).

Perennial herb. *Rhizome* 1.6–12 cm long, 0.5–1.7 cm diam, ± horizontal, with swelled fastigiate roots. *Stem* 15–64 cm, erect, leaved, corrugated, solid, not ramificated, glabrescent to weakly arachnoid, base usually with tufts of hairs and remnants of old leaves, sometimes violet coloured. *Basal leaves* 4.5–16.2 cm long, 1.3–7.2 cm wide, caducous, sometimes persistent, oblanceolate to lanceolate (ratio basal leaf width / basal leaf length = 0.10–0.80), obtuse, attenuate to cuneate, with a petiole 2–11 cm long, dentate to sinuate increasing towards the base (teeth 0.5–8 mm deep), sometimes subentire, glabrescent to weakly arachnoid (trichomes 0.7–0.8 mm long), concolorous. *Cauline leaves* 3–9; *middle cauline leaves* 3.1–17 cm long, 0.3–6.5 cm wide, alternate, oblanceolate to oblong (ratio middle leaf width / middle leaf length = 0.06–0.42), acute to obtuse, sessile to semi-amplexicaul, sometimes attenuate into a petiole up to 12 cm long, dentate towards the lower half (teeth 0.9–10 mm deep), sometimes subentire, glabrescent to weakly arachnoid (trichomes 0.5–1.3 mm long), tertiary venation inconspicuous; *upper cauline leaves* 0.8–11.5 cm long, 0.1–2.5 cm wide, lanceolate to linear (ratio upper leaf width / upper leaf length = 0.10–0.38), acute, sessile to semi-amplexicaul, entire to slightly dentate (teeth 0.6–2.5 mm deep), glabrescent to weakly arachnoid. *Synflorescence* 4–26 cm long, corymbose to pseudocorymbose, with linear-oblong bracts. *Capitula* 1–3(–9), 30.4–48.1 mm diam; *involucre* 13.4–27.5 mm diam, 11–17 mm long, narrowly cupuliform; *involucral bracts* (14–)20–21(–24), 9–17.4 mm long, 1.2–2.7 mm wide, with scarious margin 0.3–0.8 mm wide, lanceolate, attenuate, 1–2 keeled, apex usually with a black spot, sometimes purplish coloured, glabrescent to weakly arachnoid (trichomes 0.2–1.2 mm long);

supplementary bracts (5–)6–9(–14), 2.5–9.2 mm long, 0.6–1.3 mm wide, subulate, without scarious margin, a third to a three-quarters as long as involucral bracts, glabrescent to weakly arachnoid (trichomes 0.2–1.2 mm long), not imbricate. *Ligulate florets* 11–16, 16.3–27.7 mm long, yellow; *tubular florets* 8.9–15.3 mm long, 0.8–2 mm diam, yellow. *Achenes* 6.8–10.1 mm long, 0.9–1.7 mm wide, subcylindrical (ratio achene width / achene length = 0.13–0.24), shorter than pappus (ratio achene length / pappus length = 0.49–0.77), with 10–12 ribs, glabrous to hairy (trichomes 0.1–0.2 mm long); *pappus* 9.8–15.2 mm long, whitish. Chromosome number: unknown.

Etymology. Senecio paulsenii is named in honor of Ove Vilhelm Paulsen (1874-1947), Danish botanist who collected in the Pamir Mountains during 1898-1899.

Discussion. Senecio paulsenii is characterized by bearing 1–3(–9) capitula, basal leaves oblanceolate to lanceolate, subentire to sinuate increasing towards the base of the lamina, and stem base with tufts of hairs and remnants of old leaves. The length of the achenes (6.8–10.1 mm) is a distinctive character to discriminate it from the Anatolian species, which rarely reach 7 mm long. It is similar to *S. franchetii* and *S. olgae* (see comments under the last). It differs from *S. franchetii* in its smaller size, less number of capitula [1–3(–9) vs. (1–)4–8(–15)], and the stem base with tufts of hairs and remnants of old leaves. Moreover, *S. paulsenii* displays smaller basal leaves, subentire to irregularly sinuate, tend to be persistent, while those from *S. paulsenii* usually are larger, regularly dentate, and usually caducous. Although they are parapatric in Tajikistan, the mentioned characters are useful to distinghish each other.

It is a variable species regarding the leaves shape, indumentum of involucre, and achenes indumentum. The last character mainly holds the two subespecies recognized here. In disagreement with Nordenstam (1989), the shape of the leaves is not a valuable character to distinguish both subspecies. It is highly variable and does not discriminate between these taxa. Although they partially overlap at northeastern Afghanistan, most of the specimens could be easily identified by the characters of their achenes.

Key to subspecies of *Senecio paulsenii*

1a. Achenes glabrous; plant with indumentum ± arachnoid.....**27a. *S. paulsenii* subsp. *paulsenii***

1b. Achenes with intercostal trichomes, sometimes covering the whole surface; plant glabrescent.....**27b. *S. paulsenii* subsp. *khorasanicus***

27a. *Senecio paulsenii* subsp. *paulsenii*

Plant with indumentum ± arachnoid, specially on the involucre. *Achenes* glabrous to glabrescent.

Iconography. Nordenstam (1989, tab. 42).

Distribution and habitat. Afghanistan, Pakistan, Tajikistan; rocky slopes, screes, steppes, grassy open slopes; altitude 2400–4300 m (Figure 33).

Phenology. Flowering from May to August.

Discussion. Its glabrescent achenes are a distinctive character among the *Crociseris* species from Middle Asia.

Selected specimens examined. AFGHANISTAN. **Badakhshan**: Vakhan-Ishkashimskiy rayon, upper reach of the Kugi-lyal' river, canyon at W slopes of mountains opposite to the Pyandzh river, 36º48'N, 72º2'E, 17 June 1935, *P.N. Ovczinnikov & C.S. Afanassiev 555* (LE); Shughnan, valley of the Bartang river, between Chadut and Razduzh, 37º41'N, 71º31'E, 23 May 1914, *N.N. Tuturin & P.I. Bessedin 52* (LE). **Baghlan**: Andarab-Tal, Seitental des Taganak-Tales südlich Darrah-i-Shu, 35º37'N, 69º12'E, 4 June 1965, *D. Podlech 11104* (M); Andarab-Tal, kleines Seitental nördlich von Sarab, 35º34'N, 69º14'E, 6 June 1965, *D. Podlech 11145* (M). PAKISTAN. **Khyber Pakhtunkhwa**: Chitral, Chitral-Mastuj track, Kuragh, 36º16'N, 72º29'E, 26 May 1958, *J.D.A. Stainton 2517* (UPS). TAJIKISTAN. **Districts of Republican Subordination**: The Emirate of Bukhara, Kara-Shura, 39º16'N, 71º32'E, 19 July 1897, *V.I. Lipsky s.n.* (LE). **Gorno-Badakhshan**: north ridge of the Shakh-Dara range, 4 km up the source of the Shakh-Dara river, slope of E exposure, 37º26'N, 72º13'E, 12 Aug 1955, *P. Gagarin 2053* (LE); the Bartang river, Khorodzhio valley, 38º6'N, 72º8'E, 28 July 1964, *S.S. Ikonnikov 16139* (LE); the Shakh-Dara river, Kok-Chashma valley, 3 km up the Botanical garden, 37º28'N, 71º38'E, 15 Aug 1965, *S.S. Ikonnikov 17513* (LE); valley of the Toguz-Bulak river near Dzhelanda, 37º34'N, 72º36'E, 28 July 1957, *S.S. Ikonnikov 2181* (LE); the Toguz-Bulak river, S slope of the Bakchigir range, 37º34'N, 72º38'E, 28 July 1957, *S.S. Ikonnikov 3082* (LE); the Toguz-Bulak river, right bank, slope near 591 km, 37º30'N, 72º45'E, 8 July 1957, *S.S. Ikonnikov 3227* (LE); the Toguz-Bulak

river, left bank, 5 km down Dzhelanda, upper part of the slope of N exposure, 37º36’N, 72º33’E, 10 July 1957, *S.S. Ikonnikov 3267* (LE); valley of -the Shadzud-Dara river, upper part of the valley, 37º29’N, 72º46’E, 14 July 1957, *S.S. Ikonnikov 3404* (LE); near Khorog Botanical Garden, 37º28’N, 71º36’E, 21 June 1966, *R.V. Kamelin s.n.* (LE); The Pamir, the North-Alichur Range, right slope of Alichur valley, 2,5–3 km north of the mouth, 37º37’N, 73º31’E, 5 July 1962, *L.V. Kuzmina 305* (LE); Pamirskiy highway, 114/614 km, valley of the Toguz-Bulak river, 37º36’N, 72º33’E, 23 June 1957, *G. Ladygina 1035* (LE); the Vanch river, Bunay canyon, 38º25’N, 71º33’E, 13 July 1962, *N.P. Litvinova 13543* (LE); The Western Pamir, upper reaches of the Shakh-Dara river, Dzhaushangoz track, near weather station, 37º21’N, 72º28’E, 18 July 1956, *V.V. Pissjaukova 350* (LE); Shadzud-Dara valley, 7 km away of the mouth, right slope, 37º29’N, 72º44’E, 15 July 1957, *L. Sidorov 2454* (LE); Shughnan, Vakhan, Nishgar canyon, 37º1’N, 72º28’E, 13 June 1914, *N.N. Tuturin & P.I. Bessedin 252* (LE, US); Shughnan, near Seydzh lake, 37º12’N, 72º4’E, 27 July 1913, *N.N. Tuturin 94* (LE); The Pamir, the North-Alichur Range, right slope of Karadzhilga valley, 4 km away of the source, 37º52’N, 73º18’E, 18 July 1962, *V.N. Ukhacheva 643* (LE).

27b. *Senecio paulsenii* subsp. *khorasanicus* (Rech. f. & Aellen) B. Nord. in Rech. f., Fl. Iran. 164: 68. 1989. *Senecio khorasanicus* Rech. f. & Aellen, Oesterr. Bot. Z. 97: 236. 1950. TYPE: Iran, Khorasan, in montibus serpentinicis ditionis Robat Safid, [35º47'N 59º20'E], 27 May 1948, *Rechinger 4439 & al.* (holotype, designated by Rechinger (1950: 237), W-3490 image!).

Senecio orientalis f. *subsimplex* Bornm., Beih. Bot. Centralbl. 20(2): 156. 1906. TYPE: Iran, Markazi, between Arak and Qom, dit. urb. Sultanabad, monte Latetar, [34º22'N 50º20'E], Aug 1898, *Strauss s.n.* (lectotype, designated here, JE-5744 image!; isolectotype, B-10-0325080!).

Plant glabrescent. *Achenes* with intercostal trichomes 0.1–0.2 mm long.

Iconography. Nordenstam (1989, tab. 43).

Distribution and habitat. Afghanistan, Iran, Turkmenistan; clay slopes, dry places, steppes, serpentine rocks, unless on calcareous soil; altitude 1400–3000 m (Figure 34).

Phenology. Flowering from May to June.

Discussion. The epithet khorasanicus currently refers a region located in northeastern Iran, but historically embraced a larger area on the east and northeast of the Persian Empire. The name Khorasan is Persian and means “where the sun comes from”. The name was given to the eastern province of Persia during the Sassanid Empire.

Selected specimens examined. AFGHANISTAN. **Badakhshan**: Zebak, 36º31’N, 71º20’E, 15 July 1948, *L. Edelberg 1244* (C). **Bamiyan**: Band-e-Amir, abrupt slope to the lake, 34º50’N, 67º11’E, 22 July 1974, *I. Gubanov, B. Pavlov & M.C. Younos 652* (LE); au-dessus du lac suspendu de Band-i Amir, 34º50’N, 67º14’E, 26 Aug 1958, *H. Pabot s.n.* (G); Band-i Amir, 34º23’N, 67º17’E, 13 July 1962, *K.H. Rechinger 18249* (B, G, M); in valle 12 km E Panjao, 34º21’N, 67º0’E, 21 June 1967, *K.H. Rechinger 36208* (G, MA). **Ghazni**: Okak, NE altoplanitiei Dasht-e Nawar (Naour), 33º50’N, 67º55’E, 4 July 1962, *K.H. Rechinger 17769* (G). **Ghor**: 4 km W Chehelgar (an der Strasse Taywara-Pasaband), 33º37’N, 64º34’E, 5 June 1971, *D. Podlech 21840* (G, LE); prope Dorahi Tarbulak inter Panjao et Lal, 34º27’N, 66º29’E, 25 July 1962, *K.H. Rechinger 18808* (G). **Wardak**: Farakulum, 34º29’N, 68º7’E, 22 July 1948, *M. Köie 2534* (C); Siah Sang prope Farakulum, ad fluvium Helmand, 34º31’N, 68º8’E, 20 June 1967, *K.H. Rechinger 36098* (G, M). IRAN. **Hamadan**: région d'Aq Bolagh-e (90 km N. de Hamadan), 35º37’N, 48º26’E, 1960, *J.-A. Rioux & E. Golvan 461* (G). **Isfahan**: in jugo 10 km a Kohruyeh meridiem versus, inter Shahreza et Semirom, 31º42’N, 51º48’E, 5 June 1974, *K.H. Rechinger 47276* (G, S, WU). **Khorasan**: montes Kopet-Dagh, in jugo Alamli, 38º4’N, 57º22’E, 3 June 1948, *K.H. Rechinger 4819* (B, MO, NY, S); ditionis Robat-i Safid 82-90 km S Mashhad, 70 km N Torbat-e Heydariyeh, 35º47’N, 59º20’E, 7 May 1975, *K.H. Rechinger 51314* (G, MA, S); prope Robat-e Safid inter Mashhad et Torbat-e Heydariyeh, 35º47’N, 59º20’E, 29 May 1977, *K.H. Rechinger 55880* (B, G). **Markazi**: dit. urb. Sultanabad, montes Tefresch, 34º22’N, 50º20’E, Aug 1898, *T. Strauss s.n.* (B). TURKMENISTAN. **Ahal**: eastern Kopet Dag, in the canyon Kurtlisuvv, 38º3’N, 57º24’E, 19 May 2001, *Kurbanov 1218* (MO).

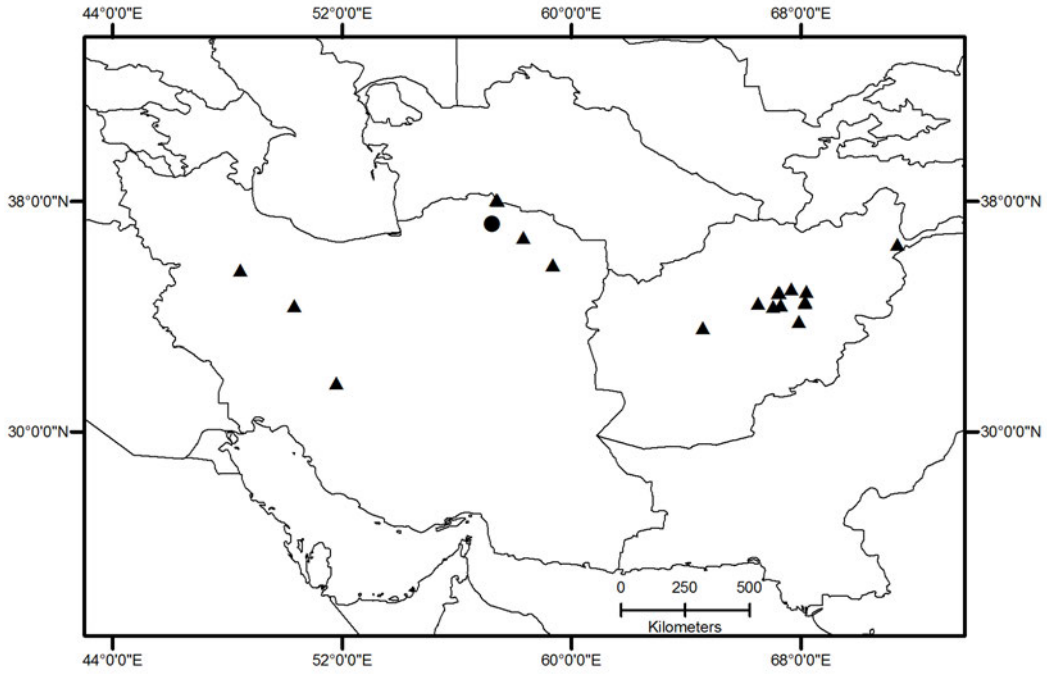


Figure 34. Distribution map for *Senecio paulsenii* subsp. *khorasanicus* (Rech. f. & Aellen) B. Nord. (▲) and *S. joharchii* F. Ghahrem., Ezazi, Rahch. & Attar (●).

28. *Senecio joharchii* F. Ghahrem., Ezazi, Rahch. & Attar, Feddes Repert. 121: 27. 2010. TYPE: Iran, Northern Khorasan province, Esfarayen, Saluk National Park, mt. Ahangaran, 37º13'23"N 57º13'35"E, 16 April 2008, *Ezazi & Rahchamani 4692* (holotype, FAR not seen; isotypes, FAR image!, TUH not seen).

Perennial herb. *Stem* ca. 17 cm, erect, leaved, not ramificated, densely arachnoid-floccose. *Basal leaves* 3–9 cm long, 0.8–1.8 cm wide, persistent, oblanceolate, obtuse, attenuate to cuneate, with a petiole 3–6 cm long, entire to denticulate towards the base, densely arachnoid-floccose, concolorous. *Middle cauline leaves* 7.5–10 cm long, 1.2–1.6 cm wide, alternate, oblanceolate, obtuse, sometimes acute, semiamplexicaul, entire to denticulate towards the base, densely arachnoid-floccose, tertiary venation inconspicuous; *upper cauline leaves* 1.5–7 cm long, 0.2–0.9 cm wide, acute, sessile, densely arachnoid-floccose. *Synflorescence* reduced to a solitary capitulum. *Capitula* 1; *involucre* 18–20 mm diam, cupuliform; *involucral bracts* 32–35, 9–10 mm long, 0.8–1 mm wide, lanceolate to oblong, long-attenuate, apex violet coloured with a black spot on the top, arachnoid-floccose; *supplementary bracts* 13–16, 2.5–4 mm long, 0.5–1 mm wide, subulate, widened at base, without scarious margin, a quarter to a three-quarters as long as involucral bracts, apex violet coloured with a black spot on the top, arachnoid-floccose, not imbricate or slightly at base. *Ligulate florets* ca. 12, ca. 10 mm long, yellow; *tubular florets* ca. 6 mm long, yellow. *Achenes* 1.2–1.5 mm long, shorter than pappus, with scattered trichomes; *pappus* 4–6 mm long, whitish. Chromosome number: unknown. Figure 23.

Iconography. Ghahremaninejad & al. (2010: 28 fig. 1).

Distribution and habitat. Iran, northern Khorasan province; habitat unknown; altitude ca. 1900 m (Figure 34).

Phenology. Flowering from April to May.

Etymology. The specific epithet honors an iranian plant taxonomist, Mohammad-Reza Joharchi, who develops his career at FUMH herbarium, Ferdowsi University of Mashhad, Mashhad, Iran.

Discussion. This is a new species recently described only known from the type material, and therefore, scarce information about it is available. The unsuccessful efforts to get dried material made that the biometric data here presented are based on the protologue. Nonetheless, some pictures of one isotype allow us to recognize it as a different species. The leaves indumentum, number of involucral bracts, and number and size of the

supplementary bracts discriminate this species from *S. paulsenii* subsp. *khorasanicus*, which also grows in the Khorasan province. *Senecio joharchii* has the leaves densely arachnoid-floccose, while those of *S. paulsenii* are glabrescent to weakly arachnoid. The number of involucral bracts are clearly higher in *S. joharchii* [32–35 vs. (14–)20–21(–24)]. Concerning the supplementary bracts, these also differ in number [13–16 in *S. joharchii* vs. (5–)6–9(–14) in *S. paulsenii*] and size (widened at base in *S. joharchii* vs. linear-oblong in *S. paulsenii*).

The number and shape of both involucral and supplementary bracts are very similar to those of *S. provincialis* from NE Spain and SE France, and they usually bear solitary capitulum. In this case, the basal leaves are useful to distinguish from each other. *Senecio provincialis* displays ovate to lanceolate basal lesves, glabrescent to covered with scattered arachnoid trichomes above, arachnoid to slightly lanate beneath, usually discolorous. On the other hand, *S. paulsenii* has oblanceolate to lanceolate leaves, densely arachnoid-floccose on both faces, concolorous. Moreover, it differs from *S. provincialis* because the apex of the involucral bracts are violet coloured with a black spot on the top. The stem base is also violet coloured, character more frequent among the far eastern *Crociseris* species.

Taking into account that the isotype studied is just starting to bloom, the length measurements of the ligulate flowers and the achenes are doubtful. More collections are needed in order to deepen in some morphological characters, limits of distribution, and to understand the variability that *S. joharchii* may harbour.

Doubtful or excluded names

Arnica senecionoides Fenzl, nom. nud., in sched. (B-10-0325121!, H-1439547!, S!).

Cineraria d. [unranked] *Crociseris* Rchb. in Mössler, Handb. Gewächsk., ed. 2, 2: 1501. 1829, nom. nud., pro syn.

Cineraria serratifolia Gray, Nat. Arr. Brit. Pl. 2: 469. 1821, nom. inval. (ICBN Art. 11.4).

Crociseris lusitanica Gand., nom. nud., in sched. (LY image!).

Jacobaea doronicum var. *maxima* Lag., nom. nud., in sched. (MA-130621!).

Jacobaea doronicum var. *minor* Lag., nom. nud., in sched. (MA-130656!).

Senecio apenninus Tausch in Syll. Pl. Nov. 2: 252. 1828. *Senecio doronicum* var. *apenninus* (Tausch) Steud., Nomencl. Bot. ed. 2, 2: 560. 1841 [appeninus]. *Senecio doronicum* subvar. *apenninus* (Tausch) Nyman, Consp. Fl. Eur.: 354. 1879. *Senecio doronicum* var. *apenninus* (Tausch) Fiori in Fiori & Paol., Fl. Italia 3: 218. 1903, nom. illeg. comb. superfl. TYPE: Italy, Apennine Mountains, *Tausch s.n.* (PR?, not found).

Senecio arachnoideus Sieber, nom. nud., in sched. (H-1442050!, LE!, PR-615648!, PR-270247!).

Senecio auricomus Link ex DC., Prodr. 6: 354. 1837, nom. inval., pro. syn.

Senecio auricularis Pau, nom. nud., in sched. (MA-130560!).

Senecio codonocephalus Fenzl, in sched., nom. nud. (LE!, S!).

Senecio corbariensis Timb.-Lagr., nom. nud., in sched. (P-3777563 image!).

Senecio doronicum f. *glabra* (Evers) Fiori in Fiori & Paol., Fl. Italia 4: 181. 1907 [“glabrum”], comb. inval.

Senecio doronicum f. *glabrescens* Evers, Verh. K.K. Zool.-Bot. Ges. Wien 46: 77. 1896, nom. inval. (ICBN Art. 32.1).

Senecio doronicum f. *normalis* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 32. 1916, nom. inval. (ICBN Art. 24.3).

Senecio doronicum f. *toro* Costa, Supl. Cat. Pl. Cataluña: 42. 1877, nom. inval., pro. syn.

Senecio doronicum f. *uniflorus* Duffour, nom. nud., in sched. (P-3778648 image!, P-3790118 image!).

Senecio doronicum subsp. *eu-doronicum* Briq. & Cavill. in Burnat, Fl. Alpes Marit. 6: 31. 1916, nom. inval. (ICBN, Art. 21.3).

Senecio doronicum var. *aronicum* (Arv.-Touv.) Breistr., nom. nud., in sched. (GRM image!) [ICBN Art. 30.1].

Senecio doronicum var. *glabra* Evers, Verh. K.K. Zool.-Bot. Ges. Wien 46: 77. 1896, nom. inval. (ICBN Art. 32.1).

Senecio doronicum var. *minor* Lag. ex Willk. in Willk. & Lange, Prodr. Fl. Hispan. 2: 115. 1865, nom. nud., pro syn.

Senecio doronicum var. *simplex* Gand., nom. nud., in sched. (MA-130638!).

Senecio doronicum var. *typicus* Fiori in Fiori & Paol., Fl. Italia 3: 218. 1903, nom. inval. (ICBN, Art. 24.3).

Senecio eriopus f. *oblongifolius* C. Vicioso, nom. nud., in sched (MA-130577!).

Senecio fenzlii Sch. Bip., nom. nud., in sched. (LE!).

Senecio hervaloira Link, Bemerk. Reise Frankreich Spanien Portugal 3: 138. 1804, nom. inval., pro. syn.

Senecio italicus Tausch ex Ten., nom. nud., pro. syn. (P-3683275 image!).

Senecio julicus A. Kern., nom. nud., in sched. (M-152064 image!).

Senecio latronum Boiss. & Hausskn., nom. nud., in sched. (G-150324 image!, JE-6949 image!, JE-6950!, JE-6951 image!, JE-6952!, LE!, P-3729808 image!, W-32015 image!, W-Rchb-101002 image!).

Senecio libanoticus Ehrenb., nom. nud., in sched. (LE!, S!).

Senecio longipedunculatus Halácsy, Verh. K.K. Zool.-Bot. Ges. Wien 54: 484. 1904. TYPE: Greece, Central Greece, Delphi, mt. Parnassus loco Livadi dicto, [38º34'N 22º34'E], 5 July 1903, *Leonis 137* (lectotype, designated here, WU!; isolectotypes, WU!).

Senecio longipetalus Sennen ["longipetala"], nom. nud., in sched (BC-29073!, MA-130573!).

Senecio megalophron Fenzl, in sched., nom. nud. (B-10-0325113!, G-162718!, H-1441895!, LE!, M-30305 image!, UPS!).

Senecio orientalis Mill., Gard. Dict. ed. 8, n.º 10. 1768. SYNTYPES: Chelsea garden, *Miller s.n.* (BM?, LINN?, not found); Levant, 1700-1702, *Tournefort s.n.* (BM?, LINN?, not found).

Senecio orientalis Pacho, Voy. Marm. 386, plate 97. 1827, nom. inval. (ICBN Art. 44.1).

Senecio orientalis var. *uniflora* Willd., nom. inval., in sched. mss. (B-W-15799-02 image!).

Senecio paludosus f. *gymnocarpus* Soó, Acta Bot. Hung. 13: 308. 1967, nom. inval. (ICBN Art. 37.1).

Senecio paludosus f. *hungaricus* Soó, Acta Bot. Hung. 13: 308. 1967, nom. inval. (ICBN Art. 37.1).

Senecio paludosus var. *leucophyllus* (DC.) Láng, nom. nud., in sched. (L-212592!, LE!).

Senecio paludosus var. *typicus* Rouy in Rouy & Foucaud, Fl. France 8: 325. 1903, nom. inval. (ICBN, Art. 24.3).

Senecio ponticus Sch. Bip., nom. inval., mss. (ICBN, Art. 29.1) (P-3729601 image!).

Senecio pseudogerardi Rouy in Rouy & Foucaud, Fl. France 8: 328. 1903 [“pseudo-gerardi”], nom. nud., pro syn.

Senecio pyrenaicus var. *asturiensis* Rivas Goday, nom. nud., in sched (SALA-50331 image!).

Senecio racemosus var. *puberus* DC., Prodr. 6: 358. 1838, nom. inval. (ICBN Art. 26.2).

Senecio sadleri Láng ex Rchb., Fl. Germ. Excurs.: 245. 1831-1832, nom. nud., pro syn.

Solidago serratifolia Gilib., Fl. Lit. Inch. 1: 202 (1782), nom. inval. [ICBN Appendix VI Opera Utique Oppressa].

Senecio shelkovnikovi Grossh., Trudy Azerbaidzhansk. Otd. Zakavkazsk. Fil. Akad. Nauk S.S.S.R. 1: 60. 1933, nom. nud., pro syn.

Senecio straussii Hausskn., nom. nud., in sched. (JE-5740 image!, JE-5741 image!).

Senecio subcorymbosus Rupr. ex Boiss., nom. inval., in sched. mss. (LE!).
Senecio subinteger Rouy in Rouy & Foucaud, Fl. France 8: 326. 1903, nom. nud., pro syn.

Senecio tmoleus var. *longifolius* Boiss. & Heldr., nom. nud., in sched. (G-162680!, G-162679!, LE!).

Senecio tournefortii var. *angustifolius* Sennen, nom. nud., in sched. (BC-29058!).

Senecio tournefortii var. *guadarramica* C. Vicioso ex Sennen, nom. nud., in sched. (BC-872413!).

Senecio tournefortii var. *serratus* Pau, Not. Bot. Fl. Españ. 6: 59. 1896, nom. inval. (ICBN Art. 26.2).

Senecio × *valdelongum* Pau, nom. nud., in sched. (MA-130678!).

Literature Cited

Afzelius, K. 1951. On chromosome numbers in *Senecio* and some allied genera. Acta Horti Berg. 15: 65–77.

Applequist, W.L. 2012. Report of the Nomenclature Committee for Vascular Plants: 64. Taxon 61(5): 1108–1117.

Arènes, J. 1951. Nouvelle contribution a l'étude des Composées. Notul. Syst. Paris 14(3): 187–197.

Ascaso, J. & J. Pedrol. 1991. De plantis vascularibus præsertim ibericis. Fontqueria 31: 135–140.

Avetisyan, V.E. 1971. Rod *Senecio* L. v Armenii. (The species of *Senecio* L. in Armenia). Biol. Zhurn. Armenii 24(11): 44–49.

Avetisyan, V.E. 1995. *Senecio* L. Pp. 462–485 *in* A.L. Takhtajan, Flora Armenii, vol. 9, Campanulaceae, Asteraceae. Koeltz Scientific Books, Czech Republic.

Bellot, F. & B. Casaseca. 1975. Specimens «typus» de quelques espèces proposés par Mariano Lagasca, se trouvant dans l'herbier du Jardin Botanique de Madrid. Lagascalia 5(1) : 15–26.

Blanca, G. 1996. Nuevas combinaciones para el género *Senecio* L. (Compositae) en el N de Marruecos. Lagascalia 18(2): 308–309.

Blanca, G. & C. Quesada. 2009. *Senecio* L. Pp. 316–326 *in* G. Blanca, B. Cabezudo, M. Cueto, C. Fernández López & C. Morales Torres (eds.), Flora vascular de Andalucía Oriental, vol. 4. Sevilla, Spain.

Boissier, E. 1840. Voyage botanique dans le midi de l'Espagne, vol. 2(11). Paris, France.

Boissier, E. 1841. Voyage botanique dans le midi de l'Espagne, vol. 2(13). Paris, France.

Boissier, E. 1844. Diagnoses plantarum orientalium novarum ser. 1, vol. 1(4). Leipzig, Germany.

Boissier, E. 1875. Flora Orientalis, vol. 3. Genevæ, Basileæ.

Bolòs, O. & J. Vigo. 1987. Notes sobre taxonomia i nomenclatura de plantes, III. Collect. Bot. (Barcelona) 17(1): 89–93.

Bonnier, G.E.M. 1922. Flore complète illustrée en couleurs de France, Suisse et Belgique vol. 5. Paris, Neuchâtel, Bruxelles.

Bremer, K. 1994. Asteraceae: Cladistics & Classification. Singapore.

Briquet, J. & F. Cavillier. 1916. Composées (*Senecio-Santolina*). Pp. 5–47 *in* E. Burnat, Flore des Alpes maritimes, vol. 6(1). Genève; Basel, Lyon.

Budak, Ü., E. Hamzaoğlu & A. Aksoy. 2009. New records of *Senecio* L. (Asteraceae) for the Flora of Turkey. Turk J Bot 33: 231–233.

Burdet, H., A. Charpin & F. Jacquemoud. 1983. Types nomenclaturaux des taxa ibériques décrits par Boissier ou Reuter. IV. Cistacées à Composées. Candollea 38: 751–802.

Caballero, A. 1948. Ilustraciones de la Flora endémica española. Anales Jard. Bot. Madrid 8: 523–579.

Calvo, J. 2012. Amendment to: "(2024) Proposal to conserve the name *Solidago doronicum* (*Senecio doronicum*) (*Compositae*) with a conserved type" by Joel Calvo, Inés Álvarez & Carlos Aedo in *Taxon* 60(4): 1215-1216. Taxon 61(5): 1133.

Calvo, J., I. Álvarez & C. Aedo. 2011a. Proposal to conserve the name *Senecio gerardi* against *Inula provincialis* (*S. provincialis*) (*Compositae*). Taxon 60(2): 602–603.

Calvo, J., I. Álvarez & C. Aedo. 2011b. Proposal to conserve the name *Solidago doronicum* (*Compositae*) with a conserved type. Taxon 60(4): 1215–1216.

Calvo, J., I. Álvarez & C. Aedo. 2011c. Proposal to conserve the name *Senecio paucifolius* (*Compositae*) with a conserved type. Taxon 60(4): 1217.

Calvo, J., I. Álvarez & C. Aedo. 2012. Lectotypification of two Linnaean names in Compositae. Nordic J. Bot. 30: 127–128.

Calvo, J., I. Álvarez & C. Aedo. 2013a. Four New Combinations in Eurasian *Senecio* L. (Compositae, Senecioneae). Novon (submitted).

Calvo, J., I. Álvarez, C. Aedo & P.B. Pelser. 2013b. A phylogenetic analysis and new delimitation of *Senecio* sect. *Crociseris* (Senecioneae; Compositae), with evidence of intergeneric hybridization. Taxon XX: XXX–XXX.

Calvo, J. & C. Aedo. *Senecio* L. *in* S. Castroviejo (ed.), Flora iberica, vol. 16. Madrid, Spain (in prep.).

Candolle, A.P. 1838. Prodromus systematis naturalis regni vegetabilis, vol. 6. Paris, France.

Cesca, G. & M. Palermo. 1981. Citologia ed embriologia di *Senecio tenorei* Pign. *in* G. Cesca, Contributi alla conoscenza delle piante di Calabria. 1-9. Giorn. Bot. Ital. 115(6): 387–390.

Chater, A.O. & S.M. Walters. 1976. *Senecio* L. Pp. 191–205 *in* T.G. Tutin & al., Flora Europaea, vol. 4, Plantaginaceae to Compositae. Great Britain.

Chichiriccò, G. & F. Tammaro. 1982. Numeri Cromosomici per la Flora Italiana: 910-918. Inform. Bot. Ital. 14: 264-267.

Clos, D. 1857. Révision comparative de l'herbier et de l'histoire abrégée des Pyrénées de Lapeyrouse. Toulouse.

Constantinidis, T., G. Kamari & D. Phitos. 1997. A cytological study of 28 phanerogams from the mountains of SE Sterea Ellas, Greece. Willdenowia 27: 121–142.

Coste, H.J. 1903. Flore descriptive et illustrée de la France vol. 2. Paris.

Davis, P.H. 1974. Materials for a Flora of Turkey XXX: Compositae, I. Notes Roy. Bot. Gard. Edinburgh 33(2): 207-264.

Dinsmore, J.E. 1933. *Senecio bertramii* Post. Pp. 70 *in* G.E. Post, Flora of Syria, Palestina, and Sinai, ed. 2, vol. 2. Beirut.

Euro+Med. 2006-. Euro+Med PlantBase - the information resource for Euro-Mediterranean plant diversity.
Published on the Internet http://ww2.bgbm.org/EuroPlusMed/ [18-12-2012].

Fernandes, A. & M. Queirós. 1971. Contribution à la connaissance cytotaxinomique des *Spermatophyta* du Portugal. Bol. Soc. Brot. 45: 5–121.

Fernández Casas, F.J. & J. Fernández Piqueras. 1978. Números cromosómicos para la Flora Española 24-29. Lagascalia 7(2): 203–206.

Fiori, A. 1903. *Senecio* L. Pp. 208–221 *in* A. Fiori & G. Paoletti, Flora Analitica d'Italia, vol. 3. Padova.

Fiori, A. 1904. Iconographia Florae Italicae, vol. 2(9). Padova, Udine.

Fourreau, P.-J. 1868. Catalogue des plantes qui croissent spontanément le long du cours du Rhone. Ann. Soc. Linn. Lyon ser. 2, 16: 301–404.

Gallego, M.J. 1983. Números cromosómicos para la Flora Española 257-300. Lagascalia 12(1): 117–142.

Gautier, M.C.G. 1897. Catalogue raisonné de la Flore des Pyrénées-Orientales. Perpignan.

Gérard, L. 1761. Flora Gallo-provincialis. Paris.

Ghaffari, S.M. 1999. Chromosome studies in the Iranian *Asteraceae* II. Iran. J. Bot. 8(1): 91-104.

Ghahremaninejad, F., A. Ezazi, N. Rahchamani & F. Attar. 2010. A new *Senecio* L. (Asteraceae: Senecioneae) from Northeast Iran. Feddes Repert. 121: 27–31.

Gmelin, S.G. 1770-1774. Reise durch Russland vol. 1. St. Petersburg.

Godron, D.A. 1850. *Senecio* L. Pp. 110–124 *in* J.C.M. Grenier & D.A. Godron, Flore de France, vol. 2. Paris, London, Besançon.

González Bueno, A. 2010. El viaje botánico de Pierre Edmond Boissier por el sur de España (1837). Acta Bot. Malac. 35: 5–21.

Greuter, W. 2003. The Euro+Med treatment *Senecioneae* and the minor *Compositae* tribes – generic concepts and required new names, with an addendum to *Cardueae*. Willdenowia 33: 245–250.

Greuter, W. 2008. *Senecio* L. Pp. 711–720 *in* W. Greuter & E. von Raab-Straube (eds.), Med-Checklist, Dicotyledones (*Compositae*), vol. 2. Genève, Switzerland.

Greuter, W. & E. von Raab-Straube (eds.). 2006. Euro+Med Notulae, 2. Willdenowia 36: 707-717.

Greuter, W. & E. von Raab-Straube (eds.). 2007. Euro+Med Notulae, 3. Willdenowia 37: 139-189.

Guinochet, M. & A. Logeois. 1962. Premières prospections caryologiques dans la flore des Alpes maritimes. Rev. Cytol. Biol. Vég. 25: 465–477, pl. I, II.

Guinochet, M. 1967. Sur les nombres chromosomiques de quelques espèces dans les Alpes maritimes et certaines stations limitrophes. Compt. Rend. Hebd. Séances Acad. Sci., Sér. D. 264: 1623–1625.

Güleryüz, G. & S. Kirmizi. 1999. *Senecio olympicus* Boiss. Karaca Arbor. Mag. 5(2): 93–95.

Schiffner, V. 1904. Versammlung am 29. April 1904. Verh. K. K. Zool.-Bot. Ges. Wien 54: 483–486.

Hamzaoğlu, E., Ü. Budak & A. Aksoy. 2009. A new taxon of *Senecio* (Asteraceae) from Turkey: *Senecio inops* Boiss. & Balansa subsp. *karamanicus* Hamzaoğlu & Budak. Turk J Bot 33: 285–289.

Hamzaoğlu, E., Ü. Budak & A. Aksoy. 2011. A new genus, *Turanecio*, of the Asteraceae (tribe *Senecioneae*). Turk J Bot 35: 479–508.

Hegi, G. 1928. Illustrierte Flora von Mittel-Europa, vol. 6(2). München.

Hodálová, I, V. Grulich & H. Oťaheľová. 2003. Occurrence of Senecio paludosus (Asteraceae) in Slovakia. Bull. Slov. Bot. Společnost. 25: 69–76.

Hoffmann, K.A.O. 1892. *Senecio* L. Pp. 296–301 *in* H.G.A Engler & K.A.E. Prantl (eds.), Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen, unter Mitwirkung zahlreicher hervorragender Fachgelehrten, nº Fasc. 74. Leipzig, Germany.

Hoffmannsegg, J.C. & J.H.F. Link. 1813-1840. Flore portugaise, vol. 2. Berlin.

Holub, J. 1962. Beitrag zur Taxonomie der Art *Senecio paludosus* L. Novit. Bot. Delect. Seminum Horti Bot. Univ. Carol. Prag. 1962: 25–34.

Hülber, K., M. Sonnleitner, R. Flatscher, A. Berger, R. Dobrovsky, S. Niessner, T. Nigl, G.M. Schneeweiss, M. Kubešová, J. Rauchová, J. Suda & P. Schönswetter. 2009. Ecological segregation drives fine-scale cytotype distribution of *Senecio carniolicus* in the Eastern Alps. Preslia 81: 309–319.

Jacquin, N.J. 1778. Florae Austriaceae vol. 5. Viennae, Austriae.

Jeffrey, C., P. Halliday, M. Wilmot-Dear & S.W. Jones. 1977. Generic and sectional limits in *Senecio* (*Compositae*): I. Progress Report. Kew Bull. 32: 47-67.

Kadereit, J.W. 1991. Senecio L. Pp. 459–471 *in* A. Strid & K. Tan, Mountain Flora of Greece, vol. 2. Edinburgh.

Kadereit, J.W. 1998. *Senecio paludosus* L. *in* E. Jarvis & N.J. Turland, Typification of Linnaean specific and varietal names in the *Compositae* (*Asteraceae*). Taxon 47: 347–370.

Konechnaya, G.Yu. 1994. *Senecio* L. Pp. 52–63 *in* N.N. Tzvelev (ed.), *Flora Evropeiskoi Chasti SSSR, vol. 7*. St. Petersburg.

Küpfer, P. & C. Favarger. 1967. Premières prospections caryologiques dans la flore orophile des Pyrénées et de la Sierra Nevada. Compt. Rend. Hebd. Séances Acad. Sci., Sér. D. 264: 2463–2465.

Küpfer, P. 1969. Recherches cytotaxinomiques sur la flore des montagnes de la Péninsule Ibérique. Bull. Soc. Neuchâtel. Sci. Nat. 92: 31–48.

Küpfer, P. 1972. Cytotaxonomie et cytogéographie de quelques groupes d'orophytes du bassin occidental de la Méditerranée et des Alpes. Compt. Rend. Hebd. Séances Acad. Sci., Sér. D. 275: 1753–1756.

Küpfer, P. 1974. Liens de parenté entre les flores Alpienne et Pyrénéenne. Boissiera 23: 11– 322.

Kuzmanov, B. & S. Georgieva. 1983. Asteraceae, *Senecio macedonicus* Griseb. *in* Á. Löve, IOPB Chromosome number reports LXXXI. Taxon 32(4): 663–669.

Kuzmanov, B., **S. Georgieva & V. Nikolova.** 1986. Chromosome numbers of Bulgarian flowering plants. I. Fam. Asteraceae (in Bulgarian). Fitologija 31: 71–75.

Lafranchis, T & G. Sfikas. 2009. Flowers of Greece, vol. 2. Athens.

Ledebour, C.F. 1829. Icones plantarum Centuria I. Rigae, Londini, Parisiis et Argentorati, Bruxellae.

Letz, R., A. Uhríková & J. Májovský. 1999. Chromosome numbers of several interesting taxa of the flora of Slovakia. Biologia (Bratislava), Sect. Bot. 54(1): 43–49.

Lotfi, E., M. Yousofi & M. Assadi. 2010. A revision of *Senecio* L. (*Asteraceae*, *Senecioneae*), in Iran. Iran. J. Bot. 16(1): 96–106.

Lövkvist, B. & U.-M. Hultgård. 1999. Chromosome numbers in South Swedish vascular plants. Opera Bot. 137: 5–42.

Malagarriga, R.P. 1977. Sinopsis de la flora ibérica 76. Barcelona, Spain.

Marhold, K., V. Grulich & I. Hodálová. 2003. Taxonomy and nomenclature of *Senecio paludosus* (Compositae) in Europe. Ann. Bot. Fenn. 40: 373–379.

Matthews, V.A. 1975. *Senecio* L. Pp. 145–168 *in* P.H. Davis, Flora of Turkey and East Aegean Islands, vol. 6. Edinburgh, Great Britain.

Mazuc, E. & E. Timbal-Lagrave. 1834. Note sur une espèce nouvelle du genre *Senecio*, 3. Rodez.

Menitsky, G.L. & G.Y. Konechnaya. 2001. Survey of Caucasian *Senecio* (*Asteraceae*) species. Bot. Zhurn. (St. Petersburg) 86(2): 88–101.

Nordenstam, B. 1989. *Senecio* L. Pp 59–95 *in* K.H. Rechinger, Flora Iranica, Compositae VII. Graz, Austria.

Nordenstam, B. 2007. Senecioneae. Pp. 208–241 *in* J.W. Kadereit & C. Jeffrey (eds.), The Families and Genera of Vascular Plants, vol. 8, Flowering Plants. Eudicots. Asterales. Berlin.

Nordenstam, B., P.B. Pelser, J.W. Kadereit & L.E. Watson. 2009. Senecioneae. Pp. 503–525 *in* V.A. Funk, A. Susanna, T.F. Stuessy & R.J. Bayer (eds.), Systematics, Evolution, and Biogeography of Compositae. Vienna, Austria.

Nyárády, E.I. 1964. *Senecio* L. Pp. 520–587 *in* T. Săvulescu, Flora Republicii Populare Romîne vol. 9. Bucaresti.

Pau, C. 1912. Plantas nuevas de la provincia de Madrid. Bol. Soc. Aragonesa Ci. Nat. 11: 39–42.

Pau, C. 1929. Plantas de mi herbario mauritánico, II. Cavanillesia 2: 87–96.

Queirós, M. 1978. Números cromossómicos para a Flora Portuguesa. Bol. Soc. Brot. 52: 69–77.

Pelser, P.B., J.-F. Veldkamp, & R. van der Meijden. 2006. New combinations in *Jacobaea* Mill. (Asteraceae-Senecioneae). Compositae Newslett. 44: 1–11.

Pelser, P.B., B. Nordenstam, J.W. Kadereit & L.E. Watson. 2007. An ITS phylogeny of tribe Senecioneae (Asteraceae) and a new delimitation of *Senecio* L. Taxon 56: 1077–1104.

Pelser, P.B., A.H. Kennedy, E.J. Tepe, J.B. Shidler, B. Nordenstam, J.W. Kadereit & L.E. Watson. 2010. Patterns and causes of incongruence between plastid and nuclear Senecioneae (Asteraceae) phylogenies. Amer. J. Bot. 97: 856–873.

Pérez-Romero, R., C. Pérez-Morales, R.M. Valencia Barrera & A. Penas Merino. 2009. *Senecio lusitanicus* (Asteraceae. Senecioneae), a new combination for a species from Iberian Peninsula. Compositae Newslett. 47: 19–23.

Post, G.E. 1900. Plantæ Postianæ. Mém. Herb. Boissier 18: 89–102.

Ramond, L.F.E. 1801. Suite des Plantes inédites des Pyrénées. Bull. Sci. Soc. Philom. Paris 43: 146.

Rechinger, K.H. 1950. Compositae novae persicae, afghanicae et kurdicae. Oesterr. Bot. Z. 97: 221–268.

Rechinger, K.H. 1964. Flora of Lowland Iraq. Germany.

Rehder, H., M. Gökçeoğlu, G. Gebauer & G. Güleryüz. 1994. Die Vegetation des Uludağ-Gebirges (Anatolien). Phytocoenologia 24: 167–192.

Reichenbach, H.G.L. 1831–1832. Flora Germanica excursoria, vol. 1(3). Leipzig, Germany.

Reichenbach, H.G.L. 1853. Icones florae Germanicae et Helveticae vol. 16(1). Lipsiae.

Rochel, A. 1828. Plantae Banatus Rariores. Pest, Budapest.

Roldugin, I.I. 1966. *Senecio* L. Pp. 150–165 *in* N.V. Pavlov, Flora Kazakhstana vol. 9. Alma-Ata.

Rouy, G. 1903. Composées. Pp. 130–375 *in* G. Rouy & J. Foucaud, Flore de France, vol. 8. Asnières, Paris, Rochefort, France.

Schischkin, B.K. 1961. *Senecio* L. Pp. 699–788 *in* B.K. Schischkin & E.G. Bobrov, Flora of the USSR, vol. 26, Compositae. Moscow, Leningrad.

Sosnowsky, D.I. 1929. About new and critical Asteraceae of the Caucasus and adjacent countries. Zhurn. Russk. Bot. Obshch. 14: 79-91.

Stafleu, F. A. & Cowan, R. S. 1976. Taxonomic literature. Regnum vegetabile 94.

Stafleu, F. A. & Cowan, R. S. 1985. Taxonomic literature. Regnum vegetabile 112.

Stojanov, N. & B. Stefanoff. 1948. Flora na Bulgariia. Sófija.

Strid, A. 2000. New taxa described in Grisebach's "Spicilegium Florae Rumelicae et Bithynicae" (1843-46). Preslia 72: 241–321.

Tenore, M. 1830. Flora Napolitana vol. 4. Napoli.

Timbal-Lagrave, M.E. 1875. Deuxième excursion dans les Corbières Orientales. Toulouse.

Váchová, M. 1974. *Senecio paludosus* L. *in* J. Májovský, Index of chromosome numbers of Slovakian Flora, Part 4. Acta Fac. Rerum Nat. Univ. Comen., Bot. 23: 1–23.

Wiebe, E.I. 2007. *Senecio* L. Pp. 179–186 *in* I.M. Krasnoborov, Flora of Siberia, vol. 13. Enfield, USA.

Wiebe, E.I. 2000. The annotated check-list of the tribe Senecioneae Cass. (Asteraceae) in Siberia. Turczaninowia 3: 58–63.

Willkomm, H.M. 1865. *Senecio* L. Pp. 111–124 *in* H.M. Willkomm & J.M.C. Lange, Prodromus florae Hispanicae, vol. 2. Stuttgart, Germany.

Wissjulina, E.D. 1962. *Senecio* L. Pp. 371–411 *in* E.D. Wissjulina (ed.), Flora URSR, vol. 11. Kiev.

APPENDIX 1. Index to Scientific Names

Accepted names are in regular type, the entry for each is in boldface; synonyms are in italics.

APPENDIX 2. List of Accepted Species and Subspecies

1. *Senecio auricula* Bourg. ex Coss.
2. *Senecio doronicum* (L.) L.
2a. *Senecio doronicum* (L.) L. subsp. *doronicum*
2b. *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo
2c. *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo
3. *Senecio lagascanus* DC.
4. *Senecio provincialis* (L.) Druce
5. *Senecio eriopus* Willk.
6. *Senecio scopolii* Hoppe & Hornsch.
6a. *Senecio scopolii* Hoppe & Hornsch. subsp. *scopolii*
6b. *Senecio scopolii* subsp. *floccosus* (Bertol.) Greuter
7. *Senecio pyrenaicus* L.
8. *Senecio transylvanicus* Boiss.
9. *Senecio doriiformis* DC.
9a. *Senecio doriiformis* DC. subsp. *doriiformis*
9b. *Senecio doriiformis* subsp. *orientalis* (Fenzl) V.A. Matthews
10. *Senecio paludosus* L.
10a. *Senecio paludosus* L. subsp. *paludosus*
10b. *Senecio paludosus* subsp. *lanatus* Holub
11. *Senecio lopezii* Boiss.
12. *Senecio macedonicus* Griseb.
12a. *Senecio macedonicus* Griseb. subsp. *macedonicus*
12b. *Senecio macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo
13. *Senecio castagneanus* DC.
14. *Senecio olympicus* Boiss.
15. *Senecio pseudoorientalis* Schischk.
16. *Senecio kolenatianus* C.A. Mey.
17. *Senecio eubaeus* Boiss. & Heldr.
18. *Senecio tauricola* V.A. Matthews

19. *Senecio cilicius* Boiss.

20. *Senecio inops* Boiss. & Balansa

21. *Senecio racemosus* (M. Bieb.) DC.

21a. *Senecio racemosus* (M. Bieb.) DC. subsp. *racemosus*

21b. *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo

22. *Senecio buschianus* Sosn.

23. *Senecio perralderianus* Coss.

24. *Senecio trapezuntinus* Boiss.

25. *Senecio franchetii* C. Winkl.

26. *Senecio olgae* Regel & Schmalh.

27. *Senecio paulsenii* O. Hoffm.

27a. *Senecio paulsenii* O. Hoffm. subsp. *paulsenii*

27b. *Senecio paulsenii* subsp. *khorasanicus* (Rech. f. & Aellen) B. Nord.

28. *Senecio joharchii* F. Ghahrem., Ezazi, Rahch. & Attar

APPENDIX 3. List to Exsiccatae

Specimens are listed alphabetically by collector, followed by collection number or date, only when collector number is unavailable. The number in parentheses corresponds to the number in the List of Accepted Species and Subspecies above.

L. **A**damovic, 4 Aug 1903 (8); C. Aedo, 10 July 1991 (2b), 10459 (7), 26 June 1986 (2b), 29 June 1986 (3), 15850 (7), 16 Aug 1986 (7); C. Aedo & al., 2903 (7), 8287 (6b),16905 (7); C. Aedo & J. Pedrol, 19192 (2b); C. Aedo, I. Aizpuru & J. Pedrol, 8630 (2b), 8479 (7); K.S. Afanasiev, 244 (21b), 476 (21b); J. Ahrenberger, 3 Aug 1876 (2a); I. Aizpuru, 24 Aug 1985 (7); I. Aizpuru & P. Catalán, 21168 (3), 21190 (7), 21164 (3), 21167 (3); I. Aizpuru, P. Catalán & C. Aedo, 3 June 1985 (1), 21175 (3); I.J. Akinfiew, 17 July 1896 (16), 9 Aug 1906 (22); Albert, 22 May 1873 (4); E. Albertshofer, 29 July 1985 (2c), 19 Aug 1987 (2c); J.A. Alejandre, 691 (3), 546 (7), 1075 (3), 577 (3); J.A. Alejandre & B. Fernández de Betoño, 1076 (3), 249 (7); J.A. Alejandre & G. Zúñiga, 227 (7), 285 (7), 666 (3), 189 (7), 86 (3), 213 (3), 116 (7); J.A. Alejandre & P. Urrutia, 9876 (3), 1113 (3); J.A. Alejandre, B. Fernández de Betoño & P. Urrutia, 1319 (3), 1472 (7); F.N. Alexeenko, 12533 (22), 3721 (27a), 3799 (27a), 3797 (27a), 13408 (22), 12834 (22), July 1894 (21b), 22 Aug 1898 (21b), 12835 (22); T. Alexeenko, 12483 (16); C. Alleizette, 28 June 1904 (2b); E. Alonso & E. de Paz, 22 July 2000 (7); I. Álvarez, 24 June 1995 (3); J. Amaral Franco, 5162 (3); F. Amich & J. Sánchez, 83 (3); F. Amich, E. Rico & J. Sánchez, 18 June 1979 (2b); O. Anders, 6631 (25), 6057 (25); N.V. Androssow, 30 May 1916 (25); O. Angerer, 6 May 1984 (6a); A. Aparicio, 11 May 1980 (5); A. Aparicio & B. Cabezudo, 16 May 1980 (5); A. Aparicio & S. Silvestre, 20 June 1983 (5); J.C. Archibald, 608 (8); J.M.C. Arvet-Touvet, A. Faure & J.-B. Perret, 4143 (2a); M. Assadi & V. Mozaffarian, 30725 (15); D.E. Atha & al., 3977 (16); P.M.R. Aucher-Eloy, 3425 (14), 3440 (9a); Aydaronov & Ubukeeva, 14 June 1963 (25); G.V. Aznavour, 24 May 1891 (13), 5 June 1892 (13), 22 May 1908 (13), 21 May 1899 (13).

B. **B**alansa, 20 July 1854 (13), 654 (9b), 730 (20), 1281 (13), 1474 (16); A. Baldacci, 219 (6a), 51 (8); J. Ball, 12 Apr 1871 (5); E.K. Balls, 1798 (19); E.K. Balls & W.B. Gourlay, 1870 (16); H. Bamps-Rayez, 45 (2a); B. Bani, 1255 (9b), 6560 (20); F.G. Bartling, Sep 1847 (7); M. Basarman, Aug 1945 (14); E. Batalla, 28 May 1950 (4); J. Bauer & H.W. Doppelbaur, 20 Aug 1960 (2c); Baumbach, June 1874 (2c); C.G. Bayer, July 1937 (2a); Bayern, June 1867 (16); C. Beck, 11 July 1974 (16); A. Becker, 229 (22), 22 Aug 1898 (10b), 22 Aug 1884 (10b); A. Beek, July 1968 (2a); H. Beger, 8 May 1916 (4); C. Béguin & J.-P. Theurillat, 1165 (2a); C.P. Bélanger, 688 (21a); F. Bellot, B. Casaseca & S. Castroviejo, 25 May 1972 (3); Y. Belyakov, 13 June 1915 (10b); D. Benkert, 12 July 1971 (10a), 14 June 1973 (10a); E. Berger, 4037 (10a); A. Bertschinger, 1887 (9a), 4291 (9a), 4540 (9a); R. Beyer, 12 July 1894 (2a), 24 July 1890 (6a), 31 July 1887 (2a), 25 July 1889 (2a), 2 Aug 1894 (2a), 26 July 1894 (2a), 10 July 1894 (2a), 14 July 1887 (2a), 2 Aug 1907 (2c), 29 July 1882 (2c), 23 July 1892 (2a), 9 July 1885 (2a), 16 July 1889 (2a), 15 July 1890 (2c); C. Bicknell, 22 June 1890 (2a); O. Bierbach, July 1903 (12a); F.A. Bisby, 92 (18); E.

Boissier, June 1842 (13), July 1842 (14), 115 (7), Aug 1842 (14); P. Bolzon, 6 July 1900 (10a); J.L. Bonjean, 1332 (10a); E. Bonnet, 19 June 1870 (10a); B.K. Boom, 26 July 1927 (2a); V. Borbás, July 1882 (10a), Aug 1884 (10b); H. Bordère, 24 (7), 1251 (2b), 876 (7), Aug 1863 (2b), Aug 1866 (7), Aug 1859 (7), Aug 1862 (7); J.M. Borel, 8 June 1865 (2a); J. Bornmüller, 5 July 1903 (2a), 26 Aug 1936 (2a), 4624 (13), 4619 (19), 1121 (19), 1105 (15), 1105b (15), 3 Aug 1907 (2c), 29 July 1932 (2a), 9 Aug 1894 (2a), 23 June 1920 (2a), July 1894 (2a), 8 Aug 1903 (2a); V. Borodin, 2 July 1911 (21b); A. Boros, 30 July 1934 (10b), 11 June 1925 (10a); E. Borszczow, 270 (21b), 139 (21b); Bot. Exc. Spanje, 65 (1); V.P. Botschantzev, 128 (26), 96 (26), 145 (26), 27 (26), 416 (26); V.P. Botschantzev & A.Y. Butkov, 322 (26); V.P. Botschantzev & S. Yunusov, 84 (25); J. Bouchard, 24 June 1897 (2a); A. Bouchon, 10 June 1930 (3); E. Bourgeau, 5 July 1862 (15), 125 (19), 1601 (1), 1259 (1), 2515 (7), 24 July 1851 (7), 127 (24), 128 (21a), 334 (2a), 11 Sep 1860 (2a), 129 (2a), 1923 (11); J. Breidy, 233 (9a); A.H. Brotherus & V.F. Brotherus, Aug 1877 (16), 492 (16); R.K. Brummitt, 5441 (2a), 12766 (3); A. Buades, M. Costa Tenorio & A. Ramos, 12 Sep 1980 (7); P. Bubani, 3 Aug 1840 (7); Ü. Budak, E. Hamzaoğlu & A. Aksoy, 2006 (24), 2066 (20); Buhse, 610 (15); A.A. Bunge, 280 (21b); H. Burdet & al., 97 (10a); N. Busch, 775 (16), 2 July 1903 (16); E. Busch & N. Busch, 2 Aug 1929 (16), 30 July 1931 (22), 27 July 1937 (16), 23 Aug 1933 (16), 17 Aug 1929 (16), 24 Aug 1930 (16), 28 July 1928 (16), 42 (16), 22 July 1933 (16), 18 July 1933 (16), 31 Aug 1931 (22), 26 July 1930 (16), 29 July 1929 (16), 72 (16), 21 July 1932 (15), 12 Aug 1928 (16), 8 July 1936 (16), 8 Aug 1928 (16), 31 July 1928 (16), 16 July 1933 (16), 21 Aug 1933 (16), 1 Aug 1929 (16), 76 (22), 18 Aug 1929 (16), 9 July 1930 (16), 21 July 1928 (16), 12 July 1930 (16), 1 Aug 1933 (16), 8 Aug 1929 (16).

A. **C**aballero, 20 June 1925 (3); B. Cabezudo, J. Rivera & S. Silvestre, 19 May 1978 (5); J. Calvo, 4932 (10a), 1179 (1), 5001 (2a), 4933 (10a), 3547 (5), 3607 (5), 3595 (11), 3596 (11), 4931 (10b), 3603 (11), 3604 (11), 4555 (11), 4560 (11), 4565 (11), 3612 (5), 5000 (2a), 3565 (5), 1580 (7), 4982 (2b), 5622 (3), 5620 (3), 5600 (3), 5621 (3), 2671 (7), 5687 (7), 5560 (3), 4621 (3), 5030 (2a), 1084 (7), 4623 (3), 4000 (2b), 4608 (3), 5658 (2b), 3993 (7), 4012 (2b), 4020 (2b); J. Calvo & A. Quintanar, 5212 (6a), 1832 (7); J. Calvo & A. Unió, 4666 (2a), 4659 (4), 4715 (6a), 4717 (6a), 4716 (6a); J. Calvo & I. Espejo, 3492 (5); J. Calvo & J. Nogués, 3638 (1), 3642 (4); J. Calvo & J. Pedrol, 3627 (1), 3622 (4); J. Calvo & J.M. Martínez Labarga, 3505 (1); J. Calvo & S. Hantson, 3512 (1), 3520 (1), 3525 (1), 3953 (7), 3526 (1); J. Calvo & T. Buira, 3702 (4), 3703 (4), 5516 (3); J. Calvo, N. Nikolaiev & A. Stanislavsky, 4921 (10a); J. Calvo, T. Buira & D. Mesa, 5550 (3), 5544 (3); F. Cámara, 5 June 1943 (1), 9876 (3); Campo, July 1882 (2b); M. Capus, 649 (26); J.M. Cardiel, 12 July 1986 (7); J.M. Carvalho & F.M. Flores, 2526 (3), 1375 (3); B. Casaseca, 25 May 1972 (3); B. Casaseca & al., 27 June 1978 (3); R. Castillo & J.L. Fernández Alonso, 10605 (3); S. Castroviejo, S. Cirujano & J. Herrero, 1187 (1); L. Ceballos, 5 Aug 1935 (7); C. Cedercreutz, 10 May 1963 (6a); L.J. Čelakovský, Aug 1867 (10a); R. Çetik, 289 (18), 301 (13); L. Chamberet & F. Gérard, 1317 (10a); A. Charpin & D. Jeanmarod, 23424 (12a); A.G. Chukavina, 20 (25); J.R. Churchill, 22 Aug 1907 (2a); S. Cirujano, 12 Apr 1975 (1); K.E. Claus, July 1852 (21b); M. Compañó, July 1873 (2b); Copenhagen Excurs., 75 (12a); C. Copineau, 4 June 1887 (4); E. Cosson, 20 June 1880 (23), 23 June 1854 (23), 24 June 1880 (23); E. Cosson & V.C. Reboud, 2931 (23); A.C. Costae, Aug 1858 (7), 20 July 1858 (1); H. Coste, 19 June 1890 (4), 14 July 1895 (3); P. Cousturier & Wiedmann, May 1916 (4); J.M. Cowan & D.C. Darlington, 1381 (15); J. Cuatrecasas, 17 July 1922 (7); V. Curcic, 25 July 1896 (6a); B.M. Czernjaevi, Aug 1849 (21b).

O. **D**ahl, 10 Aug 1902 (2c), 4 Aug 1902 (2c), 20 Aug 1902 (2a); J. Damboldt, 667 (2a); J. Daveau, June 1879 (3); P.H. Davis, 14331 (9b), 47347 (21a), 47104 (15), 45940 (15), 30623 (21a), 46408 (21a), 47342 (19), 45852 (15), 44618 (15), 46189 (19), 31584 (21a), 46558 (21a), 9750 (9a), 10040 (9a), 20580 (16); P.H. Davis & I.C. Hedge, 32649 (21a), 30766 (15), 31812 (15); P.H. Davis & M.J.E. Coode, 37377 (14), 36762 (13); P.H. Davis & O. Polunin, 23304 (21a), 24585 (19), 23036 (19), 22690 (9b), 22901 (15); P.H. Davis, J.G. Dodds & R. Çetik, 20080 (15); P.H. Davis, M.J.E. Coode & F. Yaltirik, 38363 (15); J. de Puyfol, 306 (3), 1714 (2b), 2932 (3); A. Degen, 2 Aug 1907 (8), 19 Aug 1903 (8), 65 (8); M. Delbès, 168 (21a); M. Despaty, 2088 (10a); N.A. Dessiatoff, 1791 (25), 304 (25); J.A. Devesa & al., 20 July 1980 (2b); A. Dieterle, 1143 (27b); W. Dietrich, 1063 (2a), 5489 (2a), 6056 (2b); E. Dinsmore, 11971 (9a); T. Diomède, June 1866 (4); M. Dittrich, 2007 (2a); D.A. Divnogorskaya, 119 (25), 341 (25); J.E. Doassans, 2933 (7); C. Dökmeci, 35570 (19); G.I. Dolenko, 431 (25); I. Dörfler, 421 (6a); A.K. Drenowski, 20 July 1936 (12a); V.P. Drobow, 448 (26), 1082 (25); A. Dubuis, 9769 (23), 9768 (23); Ch. Duffour, 6920 (3); G.L. Durando, May 1857 (1); J. Duvigneaud, 79 (10a); A. Düzeuli, 913 (16); N.N. Dzens-Litovskaja, 181 (27a), 121 (27a).

L. **E**delberg, 1244 (27b); G. Een, 15 May 1957 (4); P. Eggensberger, 221 (2a); T.V. Egorova, 1835 (26); T.V. Egorova & V.P. Bochantsev, 730 (25), 1286 (25), 576 (25), 940 (25), 558 (25); C.G.

Ehrenberg, 265 (9a), June 1824 (9a); A. Eig & M. Zohary, 3 Sep 1931 (9a); G. Einar Du Rietz, 23 July 1923 (2a); A. Einsele, 877 (2c); T. Ekim, 16 (13); R. Elenevsky, 20 Aug 1939 (22), 22 Aug 1939 (22), 4 Aug 1940 (22); H. Elías, 28 June 1908 (3), May 1906 (3), 2 July 1910 (3), 940 (3); H. Ellenberg, 161 (18); S.J. Enander, 30 July 1912 (10b); E.A. Endaurowa, 11 July 1907 (16); P.A.C. Endress, Aug 1818 (7); V. Engelhardt, 29 Aug 1907 (2c), 28 July 1927 (2c); I.M. Ermolaeva, 608 (21b), 609 (21b); A. Ernst, 9 May 1909 (6a), 28 June 1927 (6a); J. Esseiva, 8 July 1852 (2b); G. Evers, 8991 (10a); C. Evrard, 10800b (6a); excursie 1964, 2 July 1964 (10a).

F. **F**ages, 7 Aug 1886 (7); A. Falck, Aug 1870 (8); L. Faurel, 22 July 1943 (23), 21 June 1931 (23); F. Faust, 48 (22); S.K. Fedoseevich, 226 (21b); B.A. Fedtschenko, 172 (14), 21 July 1904 (27a), 524 (26), 449 (26), 26 July 1904 (27a); B.A. Fedtschenko & E.P. Chernova, 67 (26), 153 (26); B.A. Fedtschenko & N.F. Gontscharow, 839 (21b), 435 (21b); O. Fedtschenko, 1 June 1870 (26), 9 June 1870 (26); O. Fedtschenko & B.A. Fedtschenko, 2 July 1901 (27a); L. Feoli Chiapella, 8818 (6a); J.L. Fernández Alonso, 220 (3); F.J. Fernández Casas, 26 Aug 1969 (2b), 2275 (5), 625 (5); F.J. Fernández Casas & al., 1263 (4), 2022 (2b); F.J. Fernández Casas & J. Molero, 68 (4); E. Ferrari, 2 Aug 1889 (2a); A. Fiori & A. Béguinot, 1770 (10a); M.A. Fischer, 16 Sep 1978 (2c), 7 June 1976 (2c); F. Fleischer, May 1826 (6a); H. Fleischmann, 198 (10a); A. Fokkinga, 24 June 1969 (17); J. Font, 18 Apr 2004 (4); P. Font i Quer, 692 (7), 12 May 1930 (5), 15 May 1930 (5), 679 (5), 680 (23), 7 June 1916 (4), 15 June 1915 (3), 11 June 1932 (1), 21 May 1912 (4), 405 (23); P. Font i Quer & F. Masclans, 16 May 1955 (1); H. Foroughi, 4247 (15), 4278 (15); J. Foucaud, 7 July 1879 (3); J. Foucaud & Jousset, 4265 (3); P. Fourès, 1847 (3), 28 May 1903 (4); Frick, 344 (21a); Y.C. Frolov, 200 (22); E. Fuentes, 18 June 1976 (3); P. Furse, 3797 (19).

E. **G**adeceau, 15 June 1890 (3); J. Gadzhiev, N. Gurvitsch & G. Ulubabov, 2 Aug 1933 (15); P. Gagarin, 2053 (27a); R. Gagnidze, 2 Sep 1964 (21a), 1035 (16); R. Gagnidze & al., 9 Aug 1997 (16); R. Gagnidze & I. Mikeladze, 27 Aug 1965 (16); C. Gaillardot, 1314 (9a), 1940 (9a); E.F. Galiano, S. Silvestre & B. Valdés, 27 July 1969 (2b); H. Gander, 7 Aug 1865 (2c); M. Gandoger, July 1869 (7), 601 (2b); O. García Cardo, B. Abad Garrido & J.M. Martínez Labarga, 209 (1); G. Gautier, June 1886 (4); G. Gavelle, 5 June 1964 (2a); D.V. Geltman & al., 719 (16), 3028 (16); C.A. Gérard, 7 July 1889 (10a); T. Gheorghieff, 138 (12a), 7 Aug 1887 (10a); A. Gilli, 21 July 1972 (2a); S.G. Gmelin, Aug 1773 (10b); E. Gochina, 4 Aug 1956 (16); A.K. Golbek, 24 June 1911 (25); D. Gómez & C. Aseginolaza, 14672 (1); N.F. Gontscharow, J. Grigorjev & V.V. Nikitin, 599 (25); N.V. Gorbunova & Ubukeeva, 6 May 1968 (25); A.E. Gorton, 6 Aug 1922 (10a); W. Greuter, 16169 (12a), 16095 (12a), 11364 (12a), 16039 (12a), 15973 (12a); W. Greuter & B. Pirker, 23891 (8); W. Griffith, 3248 (27b); J.S. Grigorjev, 117 (26), 17 July 1943 (27a), 35 (25), 58 (25); G.P. Grintescu, 832c (10a), 832 (10a); A. Gröger & W. Lobin, 1369 (16); E. Gros, 20 May 1919 (5), 8 May 1919 (5); R. Gross, 1 Aug 1906 (10a); A.A. Grossheim, 8 Sep 1920 (16); A.A. Grossheim, M.I. Kirpichnikov & I.A. Il'inskaya, 10 June 1947 (15), 16 June 1947 (15), 17 June 1947 (15); H. Groves, Aug 1875 (6b), 10 Aug 1874 (6b), 14 Aug 1875 (6b), Aug 1875 (2c), Aug 1876 (2c); V.I. Grubov, 107 (25); M. Guadagno, July 1905 (6b); I. Gubanov, B. Pavlov & M.C. Younos, 652 (27b); J. Güemes & al., 2682 (3); G. Guicciardi, 3197 (12b), 192 (12a); K.M. Guichard, 10 Sep 1960 (21a); H. Guilhot, 12 July 1906 (3), 15 July 1900 (3); Guseinov, 29 Aug 1968 (22).

W. **H**aines, 1847 (9a); E. Hamzaoğlu, Ü. Budak & A. Aksoy, 4370 (20); H.F. Handel-Mazzetti, 11 July 1905 (10a), 474 (9b); M. Haradjian, 1694 (9b), 1738 (9b); P. Harrold & McBeath, 279 (2b); O.J. Hasslow, 1566 (10a); G.A. Hauser, 399 (10a); H.C. Haussknecht, 23 Oct 1865 (21a); J. Heimans, 31 July 1935 (2a); P. Hein, 56 (20), 49 (14), 6064 (2a); T. Heldreich, July 1844 (12a), Aug 1848 (17), June 1845 (15), 10 Aug 1845 (14), 939 (12a), 313 (12a); E. Hellmann, 619 (10a); W. Hempel, 21 Aug 1962 (10a); Henle, 1 Aug 1913 (2a); F.N. Hepper, 9061 (4); J. Heribaud, 15 July 1880 (3); A.M. Hernández, 31 July 1984 (7); Herrá, 2 June 1985 (3); A. Herrero & al., 1585 (16), 2337 (12a); H. Hertel, 28025 (2a); J. Heuffel, Aug 1853 (8); P. Hiepko, 123 (6a); N. Hjalmar Nilsson, 1769 (7); O. Hoffmann, 996 (27a); L. Holm, 24 June 1947 (10a); L. Holmgren & H.E. Wanntorp, 41 (2a); J.J. Holtkamp & H. Popkema, 3959 (10a); J.D. Hooker, Apr 1871 (5); J.D. Hooker & D. Hanbury, Sep 1860 (9a); H. Höppner, 793 (10a); E. Hörandl & F. Hadaček, 4775 (14); B. Hryniewiecki, 18 July 1901 (16); A. Huber-Morath, 13254 (14), 11256 (19), 11258 (21a), 15840 (9b), 15845 (21a), 13255 (21a), 17303 (18), 13256 (19), 8543 (13), 8544 (18), 13258 (19), 15841 (18), 15839 (18), 11255 (19), 9161 (19); A. Huet de Pavillon, July 1853 (21a), 7 Sep 1852 (7); A. Huet de Pavillon & E. Huet de Pavillon, 360 (6b); R. Huter, Aug 1870 (2c), 1800 (2c); R. Huter, P. Porta & G. Rigo, 1049 (7), 1054 (5).

F. **I**dinael, 10 July 1882 (3); J.H. Ietswaart, 11337 (2a), 11470 (2a); S.S. Ikonnikov, 2181 (27a), 17513 (27a), 3892 (27a), 4637 (27a), 3227 (27a), 3267 (27a), 3082 (27a), 3404 (27a), 16211 (27a), 16139

(27a); S.S. Ikonnikov & N.D. Rachkovskaya, 3017 (27a); S.S. Ikonnikov & N.P. Litvinova, 4128 (21b); M.M. Iljin & al., 663 (21b); M.M. Iljin & M.N. Avramchik, 288 (21b); T.I. Isachenko, G.D. Samarina & G.N. Tsvetova, 3568 (21b), 3551 (21b), 3550 (21b); E. Ivanova & N. Ivanova, 718 (21b); A. Izuzquiza & al., 2250 (2c).

M. **J**abornegg, Aug 1880 (2c); M. Jacobs, 6929 (15); H. Jacquin & Metz, 16 May 1854 (4); A. Jakouschev, 30 July 1910 (10b); E. Janchen & B. Watzl, 23 July 1907 (2c), 6 July 1907 (2c), 8 July 1907 (2c); S. Jávorka & Filarnky, 2080 (8); H.E. Jeanpert, 29 July 1914 (2a), 30 July 1906 (2c), 11 Aug 1912 (2a); S. Juzepczuk, 154 (10a).

R.V. **K**amelin, 196 (26), 21 June 1966 (27a), 17 June 1966 (27a); R.V. Kamelin & A.M. Makhmedov, 355 (25); R.V. Kamelin & Mamedov, 147 (26), 53 (26); R.V. Kamelin, B. Ganibal & L. Averyanov, 322 (26), 230 (26); R.V. Kamelin, N. Abdukhamidov & A. Chukavina, 24 July 1969 (25); R.V. Kamelin, N. Sadarov & A. Khalimov, 496 (25); R.V. Kamelin, N. Safarov & Halipov, 1078 (25); G.S. Karelin, 104 (21b); I. Karjagin & B. Safiev, 16 Aug 1931 (15); Z. Kárpáti, 28 Aug 1942 (8); B.F. Kashmensky, 14 July 1904 (21b), 27 July 1904 (21b); L. Keller, 24 June 1897 (2c); L. Kemularia-Natadze, S. Kuthatheladze & A. Schchian, 3 Aug 1953 (16); L. Khintibidze & Z.I. Gvinianidze, 13 July 1966 (16); E.I. Kikodse, 2 Aug 1914 (16), 6 Aug 1914 (16), Aug 1914 (16), 11 Aug 1914 (16), 12 Aug 1914 (16), 16 July 1914 (16), 10 July 1914 (16), 8 Aug 1914 (16); A.W. Kloos, 9 Aug 1926 (2a); O.E. Knorring, 911 (21b); O.E. Knorring & V.M. Smirnova, 148 (21b), 316 (21b); W. Koch, 54/190 (10a), 16 July 1942 (2a); M. Köie, 2534 (27b); V. Kolari, 2342 (2c); F.A.R. Kolenati, 2151 (16); V.L. Komarov, 29 May 1892 (26), May 1892 (26), 1 June 1892 (26); A. Konnov, 1020 (26); A.S. Koroleva & V.A. Nikitin, 177 (26); E.E. Korotkova, 296 (26), 508 (26), 327 (26); M.F. Korotky & Z. Lebedeva, 1161 (21b); S.I. Korshinsky, 1541 (25), 1650 (25), 1542 (25), 1540 (27a), 1719 (25), 1638 (25), 208 (26), 1637 (25); T. Kotschy, 157 (8), 66 (19), 626 (9b), 251 (9b), 121 (9b), 121 (15), 428 (21a), 399 (19), 314 (19), 312 (15), June 1862 (16), 222 (9a), 310 (9b), 296 (21a), 257 (19); W. Kozlowsky, 173 (21a); L. Kralik, 125 (23); K.U. Kramer, 6621 (2a); K.U. Kramer & E.A. Mennega, 18 June 1952 (10a); I.M. Krascheninnikov, 150 (21b), 715 (21b), 635 (21b), 1039 (21b), 606 (21b), 16 July 1908 (21b); I.M. Krascheninnikov & H. Krascheninnikov, 8 Aug 1907 (21b); I.M. Krascheninnikov & K.S. Afanasiev, 1524 (21b), 1042 (21b), 1518 (21b); V. Kreczetovicz, 1009 (10b); F. Krendl & W. Burri, 14 July 1991 (12a), 28 June 1991 (12a); M. Krivonogova, 160 (27a); I.Th. Krjukow, 21 July 1898 (21b); P. Kruber, 30 July 1922 (2a); J. Kruseman, 16 Aug 1953 (2a); W. Kruyt, 17 Aug 1965 (2a); P.N. Krylov, 1 June 1916 (16), 17 July 1904 (10b); P.N. Krylov & E.I. Steinberg, 5 July 1916 (16); S.E. Kucherevskaya, 1900 (21b); S.E. Kucherevskaya & S. Nevski, 828 (21b), 712 (21b); G.L. Kudrjaschova, 174 (25); H. Kuehn, 1 Aug 1890 (10a); E. Kugler, 16 Aug 1875 (2c), 15 July 1882 (2a); I. Kukkonen, 6210 (25); H. Kulzer, June 1912 (15); J.B. Kümmerle, 24 July 1918 (6a); Kurbanov, 1218 (27b); S.E. Kutscherovskaja, 539 (21b); B. Kuzmanov, 7572 (8); L.V. Kuzmina, 346 (27a), 305 (27a); N.I. Kuznetsow, 254 (21b); I.V. Kuznetzow, 15 July 1909 (16).

C.C. **L**acaita, 2 July 1910 (6a); F. Lacroix, 1693 (10a); M. Ladero & al., 27 Apr 1983 (11); M. Ladero & J. González, 10 June 1983 (7); G. Ladygina, 2168 (27a), 500 (27a), 1035 (27a); M. Lagasca, 117 (3); J. Lamond, 4131 (15); M. Lamotte, 2170 (4); R. Lampinen & T. Lampinen, 18132 (10a), 18095 (10a); J.E. Langhe, 8 July 1967 (6a), 368/1971 (2a), 2838 (10a), 210/1968 (2a), 240/89 (10a); I.W. Larin, 189 (10b); K. Larsen, 20965 (2c); E.M. Lavrenko, 10 Aug 1938 (21b); J.J. Lazare, 14671 (1); J.A. Lázaro Bello, 6 June 2004 (3); Leidse bot. exc., 48 (5); G. Lengyel, June 1900 (10b); C. Leonis, 4344 (17), 123 (12b); A.I. Leskov, 259 (16), 824 (16); A.I. Leskov & A.P. Rusaleev, 24 July 1929 (16), 638 (16); G.H. Leute, 9351/4 (10a); E. Levier, 20 July 1876 (6a), 21 Aug 1875 (6b), 10 Aug 1874 (6b); F. Levina, 333 (10b); S. Levitsky, 22 Aug 1937 (21b); I.A. Linczevski, 16 (25), 106 (25), 43 (25), 258 (25); H. Lindberg, 10 May 1905 (6a); J.C. Lindeman, 434 (10a); J.I. Lindroth, 28 Aug 1899 (10b); W. Lippert, 24 Aug 1962 (2c), 15992 (2a); S.I. Lipschitz, 261 (27a); V.I. Lipsky, 9 July 1897 (25), 19 July 1897 (27a), 2 June 1891 (26), 6 Aug 1895 (16), 2 June 1897 (26), 3 June 1896 (26), 14 July 1892 (22); D.I. Litvinov, 19 Aug 1888 (21b), June 1914 (15), 19 Aug 1889 (21b), 553 (16), 24 July 1895 (21b), 1264 (21b), 13 July 1914 (21a); N.P. Litvinova, 13543 (27a); J. Lloyd, 14 July 1874 (3); A. Lomakin, 8 July 1895 (15); A.E. Lomax, 15 July 1892 (7); M. Longa, 973 (2a); G. López, 1006 (11), 9747 (1); A.D. Lordkipanidze, 11 July 1936 (16); E. Loriente, 4 June 1983 (3); J.M. Losa Quintana, 5 July 1978 (2b); C. Loscos, June 1876 (3); M. Luceño, 2 July 1984 (3); M. Luceño & al., 141 (2b); M. Luceño, F. Muñoz & P. Vargas, 6 July 1985 (7); V. Lukanenkova, 224 (27a).

V. **M**adiot, 6651 (10a); A. Maillefer, 12 July 1903 (10a); R. Maire, 2457 (23); J.V.C. Malato-Beliz & A. Cadete, 5303 (11); J.V.C. Malato-Beliz & J.A. Guerra, 16035 (11), 16100 (11), 16021 (11);

Mall, July 1865 (10a); A. Manissadjian, 208 (15); A. Marais, 22 July 1885 (2a); E. Marchal, 331 (10a); C. Marchesetti, 1801 (6a), Aug 1908 (2c), 974 (6a); F. Markgraf, 10865 (16); F. Markgraf & I. Markgraf, June 1950 (6a); U. Martelli, 10 May 1893 (6a); P. Martin, 2754 (10a); E.F. Martín del Amo, July 1872 (7); M. Martínez, 9 June 1934 (4); M.J. Martínez Lirola, 14 May 2001 (1); D. Marzialetti, June 1845 (6b); J. Mas Guindal, 13 Apr 1929 (5), 1 June 1930 (23); G. Mateo, 22 June 1988 (3); E. Mayer, 63380 (10a), 63414 (10a), 10001 (10a), 63476 (6a), 54796 (6a); E. Mayer & al., 10056 (6a); L. Medina, 4694 (7); Y. Menitsky, 197 (16), 18 July 1969 (16), 23 June 1974 (15); Y. Menitsky & al., 107 (16); Y. Menitsky, T. Popova & T. Gorlina, 430 (22), 453 (22); E. Mercier, 5 May 1862 (4); H. Merxmüller & J. Grau, 20731 (2c); H. Merxmüller & W. Gleisner, 25760 (1); H. Merxmüller & W. Lippert, 23760 (6a); H. Merxmüller & W. Wiedmann, 17896 (6a), 17707 (2a), 11 June 1962 (4); C.A. Meyer, 686 (22); O. Meylan, 2417 (2a); A.I. Michelson, 1040 (26), 442 (26), 1691 (25), 1334 (25); J. Milliat, 7193 (10a); N.I. Miloshevich, 19 Aug 1939 (16); P. Mingard, 13 July 1988 (2a); B. Mirich, 23 May 1857 (6a); E.R. Missbach, July 1897 (2c); J. Molero, 2 June 1978 (4), 23 June 1974 (4), 10 June 1980 (5), 82 (1); J. Molero & Ll. Sáez, 9 June 1996 (3); A. Moller, 273 (7); E. Monasterio & al., 1334 (3); P. Montserrat & L. Villar, 5 June 1983 (4); P. Montserrat, L. Villar & D. Gómez, 17 July 1985 (2b); R. Morales & J. Esteban, 1056 (7); W. Möschl & H. Pittoni, 24 Aug 1974 (10a); P. Mouterde, 5586 (9a), 10 July 1932 (9a), 13 Aug 1933 (9a); J. Müller, 10330 (2b); Munvarov, 2187 (27a); L. Muñoz Centeno, X. Giráldez & M. Martínez Ortega, 15 July 2002 (16); R.P. Murray, 203 (3).

J. **N**emetz, 27 May 1897 (13); G.N. Nepli & E.I. Varivetseva, 442 (25), 651 (25), 962 (25), 433 (25), 157 (25), 3 May 1948 (25), 15 Apr 1947 (25); V. Nikitin, 4198 (25); S. Nisa & al., 917 (16); I.V. Novopokrovsky, 1117 (21b); I.V. Novopokrovsky & al., 865 (21b); I.V. Novopokrovsky, P.Kh. Mikhaylov & E.S. Zaytseva, 1060 (21b); I.V. Novopokrovsky & V.N. Yakovlev, 1240 (21b); J. Nuet, 441 (4); E.I. Nyárády & E. Pop, 829 (8); M. Nydegger, 15059 (14), 11541 (14), 15128 (13), 17293 (19), 17367 (19), 14050 (14), 43751 (19), 14682 (21a), 16994c (19), 17168 (19), 16993 (15), 17633 (19).

E. **O**lden, 21 June 1938 (2a); J. Ooststroom, 19319 (2a), 16190 (2a); T.G. Orphanides, 7 Aug 1871 (17), 109 (12a), 26 July 1871 (17), 30 July 1871 (17), July 1857 (12a), 85 (8), 1065 (8), 3283 (12a), 7 Aug 1886 (17), 1139 (12a), 8 July 1851 (12a), 2959 (12a); A. Orsini, Oct 1851 (6b), 90 (6b); P.N. Ovczinnikov & C.S. Afanassiev, 393 (27a), 669 (27a), 1550 (27a), 555 (27a); C. Ozanon, 94 (2a); P. Ozenda, 30 July 1975 (6b).

R. **P**abo, 6 Aug 1847 (10b), 28 July 1848 (21b); H. Pabot, 753 (21a), 13 Sep 1951 (9a), 26 July 1953 (9a), 25 July 1952 (9a), 30 July 1952 (9a), 22 July 1952 (9a), 26 Aug 1958 (27b), 7923 (27b), 10 July 1951 (9a); G. Pahnsch, 8 Aug 1875 (10a); P.S. Panjutin, 2491b (16), 24916 (16), 27 July 1933 (16); M. Pardo de Santayana, 1416 (3), 1317 (3); E. Parry, 184 (18); C. Pau, 23 June 1917 (3), 9 July 1887 (3), 11 July 1906 (2b), 8 May 1921 (23), 30 May 1905 (3); O. Paulsen, 996 (27a); H. Pavillon, Aug 1853 (19); N.V. Pavlov, 26 July 1921 (21b), 21 July 1921 (21b); J. Pedrol, 197 (1); A. Perlaky, 3776 (10b); L. Péronin, July 1872 (18); H. Peşmen, 1069 (9b); V. Petrov & M. Shevljakov, 13 Aug 1938 (21a); V. Petrova, 346 (10b); I. Pevalek, 5 Sep 1917 (10a); E. Peyron, 1582 (9a); D. Phitos, 232 (6a), 3955 (17); T. Pichler, 1800 (2c), July 1883 (2c), 65 (6a), 104 (14); V.V. Pissjaukova, 350 (27a); C.J. Pitard, Aug 1900 (2a); D. Podlech, 11145 (27a), 39203 (23), 37863 (8), 39340 (23), 10559 (25), 10572 (25), 10625 (25), 11104 (27a), 21840 (27b), 12136 (27b), 21439 (25), 24489 (2a), 21572 (25); D. Podlech & K. Jarmal, 30151 (25); J. Poelt, 8 June 1963 (2a); S. Pons, 2 Aug 1886 (7); G. Popescu & M. Păun, 750 (10a); M.G. Popov, 9 May 1915 (26), 27 Apr 1916 (26), 50 (25), 4 May 1915 (26); T.I. Popov, 19 Aug 1913 (21b); P. Porta, 25 June 1871 (10a); P. Porta & G. Rigo, 198 (1), 197 (1); B. Post, 177 (9a), 2 Aug 1899 (9a), 119 (9b), 179 (8), 18 Apr 1937 (13), 25 May 1939 (13), 907 (19), 832 (19); M. Prjachin, 20 May 1939 (25); I.G. Protopopov & P. Gomolitsky, 228 (26); H. Puech, 27 May 1906 (4), 10 June 1908 (4), 5 June 1905 (4).

I. **Q**uasdorf, 328 (16).

G.I. **R**adde, 22 Aug 1864 (16), 161 (16), 421 (16), 192 (15), 226 (15), 308 (16); N. Rahchamani & A. Ezazi, 4692 (28); V. Rastetter, 6297 (2b); T. Raus, 4124 (15), 4445 (21a), 4391 (15); M. Răvărut, 30 July 1950 (8); V.C. Reboud, 27 May 1858 (1), June 1854 (1); K. Rechinger, 1637 (8), 6 Aug 1922 (8); K. Rechinger & K.H. Rechinger, 10386 (12a);K.H. Rechinger, 49889 (21a); K.H. Rechinger, 36208 (27b), 17769 (27b), 18808 (27b), 16732 (17), 184 (7), 18249 (27b), 53874 (15), 43132 (15), 32891 (19), 27 May 1928 (6a), 48587 (15), 56847 (15), 45211 (12a), 20968 (8), 36098 (27b), 55880 (27b), 4819 (27b), 16775 (27b), 47276 (27b), 51314 (27b); K.H. Rechinger & J. Scheffer, 1485 (6a); A. Regel, 7 May 1883 (25), 4 May 1883 (25), 2 May 1883 (25), May 1883 (25), 28 Apr 1883 (25), 3 May 1883 (25); C. Regel, 8 July 1939 (12a), 14 July 1953 (7); Rehnelt, Aug 1967 (10a); J. Renz & H. Runemark, 56088 (27b); B. Retz,

4038 (10a), 89951 (4), 65670 (10a); W. Retzdorff, 2 July 1892 (2a), 4 Aug 1889 (2a); G.F. Reuter, Aug 1841 (7); J. Revel, 24 June 1858 (3); E. Reverchon, 809 (3), June 1898 (23), July 1897 (23), 5096 (7), 23 June 1872 (2a), 25 June 1877 (4), 137 (11), July 1905 (7), June 1898 (23), July 1904 (7), 166 (2a); R. Ricci, 15 June 1879 (6b), July 1877 (6b); 3 July 1877 (6b), A. Richter, 16 June 1909 (2a); K. Richter, 20 May 1887 (6a); E. Rico, 281 (7); G. Rigo, 412 (6a), 10 June 1886 (10a); A. Rigual, 15 Apr 1961 (1); J.-A. Rioux & E. Golvan, 461 (27b); S. Rivas-Martínez, 8 July 1966 (2b), 28 May 1951 (1); S. Rivas-Martínez & al., 17612 (7); E.M. Rix, 331 (15); A. Rochel, 1 Aug 1840 (10b); L.E. Rodin & D.V. Lebedev, 705 (21b); A. Rodríguez, 20 Aug 1960 (7); A. Rodríguez-Hergueta, June 1998 (7); H. Roivainen, 30 May 1952 (5); C.M. Romero Rodríguez, July 1983 (2b), 4 July 2005 (7); H.A. Romieux, 18 July 1886 (2b), 273 (23); A. Romo, 19 June 1979 (4), 17 June 1978 (4), 6 June 1980 (4); K. Ronniger, 23 Aug 1894 (2a); R.Y. Roshevitz, 360 (25), 575 (25), 683 (25); Rost, Sep 1948 (10b); G. Rouy, 3 June 1866 (4), 20 June 1879 (4), 24 May 1857 (4), 344 (10a); Royl & W. Hempel, 27 Sep 1986 (2c); Royl, W. Hempel & U. Richter, 19 Sep 1986 (2a); F.J. Ruprecht, 17 July 1960 (16), 131c (16), 130 (16), 12 July 1853 (10a).

H. **S**abeti, 4148 (15); W. Sadé, 30 June 1968 (2a); J. Sadler, July 1826 (10b); E. Saint-Lager, 21 June 1898 (6a); Sajarov, 15 July 1909 (16); F.É. Saltel, 29 June 1880 (3), 24 July 1882 (3); F.É. Saltel & G. Chastaingt, 15 July 1880 (3); G. Samuelsson, 6063 (9a); N.Y. Sandwith, 5168 (3), 4610 (3); Santo, 18 May 1989 (3); M. Sanz Elorza, 24 June 2001 (7); V. Sapoznikov, 24 July 1916 (15); W. Savicz, 1916 (21b); J. Savola, 31 July 1994 (10a), 18 July 1993 (10a); Schafferer, 27 July 1892 (2a); I. Schanzer & T. Kramina, 29 July 1993 (10b); Scharolhowa, 14 Aug 1882 (21b); J. Scheffer, 25 Aug 1934 (8); A.B. Schelkovnikov, 15 July 1906 (15), 21 July 1911 (16), 12 July 1911 (16), 9 July 1966 (15); A.B. Schelkovnikov & E. Kara-Murza, 20 Aug 1927 (21a), 29 July 1928 (15); J. Schell, 483 (21b), 485 (10b); C. Scheppig, 1 July 1888 (10a); I. Schirajewsky, 21 July 1907 (10b), 16 July 1904 (21b); B.K. Schischkin, 4 July 1916 (21a), 7 July 1916 (15), 6 July 1916 (19), 11 July 1920 (16), 1 July 1916 (15), 26 May 1916 (15), 7 July 1916 (21a), 4 June 1916 (15); C.O. Schlyters, 29 July 1879 (2c); A. Schneider, 17611 (10a); C.K. Schneider & Bergmann, 1420 (8), 828 (8); P. Schönswetter & A. Tribsch, 17 July 1997 (16); A.G. Schrenk, 136 (21b), 2334 (21b); F. Schuhwerk, 363 (2a); C. Schultz, 1278bis (10a); R. Schulz, 14 July 1896 (2a), 19 July 1911 (10a), 25 July 1911 (10a), 20 July 1892 (10a), 9 Aug 1911 (10a); O. Schwarz, 931 (13); A. Sedelnikov, 1 Aug 1907 (21b); A. Segura Zubizarreta, 9836 (1), 31465 (7), 16941 (3); R. de Seigneux, Aug 1883 (2a); D. Sellmair, 28 July 1973 (10a); (frère) Sennen, 16 June 1898 (4), 21 Aug 1909 (1); 3 Aug 1916 (7), 1699 (7), 31 July 1929 (7), 4435 (7), 2690 (2b); A. Serra, 12 Sep 1985 (7); L. Serra & F. Pérez, 8538 (1); A.B. Shelkovnikov & N.V. Schipczinsky, 7 May 1916 (15); R.J. Shuttleworth, 30 July 1868 (2a); L. Sidorov, 2454 (27a); L. Sidorov & G. Ladygina, 2243 (27a); F.W. Sieber, May 1812 (6a); W. Siehe, 149 (9b), 553 (18), 667 (9b), 616a (15), 616 (15); E. Simon, 11 June 1894 (4); P. Sintenis, 2693 (15), 6274 (15), 897 (15), 4815 (15), 2922 (19), 7219 (19), 593 (6a), 1024 (19), 742 (6a), 3271 (19), 628 (13), 1222 (15), 7212 (16), 3272 (21a); P. Sintenis & Hedge, 3273 (21a); C. Sîrbu, 21 Aug 2002 (8); Skinnes, May 1895 (6a); A.K. Skvortsov, 17 Sep 1966 (21b), 15 Sep 1980 (21b); A.K. Skvortsov & al., 9 July 1993 (10b); H. Sleumer, 1471 (2b); A.A. Slobodov, 86 (25); J.G. Sloff, 767 (10a); B.E. Smythies, 170 (5), 512 (1); E. Sobrino & M. Sanz, 27 May 1996 (3); V.B. Soczava & V.F. Semenov, 28 July 1948 (16); J.L. Soest, 21 July 1956 (2a); D. Sofinsky, 23 July 1902 (21b); T. Sokova & S. Kuzmenko, 6 Aug 1975 (10b); S. Sommier & E. Levier, 717 (16); K.A. Sonklar, June 1869 (10a); J. Soulié, 10 June 1903 (4); R.B. Spicee, 55 (17); M.D. Spiridonova, 399 (21b); A. Spitzel, 435 (2a); G.C. Spreitzenhofer, 4 July 1871 (2c); I.I. Sprygin, 275 (21b); N. Sredinsky, 160 (16); F.A. Stafleu, 609 (10a); J.D.A. Stainton, 2517 (27a), 7789 (12a); W. Starmühler, 3 May 2001 (6a); A. Sterneck, 15 July 1904 (2a); W. Steup, 4 Aug 1924 (16), 12 Aug 1924 (16); C. Steurer, May 1893 (6a), June 1891 (6a), Apr 1884 (6a); G. Stohr, 27 (16); N. Stojanoff & T. Georgieff, 29 June 1930 (12a); A. Stork, 7906 (2b); T. Strauss, Aug 1898 (27b), July 1899 (15), 15 July 1895 (15); V. Střibrny, 5 July 1896 (12a), 13 July 1895 (12a), 10 July 1898 (12a), July 1894 (12a), 4 Aug 1895 (12a), 9 July 1898 (12a), Aug 1907 (8); A. Strid & al., 18602 (12a); A. Strid & D. Vassiliades, 55317 (6a); A. Strid & E. Georgiadou, 13319 (12a); A. Strid, L. Farsakoglou & R. Franzén, 19343 (12a); J.D. Sukhova, 488 (21b); E. Sulger Büel, 26 Aug 1951 (2a); S. Sultanov, 661 (27a); A.J. Szovits, June 1829 (15), June 1828 (15), 29 (21a), 523 (21a).

A.L. **T**akhtajan, 10 May 1965 (25); L. Tamamdjieff, 23 Aug 1929 (8), 27 Aug 1929 (8); P.H.W. Taubert, 1328 (10a); I.F. Tausch, 815b (10a), 815a (10b); J.A. Tauscher, 19 June 1879 (10a); H.G. Tedd, 1879 (12a); V. Tenore, July 1880 (6a); J. Terré, 1762 (2a); A. Thielens, July 1863 (10a); A. Thielens & A. Devos, 267 (10a); M. Thulin, 5779 (5), 4878 (5); P.M.E. Timbal-Lagrave, June 1879 (4); P.M.E. Timbal-Lagrave & E.J.M. Jeanbernat, 31 July 1884 (7); A. Timmermans, 1 Aug 1959 (10a); J. Timothée, Aug 1879 (2a); D. Tolimir, M. Döring & G. Parolly, 1680 (16); M. de Tommasini, 81bis (6a), 1434 (6a), 81 (6a); E. Topa, 832b (10a); A. Touw, 13280 (2b); C.C. Townsend, 91/478 (2a); G. Treffer, 20 July 1895 (2c), 24 June 1897 (2c), 3 Aug 1886 (2c); A. Tribsch, 8 Aug 1998 (10a); A. Tribsch & al., 6480

(2b); N.N. Tsvelev, 30 (21b); N.N. Tsvelev & C. Cherepanov, 886 (15), 487 (15); S.A.T. Tullberg, Aug 1867 (10a); B. Tuntas, 124 (12b), 283 (12b); W.B. Turrill, 1239 (8); N.N. Tuturin, 94 (27a); N.N. Tuturin & P.I. Bessedin, 252 (27a), 617 (27a), 364 (27a), 52 (27a), 645 (27a), 679 (25), 90 (25); M. Twardowska, 445 (10b); N.N. Tzvelev & al., 1553 (21b).

V.N. **U**khacheva, 643 (27a); J. Ullepitsch, July 1880 (2a); R. Ulrich, 7 May 1992 (5); P. Uotila, 19630 (21a); P.M. Uribe-Echebarría & P. Urrutia, 18 June 1987 (1); P. Urrutia, 15217 (1); P. Urrutia & al., 22 July 1987 (7); L. Vágner, July 1849 (10b); E. Valdés-Bermejo, 1128 (2a), 12016 (2a); E. Valdés-Bermejo & al., 11448 (2b); E. Valdés-Bermejo & S. Castroviejo, 1202 (7); C. Valle, 17 July 1983 (7); E. Valon, 3111 (2a); N.E. Vargina, 19 Aug 1958 (22); E.I. Varivetseva, 13 May 1937 (25), 28 Apr 1937 (25); V. Vašák, 9 Aug 1992 (9b), 15 July 1979 (16); V. Vašák & G. Esvandzhia, 22 July 1979 (16); A. Vasinger, 853 (21b); S. Vautier, L. Guibentif & P. Hainard, 555 (10a); M. Velayos & al., 9210 (3); L. Verguin, 16 June 1911 (3); J.D. Verleur, 7 July 1951 (2b), 16 July 1951 (2b); T. Vestergren, 1 July 1922 (10a); C. Vicioso, June 1914 (1), 11 May 1931 (5), 30 July 1930 (7), 4 May 1931 (5), 20 June 1918 (7), 20 June 1935 (3), 19 July 1936 (3); C. Vicioso & F. Beltran, 1544 (7); C. Vicioso & L. Ceballos, 10 Aug 1930 (7); F. Vierhapper, Aug 1917 (2c), Sep 1921 (2c); E. Vitek, 15 Aug 1981 (7); F. Vollmann, 8 Aug 1916 (2a); V.J. Vorobjew & B.N. Klopotow, 5 Aug 1906 (16); M. Vural, 266 (13); A.I. Vvedensky, 5405 (16), 68 (26); A.I. Vvedensky, S.S. Kovalevskaya & O.V. Tscherneva, 115 (26).

G. **W**agenitz, 556 (2c); G. Wagenitz & H.-J. Beug, 74 (10a), 172 (10a); J. Wagner, 73 (8); L.J. Wahlstedt, 31 July 1878 (10a); E. Wall, 622 (9a); H.u.E. Walter, 918 (10a); J.M. Watson, Albury & M.J. Cheese, 3219 (16); J.M. Watson, Mitchell & M.J. Cheese, 3600 (19); C. Weber, 3 July 1944 (2a); A. Webster, 23 July 1912 (10a); M. Weigend, 3697 (2c); T. Wells, 15 Aug 1991 (10a); F.M.J. Welwitsch, 203 (3), 793 (7); B. Wiki, July 1918 (2a); E. Wilczek, 20 Aug 1899 (2a); W.J.J.O de Wilde & B.E.E. de Wilde, 21040b (16); E. Willing, 7903 (6a); M. Willkomm, 180 (7), 414 (7), 729 (5), 310 (3); E.A. Willmott, 8 July 1859 (2a); M. Winkler, 3 July 1873 (7); C. Winkler, 13 July 1896 (25); G.F. Witte, 15686 (2a); Wittmann, 280 (21a); J.S. Womersley, 19 July 1958 (2a); G. Woronow, 10182 (16), 3490 (16), 3487 (16), 9069 (16), 10183 (16), 3488 (16), 6127 (16), 10184 (16); G. Woronow & W. Steup, 5 Sep 1927 (16); J. Woynar, July 1884 (2a), July 1882 (2a); T. Wraber, 2 July 1968 (2c), 454 (6a), 4 Aug 1973 (2c); T. Wraber & M. Lovka, 89932 (6a).

E. **Y**akimova, 113 (27a); D. Yanishevsky, 12 July 1915 (21b), 23 Aug 1925 (21b), 15 Aug 1927 (21b); J. Ysern, June 1860 (1); Y. Yudin & O. Budyko, 29 May 1939 (26).

V. **Z**akrzhevsky, 465 (26); T. Zaprjagaev & L. Kozhura, 846 (26); E. Zederbauer, July 1902 (15); J.E. Zetterstedt, 21 July 1856 (2b); R. Ziebarth, 5 July 1990 (10a); A. Zimmeter, 25 July 1887 (2a), 28 July 1888 (2a); N. Zinger, 5 Sep 1899 (10b); N. Zinger & V. Finn, 7046 (10a); E. Zogg, 4605 (2a), 95 (2a); M. Zohary, A. Danin & A. Shmida, 8 July 1969 (9a); B. Zollitsch, 30 May 1966 (6a); I. Zubía, 16 July 1882 (2b).

A phylogenetic analysis and new delimitation of *Senecio* sect. *Crociseris* (Compositae: Senecioneae), with evidence of intergeneric hybridization

Joel Calvo,[1] Inés Álvarez,[1] Carlos Aedo[1] & Pieter B. Pelser[2]

1 *Real Jardín Botánico-CSIC, Plaza Murillo 2, 28014 Madrid, Spain*
2 *University of Canterbury, School of Biological Sciences, Private Bag 4800, Christchurch 8140, New Zealand*
Author for correspondence: *Joel Calvo, jcalvo@rjb.csic.es*

Abstract *Senecio* sect. *Crociseris* is one of the three main sections of western Eurasian/northern African *Senecio* species. Previous studies indicated that species commonly assigned to this section are closely related to those of sect. *Doria*. The aim of the research presented here was to test the morphology-based delimitation of sect. *Crociseris* using phylogenetic analyses of plastid and nuclear DNA sequence data. The results of these studies are used to propose a new delimitation of sect. *Crociseris*. Species of sect. *Doria* were nested within a clade formed by species of sect. *Crociseris*. Section *Doria* is therefore best considered a synonym of sect. *Crociseris*. In addition, *S. racemosus*, traditionally included in sect. *Crociseris*, is transferred to the genus *Jacobaea*. One of the two *J. kirghisica* specimens that were sequenced contains ITS copies that are most closely related to those of sect. *Crociseris* as well as copies that nest among ITS accessions of *Jacobaea*. This suggests intergeneric hybridization between *Senecio* and *Jacobaea*.

Keywords Compositae; hybridization; *Jacobaea*; new combination; section *Crociseris*; section *Doria*; *Senecio*; systematics; taxonomy

Supplementary Material The Electronic Supplement (Tables S1–S3) and the alignments are available in the Supplementary Data section of the online version of this article (http://www.ingentaconnect.com/content/iapt/tax).

Received: 13 June 2012; revision received: 19 October 2012; accepted: 19 October 2012.

INTRODUCTION

Senecio L. (Compositae: Senecioneae) comprises ca. 1250 species and is one of the largest genera of flowering plants (Nordenstam, 2007a; Pelser & al., 2007). Over time, many infrageneric classifications have been proposed for *Senecio*. These frequently used the rank of section to provide taxonomic recognition to groups of species that share morphological similarities (Reichenbach, 1831–1832; Candolle, 1838; Willkomm, 1865; Boissier, 1875; Schischkin, 1961; Chater & Walters, 1976; Nordenstam, 1989). Because these classifications often had a regional focus and sections were rather loosely defined, section delimitations and circumscriptions vary widely among taxonomic treatments (Pelser & al., 2002, 2004). Modern phylogenetic methods now provide opportunities to review and revise these morphology-based infrageneric classifications of *Senecio*. Such studies contribute to arriving at a sectional classification that reflects evolutionary history and can therefore provide a useful basis for studies aimed at understanding various aspects of the diversity of *Senecio* species, such as their biochemical diversity (e.g., Pelser & al., 2005; Langel & al., 2011) and ecology (e.g., Kirk & al., 2012). These phylogenetic studies have resulted in a new delimitation of *Senecio* and the identification of major lineages within the genus (Pelser & al., 2007). Some of these lineages align with traditional, morphology-defined sections and can be used as frameworks for revising the sectional classification of *Senecio*. However, these efforts are complicated by widespread gene tree–species tree incongruence in Senecioneae, possibly caused by incomplete lineage sorting resulting from rapid evolutionary diversification and/or hybridization (Pelser & al., 2010, 2012). These patterns of incongruence confound phylogeny reconstruction at various taxonomic levels: from the relationships between subtribes to those between species.

In this paper, we present a new delimitation of *Senecio* sect. *Crociseris* (Rchb.) Boiss. based on nuclear and plastid DNA sequence data. Preliminary data from a taxonomic revision (Calvo, in prep.) suggest that this section comprises around 23 species and is distributed through Europe, western Asia and the northwestern Maghreb (NW Africa). Along with *S.* sect. *Doria* (Rchb.) Godr. and *S.* sect. *Senecio*, sect. *Crociseris* is one of the three main sections of western Eurasian/northern African *Senecio* species that are recognized in most modern taxonomic literature (Schischkin, 1961; Chater & Walters, 1976; Nordenstam, 1989; Avetisyan, 1995). Also many of the species formerly assigned to *S.* sect. *Jacobaea* (Mill.) Gray form an important Senecioneae lineage in this region. Previous research, however, demonstrated that this species group is only distantly related to *Senecio* s.str. (Pelser & al., 2002, 2007, 2010) and this motivated the reinstatement of the genus *Jacobaea* Mill. (Pelser & al., 2006).

Molecular phylogenetic studies by Pelser & al. (2007) indicated that most of the species commonly assigned to *S.* sect. *Crociseris*, sect. *Doria*, and sect. *Senecio* form two distantly related

clades within the genus. One of these is composed of most of the species that are traditionally classified in sect. *Senecio* and includes most of the region's annual *Senecio* species (Pelser & al., 2012). The other mostly western Eurasian/northern African clade is composed of perennial herbaceous species assigned to sect. *Crociseris* and sect. *Doria*. Although the latter two sections are similar in their gross morphology, plants of sect. *Crociseris* differ from sect. *Doria* in the absence of stolons (usually present in sect. *Doria*), the higher number of radiate florets ([10–]12–22 vs. [0–]5–6[–8]), and leaves that decrease in size higher up the stem (vs. leaves usually of similar size) (Chater & Walters, 1976). These characters are, however, highly variable among species and this sometimes makes it difficult to decide whether a species belongs to sect. *Crociseris* or sect. *Doria*.

The aim of the research presented here was to study and, if necessary, revise the delimitation of sect. *Crociseris*. To this end, we used nuclear (internal transcribed spacer) and plastid (5′ and 3′ *trnK* intron, *trnL* intron, *trnT-L* intergenic spacer) DNA sequence data to resolve the evolutionary relationships of species traditionally assigned to sect. *Crociseris* and the morphologically similar sect. *Doria*.

■ MATERIALS AND METHODS

Plant material. — DNA sequences of 125 specimens from 69 species were included in our datasets. A total of 65 of these are specimens of sect. *Crociseris* (21 of ca. 23 spp.). The remaining specimens were selected to represent sect. *Doria* (3 of ca. 5 spp.; *S. nemorensis* L., *S. doria* L., *S. umbrosus* Waldst. & Kit.) and several of the main *Senecio* clades identified by Pelser & al. (2007; 10 spp.). Preliminary phylogenetic studies indicated that a species formerly included in *S.* sect. *Crociseris* is, in fact, closely related to *Jacobaea*. In order to study its phylogenetic affinities in more detail, sequences of 31 (of ca. 50) species of *Jacobaea* were included in our analyses. In addition, sequences of *Crassocephalum crepidioides* S. Moore, *Kleinia neriifolia* Haw., *Packera aurea* (L.) Á. Löve & D. Löve, and *Othonna capensis* L.H. Bailey were used to root the phylogenetic trees. For most species, fresh leaves were collected in the field and preserved in silica-gel until DNA extraction. Vouchers for these samples are deposited in MA. A few samples, mainly those from western Asia, were obtained from specimens of B, BR, H.P. Comes (private herbarium), E, G, GAZI, H, IASI, J, L, M, MA, MEL, MICH, MJG, MO, NT, RNG, S, U, UPS, WAG, WU and Yozgat Türkiye Florası Herbaryumu (voucher details in Appendix 1).

DNA extraction, sequencing, and alignment. — A total of 35 species and subspecies were newly sequenced, including most species of sect. *Crociseris*. For these, total genomic DNA was isolated using the Qiagen DNAeasy Plant Mini kit (Qiagen Iberia, Las Rozas de Madrid, Spain) following manufacturer instructions. The remaining sequences were obtained in previous studies (Pelser & al., 2002, 2003, 2004). To be able to include these previously generated sequences in our analyses, DNA regions that were used in previous Senecioneae studies were sequenced (Pelser & al., 2002, 2004, 2007, 2010, 2012): the nrDNA internal transcribed spacer region (ITS1, 5.8S, ITS2) and the 5′ and 3′ *trnK* intron, *trnL* intron, and *trnT-L* intergenic spacer regions of the cpDNA. In addition, a pilot study using four other plastid regions (*psbA-trnH*, *trnCF-ycf6R*, *ycf6F-psbMR*, *rpS4-trnT*; Shaw & al., 2005) was performed, but these regions were not sufficiently variable among the species of sect. *Crociseris* and were therefore not used in the research presented here.

The 5′ and 3′ *trnK* introns were amplified using primers designed for Senecioneae by Pelser & al. (2002) and amplifications of the *trnT-L* intergenic spacer and *trnL* intron were performed with primers a, b, c, and d by Taberlet & al. (1991). PCR conditions were as follows: an initial denaturation of 1 min at 95°C followed by 1 min at 94°C, 45 s at 50°C–53°C, 45 s at 72°C, during 30 cycles, and a final extension of 10 min at 72°C. All PCRs were performed using Ecotaq-500 polymerase (Ecogen, Madrid, Spain). BSA (4%) was used as an additive to improve the amplification.

PCR amplification of the ITS region was performed using primers ITS4 and ITS5 (White & al., 1990) under the conditions described by Pelser & al. (2002), although sometimes with minor modifications to improve amplification. In order to identify intra-individual ITS polymorphisms, most of the ITS PCR products were cloned before sequencing. Ligation and transformation reactions were performed with the Promega pGEM-T easy cloning kit (Promega Corp., Alcobendas, Spain) following the protocol specified by the manufacturer. Transformed bacteria were spread on LB agar plates containing ampicillin/IPTG/X-Gal. Around 7 to 20 colonies from each transformation were screened by PCR using SP6 and T7 universal primers, and those with the expected insert length were selected to be sequenced.

PCR products were purified either using the DNA Clean & Concentrator-5 kit (Zymo Research Corp., Irvine, California, U.S.A.) or the ExoSAP-IT PCR Clean-up Kit (USB Corp., Santa Clara, California, U.S.A.). In both cases we followed the manufacturer's recommendations. Sequencing was performed either by the Macrogen Korea Sequencing Service or Macrogen Europe Sequencing Service using the same primers that were used for PCR amplification. Trace file editing and DNA sequence alignment of the individual DNA regions was performed manually in BioEdit v.7.0.9 (Hall, 1997–2005). All sequences have been submitted to GenBank (Appendix 1).

Plastid dataset. — Separate maximum parsimony (MP; details outlined below) analyses of the individual plastid regions did not reveal topological incongruence that was well-supported (>80% bootstrap support; BS). A combined plastid dataset was therefore used in all subsequent phylogenetic analyses. This dataset contains 90 accessions representing 67 species: 19 from sect. *Crociseris*, 3 from sect. *Doria*, 10 from other *Senecio* lineages, 31 from *Jacobaea*, and 4 species from other Senecioneae genera. For two species (*S. flavus* (Decne.) Sch.Bip. and *S. vulgaris* L.), the accession used in the combined dataset was composed of sequences obtained from two specimens, because sequences of all four plastid regions from a single specimen were not available.

ITS dataset. — DNA sequencing of the ITS region resulted in multiple identical ITS sequences for some of the taxa included in our study. To avoid using redundant sequences, only one of these sequences was included in our ITS dataset. For

taxa for which all ITS accessions formed a strongly supported (>95% BS) clade in a preliminary MP analysis and that did not appear to be involved in the putative hybridization events discussed below, only one accession per taxon was included in subsequent analyses. This was done to reduce computation time. The preliminary analyses of the ITS data resolved two accessions (of *S. scopolii* Hoppe & Hornsch. subsp. *scopolii* and *S. doronicum* (L.) L.) in unexpected phylogenetic positions. Their low G+C content and high number of substitution events in highly conserved regions (the conserved motif of Liu & Schardl (1994) located in the central region of ITS1, and the 5.8S rRNA gene) suggested that these are ITS pseudogenes (Jobes & Thien, 1997; Mayol & Rosselló, 2001) (Electr. Suppl: Tables S1–S3) and these sequences were therefore removed from the dataset. The final ITS dataset is composed of 185 accessions representing 69 species: 21 from sect. *Crociseris*, 3 from sect. *Doria*, 10 from other *Senecio* lineages, 31 from *Jacobaea*, and 4 species from other Senecioneae genera.

Phylogenetic analyses. — Gapcode.py v.2.1 (Ree, 2008) was used to code indels as binary characters using the simple insertion/deletion (indel) coding method of Simmons & Ochoterena (2000). Following the results of previous phylogenetic studies (Pelser & al., 2007, 2010), a representative of subtribe Othonninae (*Othonna capensis*) was selected as outgroup in all phylogenetic analyses.

Maximum parsimony analyses were carried out in TNT v.1.1 (Goloboff & al., 2008) using the Driven Search option with the default settings for Sectorial Searches (RSS, CSS, and XSS), Ratchet, Tree Drifting, and Tree Fusing; using 10 initial random addition sequences, and terminating the search after minimum length trees were found five times. Bootstrap support was calculated with Poisson independent reweighting using 1000 replicates.

Bayesian inference (BI) analyses were performed using MrBayes v.3.1.2 (Huelsenbeck & Ronquist, 2001) on processors connected in the Australian Research Collaboration Service through the Grisu v.0.2.2 interface. Prior to the BI analyses, the Akaike information criterion (AIC) in jModelTest v.0.1.1 (Guindon & Gascuel, 2003; Posada, 2008) was employed to select nucleotide substitution models for each dataset. The general time reversible model with a gamma distribution (GTR+G) model for the ITS dataset, and the TPM1uf+G model for the plastid dataset were indicated as the models that best fit our datasets. As the latter model is not available in MrBayes v.3.1.2, it was substituted with the GTR+G model because this is the available model that is most similar to the TPM1uf+G model. Indel characters were included as 'restriction type' data. The BI analyses were performed using two independent, simultaneous runs. The Markov chain Monte Carlo analyses (Geyer, 1991) were run with eight chains per analysis, temperature settings of 0.001, and one tree per 1000 generations saved. BI analyses were run until the average deviation of split frequencies between both simultaneous analyses reached a value below 0.01, indicating convergence (Ronquist & al., 2005). The burn-in values were determined empirically from the likelihood values. Majority-rule consensus trees were visualized using FigTree v.1.3.1 (Rambaut, 2009) and edited in Adobe-Illustrator CS3.

■ RESULTS

Plastid dataset. — The aligned plastid dataset has a total length of 1891 bp, of which 179 are variable (excluding indels) and 65 of these are potentially phylogenetically informative. In addition, 109 indels were coded (37 informative). The total number of informative characters is therefore 102. For three specimens, the *trnT-L* intergenic spacer could not be sequenced because of PCR amplification problems (Appendix 1).

A visual comparison of the MP 50% majority-rule consensus tree (not shown) and the BI consensus tree (Fig. 1) indicated very similar patterns of relationships. Both MP and BI consensus trees show that sect. *Crociseris* is paraphyletic with all species from sect. *Doria* included in the analyses (*S. doria*, *S. nemorensis*, *S. umbrosus*) taking nested positions. Jointly, this 'Crociseris-Doria' group forms a moderately (79% BS) or highly (0.99 posterior probability; PP) supported clade. Within the Crociseris-Doria clade both analyses fail to provide much phylogenetic resolution. However, three clades are moderately to strongly supported. The Peri-doronicum clade includes accessions of *S. doronicum* from the Jura, Alps, Maritime Alps, and Croatia, *S. provincialis* (L.) Druce, a putative hybrid between *S. lagascanus* DC. and *S. provincialis* (see below), and *S. scopolii* subsp. *scopolii* (72% BS, 1.0 PP). The second clade is composed of *S. franchetii* C. Winkl. and *S. paulsenii* O. Hoffm. subsp. *paulsenii*, two taxa from central Asia (74% BS, 1.0 PP), and the third one contains two accessions of *S. pyrenaicus* L. (72% BS, 1.0 PP). The plastid accessions of *S. racemosus* (M. Bieb.) DC., a species traditionally considered to belong to sect. *Crociseris* (Schischkin, 1961; Matthews, 1975; Nordenstam, 1989; Avetisyan, 1995; Greuter, 2008), are placed among accessions of *Jacobaea* (99% BS, 1.0 PP). Their position within a subclade formed by *J. cannabinifolia* (Less.) E. Wiebe, *J. delphiniifolia* (Vahl) Pelser & Veldkamp, *J. kirghisica* (DC.) E. Wiebe, *J. othonnae* C.A. Mey., and *J. paludosa* (L.) P. Gaertn. & al. is, however, poorly supported (<50% BS, 0.56 PP).

ITS dataset. — The alignment of the ITS data has a total length of 803 bp of which 470 are variable and 285 of these are potentially phylogenetically informative. A total of 117 indels were coded of which 46 are potentially parsimony-informative. The total number of informative characters is 331.

The MP 50% majority-rule consensus tree (not shown) and the BI consensus tree (Fig. 2) of the ITS data have similar topologies. Just like the plastid data, the ITS data recover the Crociseris-Doria clade, although it is only well-supported in the BI analysis (<50% BS, 0.96 PP). Within the Crociseris-Doria group, three main clades can be identified (Fig. 2A). The largest of these, the European clade, includes the European species *S. doria*, *S. eriopus* Willk., *S. lagascanus*, *S. lopezii* Boiss., *S. nemorensis*, *S. provincialis*, *S. pyrenaicus*, *S. scopolii*, *S. transylvanicus* Boiss., *S. umbrosus*, all *S. doronicum* accessions, and seven clones of one of the two *J. kirghisica* specimens included in our analyses (<50% BS, 0.96 PP). The second clade, the Central-Asian clade, is composed of the Asian species *S. paulsenii* subsp. *paulsenii* and *S. franchetii* (<50% BS, 0.97 PP). The third main clade, the Anatolian clade, contains all

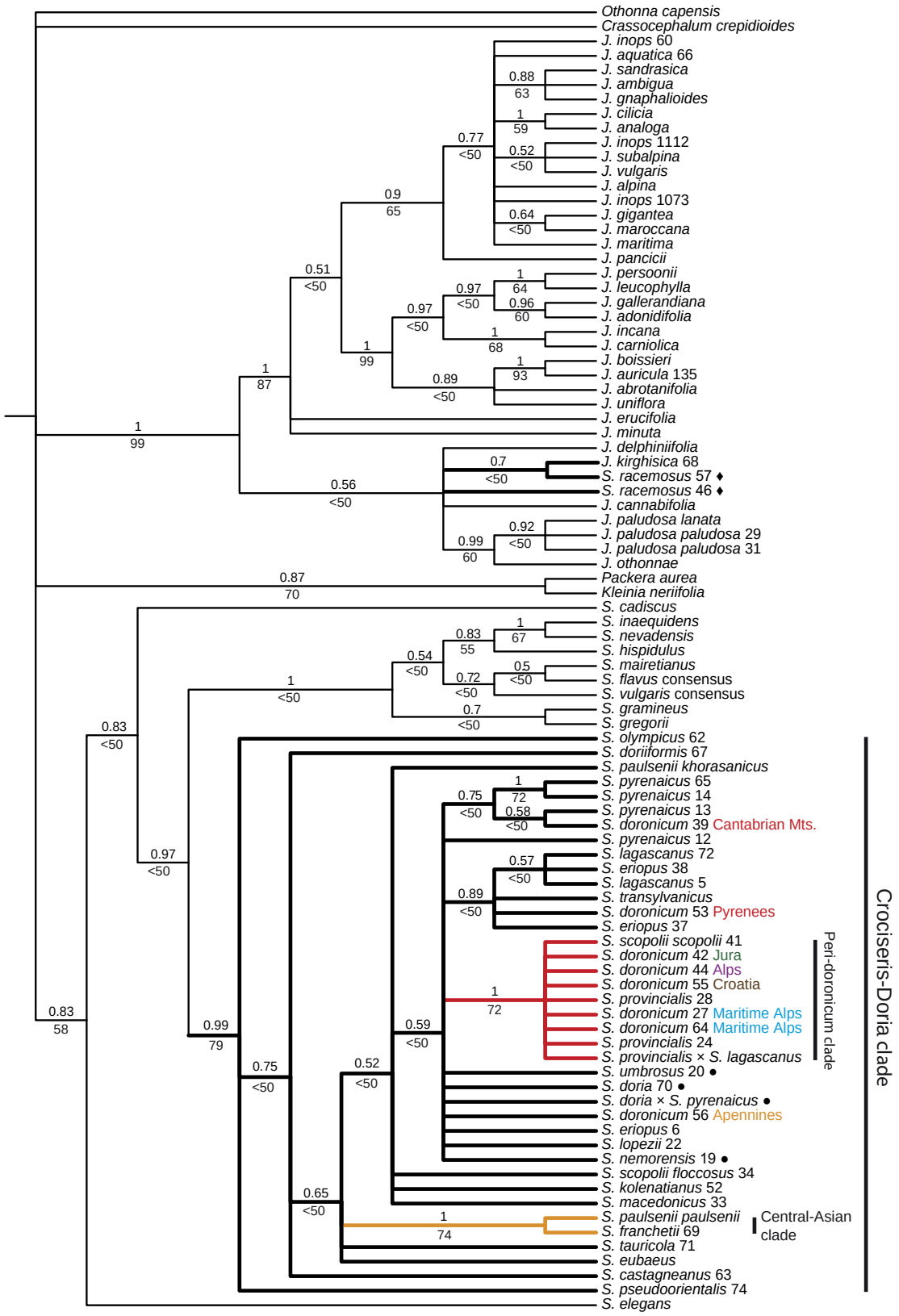


Fig. 1. Bayesian inference topology from the plastid data. Bayesian posterior probabilities are placed above branches, and bootstrap support values obtained from maximum parsimony analyses are presented below branches. ♦ Accessions of *S. racemosus* nested within *Jacobaea*; ● accessions of *Senecio* sect. *Doria* species. Numbers following names are accession numbers (Appendix 1). Highlighted branches are referred to in the text.

species from Anatolia and nearby areas (i.e., *S. castagneanus* DC., *S. doriiformis* DC., *S. eubaeus* Boiss. & Heldr., *S. kolenatianus* C.A. Mey., *S. macedonicus* Griseb., *S. olympicus* Boiss., *S. pseudoorientalis* Schischk., *S. tauricola* V.A. Matthews, and *S. trapezuntinus* Boiss.; <50% BS, 0.87 PP).

Within the European clade (Fig. 2B), four weakly to moderately supported subclades can be identified. The first one, the Provincialis subclade (<50% BS, 1.0 PP), is composed of all accessions of the two specimens of *S. provincialis* that were included, all accessions of the putative hybrid *S. provincialis* × *S. lagascanus* (discussed below), one of the six clones of a *S. doronicum* specimen from Croatia, and one of the cloned sequences of a specimen of *J. kirghisica*. The second clade, the Galloibericum subclade (50% BS, 1.0 PP), includes all accessions except for one clone of a *S. doronicum* plant from the Cantabrian Mountains (Spain), and all accessions of *S. lagascanus* (France and Spain). The third one, the Circum-Adriatic subclade, is well supported (84% BS, 1.0 PP) and contains most clones of *S. doronicum* from the Apennines, two from Croatia, one from Alps, and one from the Maritime Alps. The Transylvanicus subclade (66% BS, 0.99 PP), is composed of *S. pyrenaicus*, *S. transylvanicus*, one clone of *S. doronicum* from Croatia, and two clones of *J. kirghisica*.

Within the Anatolian clade (Fig. 2A), there are several moderately to strongly supported subclades. One of these is composed of *S. macedonicus* and *S. castagneanus* (94% BS, 1.0 PP). A close relationship between *S. kolenatianus*, *S. pseudoorientalis*, and *S. trapezuntinus* is also well-supported (91% BS, 1.0 PP). *Senecio tauricola*, *S. eubaeus*, and *S. olympicus* form a moderately supported clade (53% BS, 0.96 PP).

In accordance with the results from the analyses of the plastid data, all accessions of *S. racemosus*, all of one of the two *J. kirghisica* specimens included, and two clones of the other specimen of *J. kirghisica* are nested within the *Jacobaea* clade (96% BS, 1.0 PP). Despite one of the two clones of *J. kirghisica* no. 68 appears to be most closely related to *J. inops* (Boiss. & Balansa) B. Nord. (88% BS, 1.0 PP), all other accessions form a well-supported clade (100% BS, 1.0 PP) sister to *J. othonnae* (99% BS, 1.0 PP).

■ DISCUSSION

Hybridization. — Widespread incongruence between cladograms obtained from nuclear and plastid DNA sequence data (e.g., Pelser & al., 2010), patterns of ITS polymorphism within specimens, the identification of chimeric ITS sequences (Pelser & al., 2012), and the identification of putative hybrids that contain species-diagnostic AFLP markers of both parental species (Kirk & al., 2004) suggest that hybridization may have been an important factor in the evolutionary history of Senecioneae (Beck & al., 1992; Harris & Ingram, 1992; Comes, 1994; Hodálová & Marhold, 1996; Bain & al., 1997; Abbott & al., 2000; Lowe & Abbott, 2000; Hodálová, 2002; Kirk & al., 2004; Kadereit & al., 2006; Pan & al., 2008; Brennan & al., 2009; Pelser & al., 2010, 2012). The results of the present study provide additional support for this hypothesis by revealing the occurrence of intergeneric hybridization between *Jacobaea* and *Senecio* sect. *Crociseris*. *Senecio racemosus* (Caucasus, Transcaucasus, western Iran, northern Iraq, northern Syria, eastern Turkey) is a perennial species that is considered to be a member of *S.* sect. *Crociseris*, because it displays character states that are often found in this section such as undivided leaves that become smaller higher up the stem (Schischkin, 1961; Matthews, 1975; Nordenstam, 1989; Avetisyan, 1995; Greuter, 2008). This species is morphologically similar to *J. kirghisica* (Calvo & al., 2011; Ukraine, European Russia, south-western Siberia, Kazakhstan). *Jacobaea kirghisica*, based on *S. kirghisicus* DC., is a species that is usually classified in either *Senecio* sect. *Crociseris* (Schischkin, 1961; Wissjulina, 1962) or sect. *Doria* (Chater & Walters, 1976; Konechnaya, 1994). Plastid DNA sequences suggest that *S. racemosus* and *J. kirghisica* share the maternal haplotypes of *Jacobaea* (BS 99%, PP 1; Fig. 1). ITS DNA sequence data supports these findings, placing most *J. kirghisica* and all *S. racemosus* accessions deeply nested within *Jacobaea* (BS 96%, PP 1; Fig. 2A). The three ITS copies of the single *S. racemosus* specimen included in our studies form a clade (BS 64%, PP 0.86) that is sister to a well-supported clade (BS 81%, PP 1) composed of all ITS accessions of one of the two *J. kirghisica* specimens included (no. 75) and one of the nine accessions obtained from the other *J. kirghisica* specimen (no. 68; Fig. 2A). However, all but one of the other ITS accessions of specimen no. 68 are found in the European clade of *Senecio* sect. *Crociseris* (<50% BS, PP 0.96; Fig. 2B), suggesting that this specimen resulted from a hybridization event between a member of the *Jacobaea* clade and a species of sect. *Crociseris*. These findings were confirmed by repeating the DNA extraction, cloning, and sequencing of *J. kirghisica* specimen no. 68 (as *J. kirghisica* 68-2 in Fig. 2), which suggests that the presence of sect. *Crociseris*-like ITS copies in this specimen is not an artifact resulting from contamination. It is also unlikely that the sect. *Crociseris*-like ITS copies of *J. kirghisica* are pseudogenes, because they did not have a G+C content that deviated from other ITS sequences included in our analyses and did not display high numbers of substitution events in conserved regions (Liu & Schardl, 1994; Jobes & Thien, 1997; Mayol & Rosselló, 2001). In addition, a visual inspection of the ITS alignment and branch lengths in the Bayesian trees (not shown) indicated that these sequences are very similar to other ITS sequences of the *Crociseris* clades in which they were placed.

Although more detailed studies are needed, our data suggest that either *J. kirghisica* or *S. racemosus* is one of the parental species of the intergeneric hybrid. The first hypothesis rests on the assumption that the failure to find sect. *Crociseris*-like ITS copies in *J. kirghisica* specimen no. 75, indicates that such copies may be absent in this specimen and that it therefore represents a taxon that is not of direct hybrid origin. Alternatively, *J. kirghisica* could be a species that evolved as a result of hybridization between *S. racemosus* (potentially its closest relative within the *Jacobaea* clade) and a member of sect. *Crociseris*. *Senecio racemosus* shares close morphological similarities with *J. kirghisica* (Calvo & al., 2011) and although their distribution areas are separated by the Greater Caucasus (Fig. 4), it is possible that they overlapped in the past. Provided

Fig. 2A

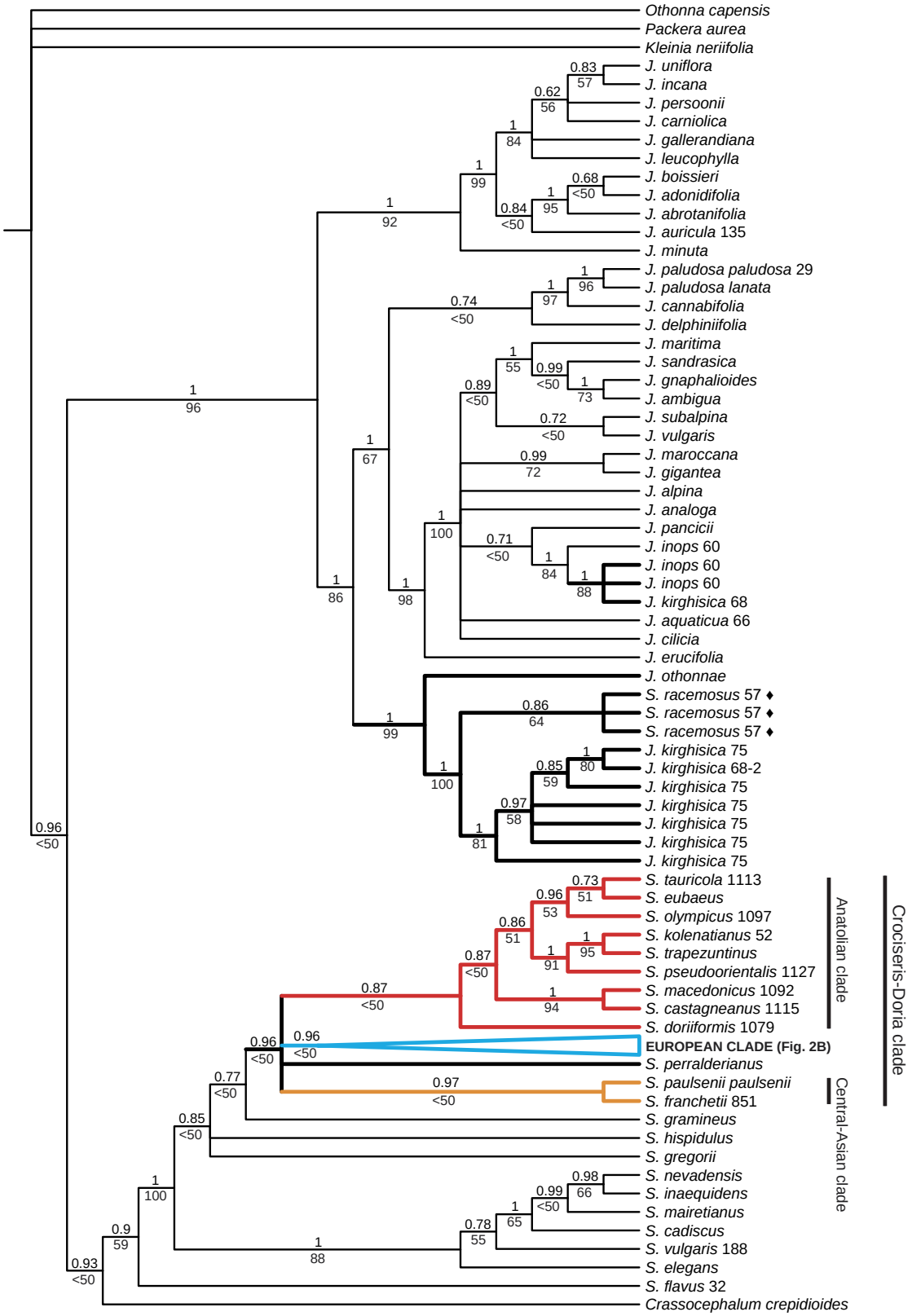
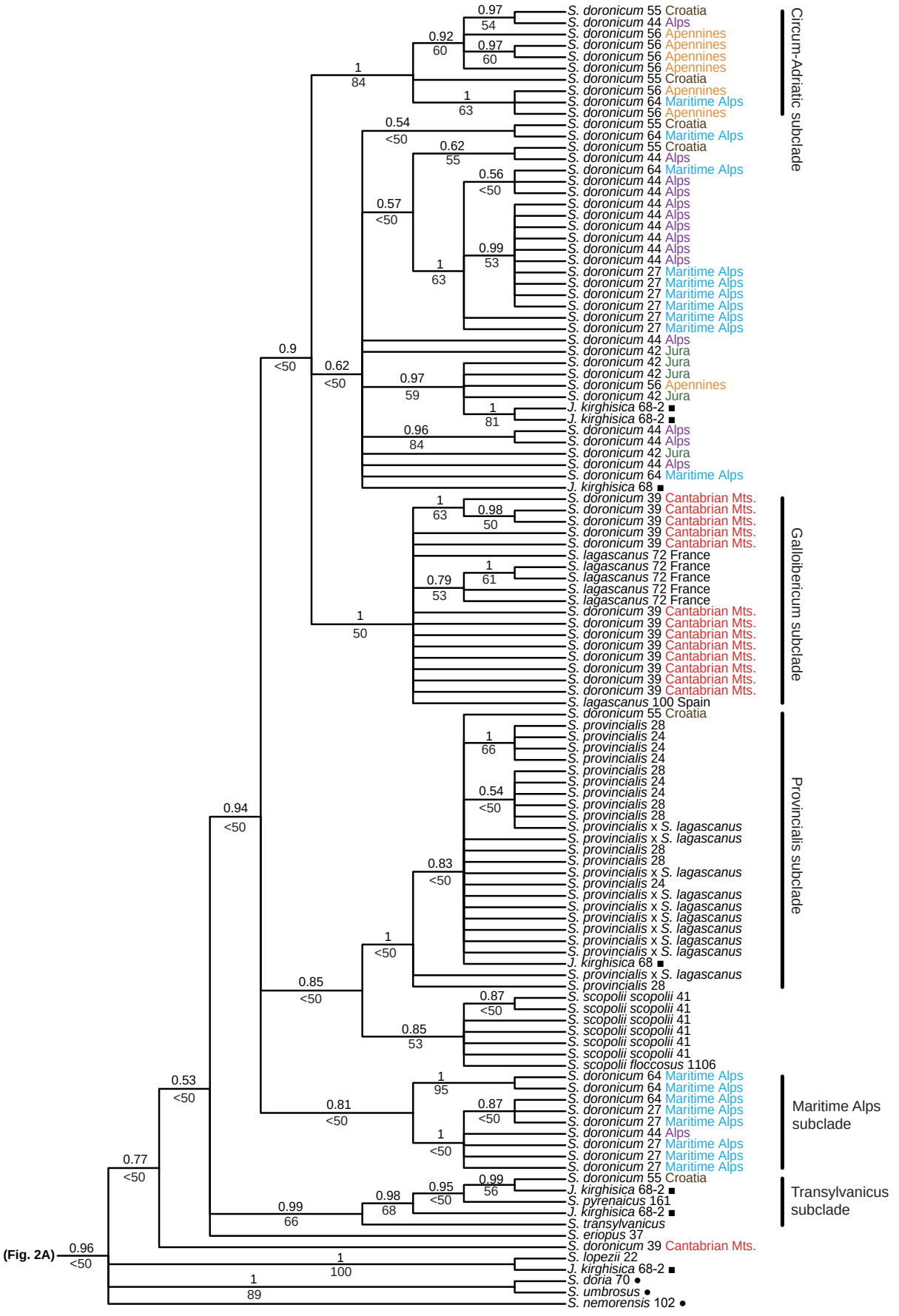


Fig. 2. Bayesian inference topology from the ITS data. Bayesian posterior probabilities are placed above branches, and bootstrap support values obtained from maximum parsimony analyses are presented below branches. ♦ Accessions of *S. racemosus* nested within *Jacobaea*; ■ accessions of *J. kirghisica* nested within *Senecio*; ● accessions of *S.* sect. *Doria* species. Numbers following names are accession numbers (Appendix 1). Highlighted branches are referred to in the text. **A,** Phylogenetic position of sects. *Crociseris* and *Doria* in *Senecio* and relationships between *Jacobaea* species; **B,** phylogenetic relationships within the European clade of sect. *Crociseris.*

Fig. 2B



that future studies show that *S. racemosus* is not a product of the same hybridization event or series of events that gave rise to the *J. kirghisica* hybrid, it is therefore a likely parental candidate. However, the finding that a single ITS accession of *J. kirghisica* specimen no. 68 nests within a clade of *J. inops* accessions (BS 88%, PP 1), a species from Turkey, indicates a much more complex origin of the lineage to which this specimen belongs, perhaps involving multiple hybridization and backcrossing events involving several *Jacobaea* species.

The ITS data are even less conclusive about the identity of the sect. *Crociseris*-parent of the intergeneric hybrid. The seven sect. *Crociseris*-like ITS accessions of *J. kirghisica* specimen no. 68 are placed in several subclades of the European clade, some of which are well-supported (BS 100%, PP 1; BS 68%, PP 0.98; BS 56%, PP 0.99; BS 59%, PP 0.97; Fig. 2B). This pattern could be explained by ancestral polymorphisms, potentially resulting from a hybridization event early in the evolutionary history of the European sect. *Crociseris* clade, failing to coalesce as a result of rapid speciation in this clade (Golden & Bain, 2000; Comes & Abbott, 2001; Devos & al., 2010; Nomura & al., 2010**)**. Alternatively, widespread secondary hybridization between the intergeneric hybrid and species of the European clade could be responsible for the topological patterns observed. However, the current distributions of *J. kirghisica* and *S. racemosus* do not overlap with those of any of the members of the European sect. *Crociseris* clade (Figs. 3, 4) and this hypothesis therefore rests on the assumption that the distribution areas of these taxa were previously overlapping.

The possibility that *Jacobaea*-like ITS copies spread from the intergeneric hybrid to multiple sect. *Crociseris* lineages through hybridization and backcrossing finds some indirect support in the polyphyletic grouping of ITS copies of individual specimens of *S. doronicum* (e.g., *S. doronicum* no. 27, 44, 55, 56, 64), the most widespread species of this clade. This absence of reciprocal monophyly within the European clade suggests recent gene flow between these taxa, which makes it plausible that *Jacobaea*-like ITS copies similarly spread throughout the European sect. *Crociseris* lineages. Fieldwork carried out as part of this project resulted in further indications that hybridization between members of this clade may be widespread. Several sect. *Crociseris* plants were identified as potential hybrids on the basis of having morphological characteristics that are intermediate between their putative parental species.

Plants resulting from a potential hybridization event between *S. lagascanus* and *S. provincialis* were found in a population from La Segarra, Catalonia, Spain (Fig. 3). This population

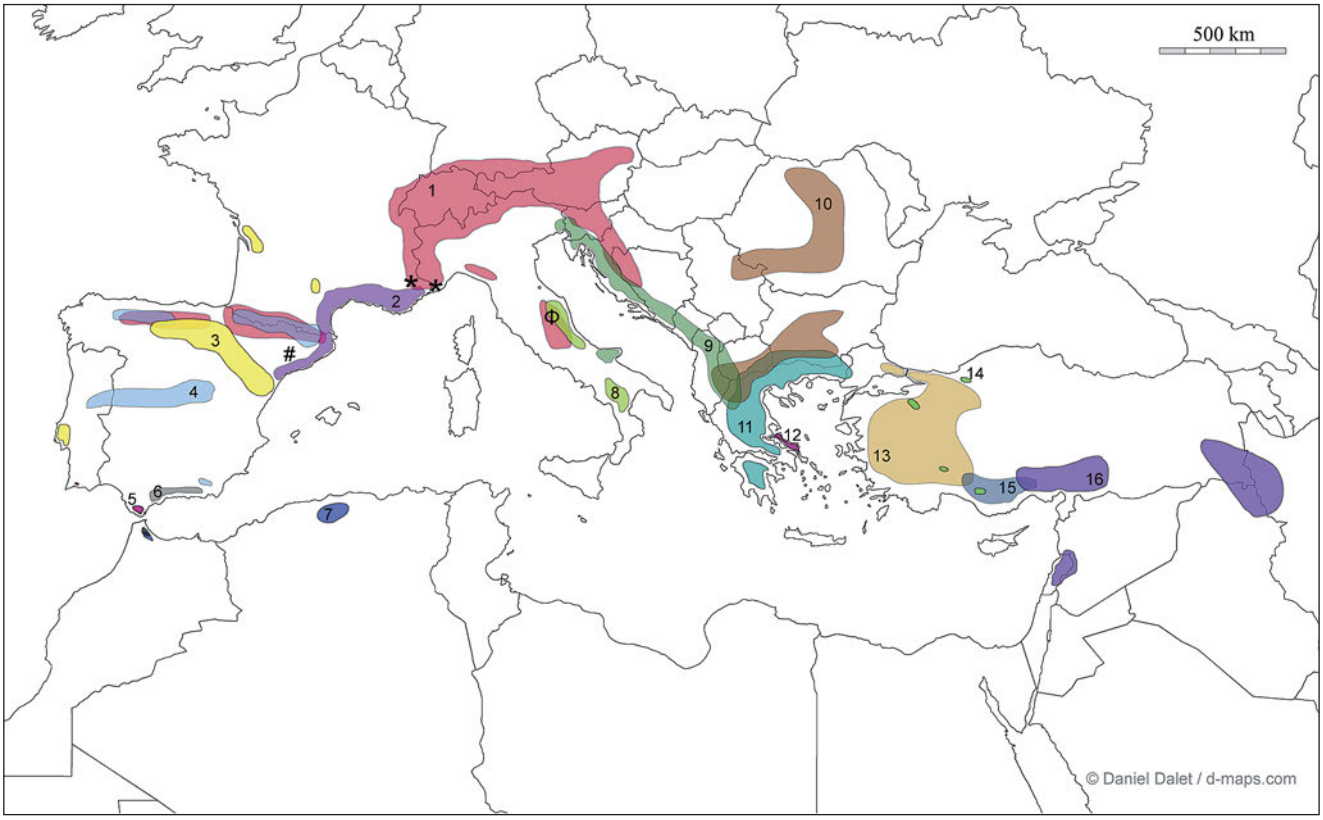


Fig. 3. General distribution areas of the *Senecio* sect. *Crociseris* species of the European clade and the Anatolian clade (p.p., see also Fig. 4). European clade: 1, *Senecio doronicum*; 2, *S. provincialis*; 3, *S. lagascanus*; 4, *S. pyrenaicus*; 5, *S. lopezii*; 6, *S. eriopus*; 7, *S. perralderianus*; 8, *S. scopolii* subsp. *floccosus*; 9, *S. scopolii* subsp. *scopolii*; 10, *S. transylvanicus*. Anatolian clade: 11, *S. macedonicus*; 12, *S. eubaeus*; 13, *S. castagneanus*; 14, *S. olympicus*; 15, *S. tauricola*; 16, *S. doriiformis*. Putative hybrids: *S. provincialis* × *S. lagascanus* (#); *S. provincialis* × *S. doronicum* (*); *S. scopolii* × *S. doronicum* (Φ).

is notably isolated from the nearest populations of the putative parental species, *S. provincialis* and *S. lagascanus*, which are about 35 and 120 km away, respectively. It is composed of plants that display the typical lanceolate to oblanceolate leaves of *S. lagascanus* as well as capitula with the characteristic short and basally wide supplementary bracts and apically elongated involucral bracts of *S. provincialis* and various other combinations of diagnostic features of both species. Our DNA sequence data (plastid and ITS) of one of the specimens of this population confirm a close relationship with *S. provincialis* (1.0 PP; Figs. 1, 2B). However, because none of the sequences obtained from this species grouped with accessions of *S. lagascanus*, our molecular data does not allow us to confirm a hybrid origin of this population. Because of the large morphological differences among the plants of this population, a better sampling of specimens is needed to test this hypothesis in future studies.

A second potential hybridization event can be found in the Marche and Abruzzo region of the Apennines (Fig. 3). This area is home to *Senecio* populations that have been referred to as *S. doronicum* var. *pseudoarachnoideus* Fiori or *S. tenorei* Pign. Currently, most authors recognize these populations as *S. scopolii* subsp. *floccosus* (Bertol.) Greuter (Fig. 3). This taxon displays a combination of characters that are considered diagnostic of *S. scopolii* (e.g., a single capitulum per plant) and *S. doronicum* (e.g., number of supplementary bracts, keeled involucral bracts with an apical black spot) and may therefore be of hybrid origin. Incongruence with respect to the phylogenetic position of subsp. *floccosus* in the ITS and plastid trees indeed provides some support for this hypothesis. The ITS data indicate a sister-group relationship between subsp. *floccosus* and subsp. *scopolii* (Fig. 2B) whereas plastid data suggest that subsp. *scopolii* is most closely related to *S. provincialis*, the putative *S. provincialis* × *S. lagascanus* hybrid, and several *S. doronicum* accessions (72% BS, 1.0 PP; Fig. 1). However, the exact phylogenetic affinities of subsp. *floccosus* are unclear in the plastid trees and only poorly supported in the ITS trees (53% BS, 0.85 PP).

A third putative hybridization event between species of sect. *Crociseris* involves *S. provincialis* and *S. doronicum* populations in the Maritime Alps (Fig. 3). Just like the previously

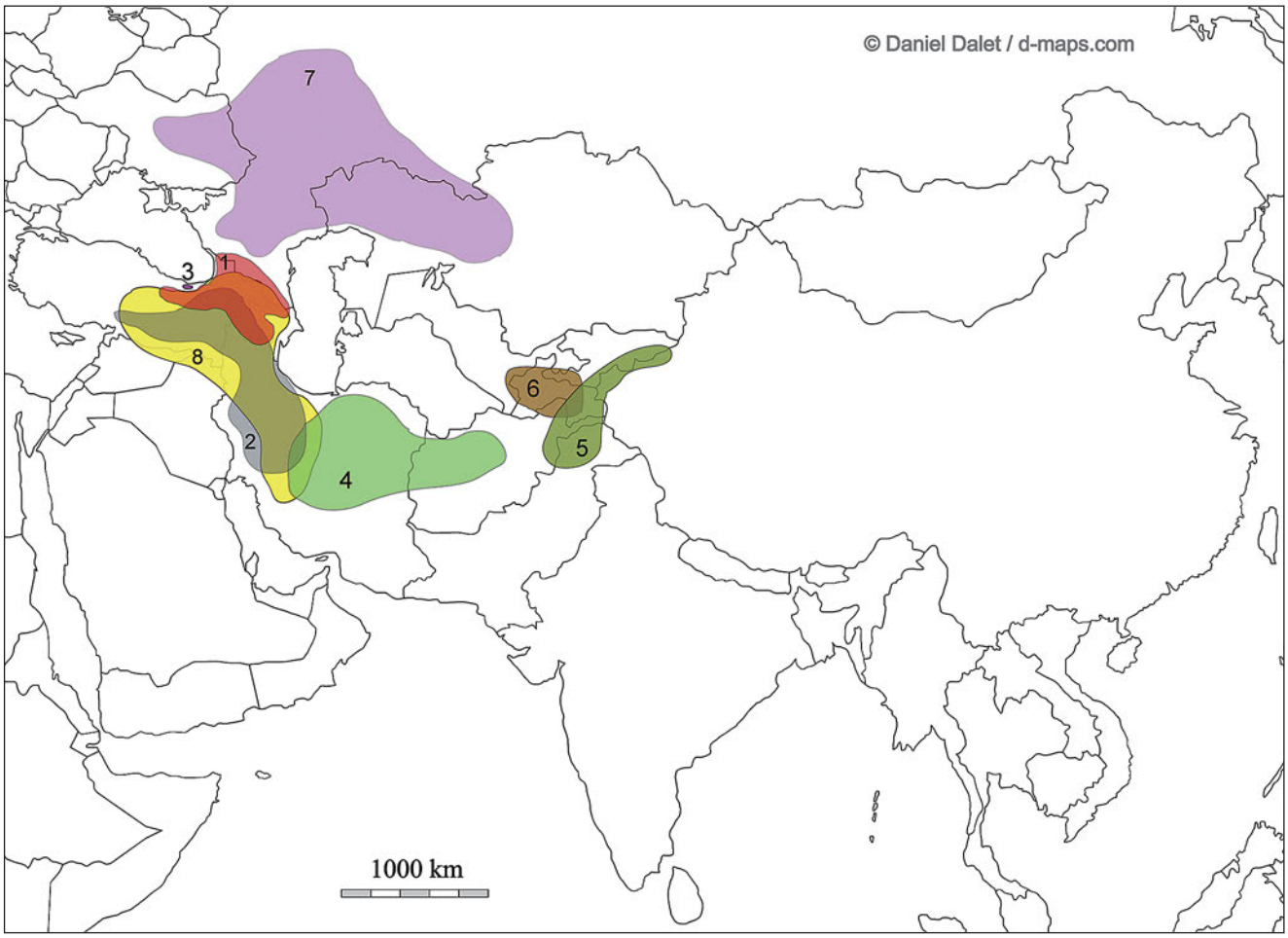


Fig. 4. General distribution areas of the *Senecio* sect. *Crociseris* species of the Anatolian clade (p.p., see also Fig. 3), the Central-Asian clade, and *J. kirghisica* and *S. racemosus*. Anatolian clade: 1, *S. kolenatianus*; 2, *S. pseudoorientalis*; 3, *S. trapezuntinus*. Central-Asian clade: 4, *S. paulsenii* subsp. *khorasanicus*; 5, *S. paulsenii* subsp. *paulsenii*; 6, *S. franchetii*. 7, *J. kirghisica*; 8, *S. racemosus*.

discussed potential hybrids, putative *S. provincialis* × *S. doronicum* populations are characterized by a combination of morphological character states that are considered diagnostic for the parental species. For example, some plants display a habit that is typical for *S. provincialis* (leaves ovate to lanceolate and solitary capitula, rarely up to 4), yet have supplementary bracts that are as long as the involucral bracts, which is characteristic of *S. doronicum*. Difficulties with characterizing these populations as either *S. provincialis* or *S. doronicum* were first noted by Reichenbach (1853) and later also by Rouy (1903), who described these putative hybrids as *S. doronicum* var. *pseudogerardi* Rouy, and Briquet & Cavillier (1916). Our analyses included sequences of two specimens that are potentially of hybrid origin: no. 27 (from Limonetto, Italy) and no. 64 (from Col de Gleize, France). The plastid data group both specimens in the unresolved Peri-doronicum clade (BS 72%, PP 1.0). Although the ITS data fail to identify the putative parental species of these plants unambiguously, these data indicate relationships with accessions of *S. doronicum* in various subclades within the European clade.

In conclusion, whereas ITS sequence data provide strong support for intergeneric hybridization between *Jacobaea* and the European clade of *Senecio* sect. *Crociseris*, complex patterns of ITS diversity, especially within sect. *Crociseris* and most likely due to extensive hybridization among some of its species, prevent us from identifying the exact identity of the parental species of this intergeneric hybrid.

Biogeography. — Despite of the lack of reciprocal monophyly for some species of the Crociseris-Doria clade and the low support for some of its subclades in the ITS and plastid cladograms, several of the inferred phylogenetic patterns reflect biogeographic patterns. Most likely due to more detailed sampling and increased resolution, these patterns are especially clear in the ITS cladograms. *Senecio* sect. *Crociseris* and sect. *Doria* species from central and southern Europe form a well-supported clade in the ITS trees (European clade; <50% BS, 0.96 PP) to the exclusion of most species growing further south (*S. perralderianus* Coss.) or east (Central-Asian clade, Anatolian clade). *Senecio perralderianus* grows in northern Africa and is endemic to the northwestern Maghreb (eastern Tell Atlas and northwestern Rif; Fig. 3). The Central-Asian clade (ITS: <50% BS, 0.97 PP) contains *S. franchetii* and *S. paulsenii* subsp. *paulsenii* from the Pamir Mountains and adjacent parts of Afghanistan and northern Pakistan and represents the eastern limit of the distribution area of the Crociseris-Doria clade (Fig. 4). The Central-Asian clade is geographically relatively isolated from most of the other centers of diversity of the Crociseris-Doria clade, although the distribution area of *S. paulsenii* subsp. *khorasanicus* (Rchb. f. & Aellen) B. Nord. (Afghanistan and Iran; ITS sequences not available) partially overlaps with that of *S. pseudoorientalis* in Iran. These taxa therefore bridge the gap in distribution between the Central-Asian clade and the Anatolian clade further west in the Caucasus region, Anatolia, and Greece. Within the Anatolian clade, *S. macedonicus* and *S. castagneanus* share close morphological similarities and compose a western element (Greece and western Turkey, respectively; ITS: 94% BS, 1 PP; Fig. 3), whereas *S. kolenatianus*, *S. pseudoorientalis*, and *S. trapezuntinus* form a well-supported clade (ITS: 91% BS, 1 PP) distributed in eastern Turkey and the Caucasus (Fig. 4). The third moderately supported group (ITS: 53% BS, 0.96 PP) is composed of *S. eubaeus*, *S. olympicus*, and *S. tauricola* (Fig. 3). These species each have relatively small distribution areas. *Senecio olympicus* displays a patchy distribution pattern in western Anatolia, *S. tauricola* is restricted to south-central Anatolia, and *S. eubaeus* is endemic to Euboea (Greece).

The European clade contains the remainder of the species of the Crociseris-Doria clade (Fig. 3). Also this clade contains subclades that are composed of accessions that are geographically proximate. One of these is the Galloibericum subclade (ITS: 50% BS, 1 PP), which is composed of *S. doronicum* accessions from the Cantabrian Mountains (Spain) and *S. lagascanus* from the lower Massif Central (France) and the Iberian System (Spain). However, other accessions from this area (*S. provincialis*, *S. pyrenaicus*) are found in different subclades. ITS data, for instance, suggest that *Senecio pyrenaicus* is most closely related to a group of accessions with a southeastern European distribution (Transylvanicum subclade). This possibly indicates that gene flow has taken place across large distances.

A new delimitation of *Senecio* sect. *Crociseris*. — In accordance with the results of previous studies (Pelser & al., 2007), our data suggest that species of sect. *Crociseris* and sect. *Doria* are each others closest relatives (plastid: 79% BS, 0.99 PP; ITS: <50% BS, 0.96 PP). Both the plastid and ITS data indicate that the accessions of the three species of sect. *Doria* (including *S. doria*, its type species) that were included are nested within the paraphyletic group that is composed of sect. *Crociseris* species (including *S. scopolii*, its type species; Reichenbach, 1831–1832). Although this pattern is not well-supported in the plastid trees, ITS data place sect. *Doria* species within the European clade of the Crociseris-Doria clade with a high posterior probability (<50% BS, 0.96 PP). These results, in combination with the lack of unambiguous morphological characters to distinguish the two sections (Chater & Walters, 1976), indicate that they should be synonymized. According to *ICN* Art. 11.3, *S.* sect. *Crociseris* (Boissier, 1844) has priority over *S.* sect. *Doria* (Godron, 1850).

Previous molecular phylogenetic studies (Pelser & al., 2002) indicated the need to transfer several species that were traditionally placed in sect. *Crociseris* or sect. *Doria* to the genus *Jacobaea* (*S. paludosus* L., *S. othonnae* M. Bieb.). New combinations for these species in *Jacobaea* were published by Pelser & al. (2006) who also transferred *S. auricula* Bourg. ex Coss., another species included in sect. *Crociseris*, to *Jacobaea* on the basis of unpublished sequence data (included in the present study). Nordenstam & Greuter (2006) and Nordenstam (2007b) made new combinations for four additional sect. *Crociseris* species in *Jacobaea*: *S. buschianus* Sosn., *S. cilicius* Boiss., *S. inops* Boiss. & Balansa, *S. trapezuntinus*. Our studies confirm that *S. auricula*, *S. cilicius*, and *S. inops* are indeed best placed in *Jacobaea*. However, plastid and ITS sequences indicate that *S. trapezuntinus* should remain in *S.* sect. *Crociseris*. Although *S. buschianus* could not be included in our studies due to a lack of suitable material for DNA sequencing,

this species is morphologically similar to *S. racemosus* and therefore possibly a member of *Jacobaea* (see below). In addition to transferring *S. kirghisicus* to *Jacobaea*, Wiebe (2000) created new combinations for three species that were traditionally placed in sect. *Doria*: *S. nemorensis* and *S. sarracenicus* L. or sect. *Crociseris*: *S. tataricus* Less. Our results show that *S. nemorensis* is better placed in *Senecio* sect. *Crociseris*, and because it shares close morphological similarities with *S. sarracenicus*, the latter species is better retained in *Senecio* as well. We consider *S. tataricus* a synonym of *Jacobaea paludosa* subsp. *lanata* (Holub) B. Nord. & Greuter.

Senecio racemosus is often included in sect. *Crociseris* (Schischkin, 1961; Chater & Walters, 1976; Nordenstam, 1989; Avetisyan, 1995). Plastid and ITS sequence data, however, suggest that it is most closely related to species of *Jacobaea* and needs to be transferred to this genus. A new combination for this taxon in *Jacobaea* is presented below. Our results further indicate that *J. kirghisica* is either an intergeneric hybrid between *Jacobaea* and *Senecio* sect. *Crociseris* or a *Jacobaea* species that is involved in such an hybridization event as a parental species.

Jacobaea is a genus of ca. 50 species without morphological synapomorphies, yet it forms a clade that is well-supported by plastid and nuclear sequence data. Although these two sources of molecular data provide incongruent hypotheses regarding the exact identity of the closest relatives of *Jacobaea*, they both indicate that this genus is only distantly related to *Senecio* (Pelser & al., 2007, 2010). *Jacobaea* displays substantial morphological diversity and some of its species share similarities with those of sect. *Crociseris* in their distribution and ecology. Both taxa have their centers of diversity in Europe and some of their species co-occur in mountain areas. In combination with morphological similarities between some species of *Jacobaea* and sect. *Crociseris* in, for instance, synflorescence architecture (e.g., usually corymbose), involucre architecture (presence of supplementary bracts), and habit (e.g., perennial herbs), and because of the lack of clear morphological synapomorphies for sect. *Crociseris*, these aspects of the biology of both taxa may have been responsible for the confusion regarding their taxonomic delimitation.

In addition to *S. buschianus*, two other species that are commonly placed in sect. *Crociseris* could not be included in our analyses: *S. olgae* Regel & Schmalh. and *S. joharchii* F. Ghahrem. & al. *Senecio olgae* is endemic to the Pamiro-Alai region (Tajikistan, Turkmenistan and Uzbekistan) and morphologically very similar to *S. franchetii*. The recently described *Senecio joharchii* is only known from one locality in Iran (northern Khorassan province). According to Ghahremaninejad & al. (2010), this species is perhaps closely related to *S. paulsenii*.

In summary, phylogenetic analyses of our plastid and nuclear DNA sequence data suggest that *Senecio* sect. *Doria* should be synomymized with sect. *Crociseris* and that *S. racemosus* needs to be transferred from sect. *Crociseris* to *Jacobaea*. Contrary to Nordenstam (2007b), our data suggest that *S. trapezuntinus* is a member of sect. *Crociseris*. *Jacobaea kirghisica* may also be best placed in *Jacobaea*, although our results indicate that it is possibly an intergeneric hybrid.

■ TAXONOMY

Jacobaea racemosa (M. Bieb.) Pelser, **comb. nov.** ≡ *Cineraria racemosa* M. Bieb., Tabl. Prov. Mer Casp.: 119. 1798 ≡ *Senecio racemosus* (M. Bieb.) DC., Prodr. 6: 358. 1838 – Lectotype (designated by Menitsky & Konechnaya, 2001: 95): Azerbaijan, Xizi, Altiaghach, ex montibus Schirvanicis, [40°52′N 48°58′E], 1796, *Bieberstein s.n.* (LE!).

■ ACKNOWLEDGEMENTS

The authors thank Ahmet Aksoy, Mecit Vural and Culiţă Sîrbu for providing specimens or tissue samples, and Emilio Cano, Fátima Duran, and Guillermo Sanjuanbenito for valuable help in the laboratory. We are grateful to the curators of B, BR, E, G, GAZI, H, IASI, L, M, MA, MO, UPS, and WU for permission to include their Senecioneae specimens in our studies. Félix Muñoz Garmendia, Manuel Laínz, and Alberto Herrero are acknowledged for their advice, and Matt Walters for helping with preparing the phylogenetic trees for publication. Two anonymous reviewers contributed helpful suggestions to an earlier draft of this paper. This work was financed by the *Flora Iberica* project (CGL2008-02982-C03-01/CLI) and a Ph.D. grant (JAE-Pre, CSIC).

■ LITERATURE CITED

Abbott, R.J., James, J.K., Irwin, J.A. & Comes, H.P. 2000. Hybrid origin of the Oxford Ragwort, *Senecio squalidus* L. *Watsonia* 23: 123–138.

Avetisyan, V.E. 1995. *Senecio* L. Pp. 462–485 in: Takhtajan, A.L. (ed.), *Flora Armenii*, vol. 9, *Campanulaceae, Asteraceae*. Koenigstein: Koeltz Scientific Books.

Bain, J.F., Tyson, B.S. & Bray, D.F. 1997. Variation in pollen wall ultrastructure in New World Senecioneae (Asteraceae), with special reference to *Packera*. *Canad. J. Bot.* 75: 730–735.

Beck, E., Scheibe, R., Schlütter, I. & Sauer, W. 1992. *Senecio* × *saundersii* Sauer & Beck (Asteraceae), an intermediate hybrid between *S. keniodendron* and *S. keniensis* of Mt. Kenya. *Phyton (Horn)* 32: 9–37.

Boissier, P.-E. 1844. *Diagnoses plantarum orientalium novarum*, vol. 1(4). Leipzig: apud B. Hermann.

Boissier, P.-E. 1875. *Flora orientalis*, vol. 3. Basel, Geneva.

Brennan, A.C., Bridle, J.R., Wang, A.-L., Hiscock, S.J. & Abbott, R.J. 2009. Adaptation and selection in the *Senecio* (Asteraceae) hybrid zone on Mount Etna, Sicily. *New Phytol.* 183: 702–717.

Briquet, J. & Cavillier, F. 1916. *Senecio* L. Pp. 5–47 in: Burnat, E., (ed.), *Flore des Alpes maritimes*, vol. 6(1). Geneva, Basel: Georg & Cie.

Calvo, J., Álvarez, I. & Aedo, C. 2011. Proposal to conserve the name *Senecio paucifolius* (Compositae) with a conserved type. *Taxon* 60: 1217–1217.

Candolle, A.P. de 1838. *Prodromus systematis naturalis regni vegetabilis*, vol. 6. Paris.

Chater, A.O. & Walters, S.M. 1976. *Senecio* L. Pp. 191–205 in: Tutin, T.G., Heywood, V.H., Burges, N.A. & Valentine, D.H. (eds.), *Flora Europaea*, vol. 4, *Plantaginaceae to Compositae*. Cambridge: Cambridge University Press.

Comes, H.P. 1994. The occurrence of *Senecio vulgaris* L. var. *vulgaris* and *S.* ×*helwingii* Beger ex Hegi (*S. vulgaris* × *S. vernalis* Waldst. et Kit.) in Israel. *Israel J. Pl. Sci.* 42: 105–113.

Comes, H.P. & Abbott, R.J. 2001. Molecular phylogeography,

reticulation, and lineage sorting in Mediterranean *Senecio* sect. *Senecio* (Asteraceae). *Evolution* 55: 1943–1962.

Devos, N., Barker, N.P., Nordenstam, B. & Mucina, L. 2010. A multilocus phylogeny of *Euryops* (Asteraceae, Senecioneae) augments support for the "Cape to Cairo" hypothesis of floral migrations in Africa. *Taxon* 59: 57–67.

Geyer, C.J. 1991. Markov chain Monte Carlo maximum likelihood. Pp. 156–163 in: Keramidas, E.M. (ed.), *Computing science and statistics: Proceedings of the 23rd Symposium on the Interface*. Fairfax Station, VA: Interface Foundation of North America Inc.

Ghahremaninejad, F., Ezazi, A., Rahchamani, N. & Attar, F. 2010. A new *Senecio* L. (Asteraceae: Senecioneae) from Northeast Iran. *Feddes Repert.* 121: 27–31.

Godron, D.A. 1850. *Senecio* L. Pp. 110–124 in: Grenier, J.C.M. & Godron, D.A., *Flore de France*, vol. 2. Paris: chez J.-B. Baillière; London: chez H. Baillière; Besançon: chez de Sainte-Agathe Aîné.

Golden J.L. & Bain J.F. 2000. Phylogeographic patterns and high levels of chloroplast DNA diversity in four *Packera* (Asteraceae) species in southwestern Alberta. *Evolution* 54: 1566–1579.

Goloboff, P.A., Farris, J.S. & Nixon, K.C. 2008. TNT, a free program for phylogenetic analysis. *Cladistics* 24: 774–786.

Greuter, W. 2008. *Senecio* L. Pp. 711–720 in: Greuter, W. & Raab-Straube, E. von (eds.), *Med-Checklist*, vol. 2, *Dicotyledones (Compositae)*. Geneva: Conservatoire et Jardin botaniques de la Ville de Genève.

Guindon, S. & Gascuel, O. 2003. A simple, fast, and accurate algorithm to estimate large phylogenies by maximum likelihood. *Syst. Biol.* 52: 696–704.

Hall, T. 1997–2005. BioEdit: Sequence Alignment Editor. http://www.mbio.ncsu.edu/bioedit/bioedit.html

Harris, S.A. & Ingram, R. 1992. Molecular systematics of the genus *Senecio* L. I: Hybridization in a British polyploid complex. *Heredity* 69: 1–10.

Hodálová, I. 2002. A new hybrid *Senecio* ×*slovacus* from the *S. nemorensis* group (Compositae) in the West Carpathians. *Biologia (Bratislava), Sect. Bot.* 57: 75–82.

Hodálová, I. & Marhold, K. 1996. Sympatric populations of *Senecio ovatus* subsp. *ovatus*, *S. germanicus* subsp. *germanicus* (Compositae) and their hybrid in the Carpathians and the adjacent part of Pannonia. I. Multivariate morphometric study. *Flora* 191: 283–290.

Huelsenbeck, J.P. & Ronquist, F. 2001. MRBAYES: Bayesian inference of phylogenetic trees. *Bioinformatics* 17: 754–755.

Jobes, D.V. & Thien, L.B. 1997. A conserved motif in the 5.8S ribosomal RNA (rRNA) gene is a useful diagnostic marker for plant internal transcribed spacer (ITS) sequences. *Pl. Molec. Biol. Reporter* 15: 326–334.

Kadereit, J.W., Uribe-Convers, S., Westberg, E. & Comes, H.P. 2006. Reciprocal hybridization at different times between *Senecio flavus* and *Senecio glaucus* gave rise to two polyploid species in North Africa and south-west Asia. *New Phytol.* 169: 431–441.

Kirk, H., Máčel, M., Klinkhamer, P.G.L. & Vrieling, K. 2004. Natural hybridization between *Senecio jacobaea* and *Senecio aquaticus*: Molecular and chemical evidence. *Molec. Ecol.* 13: 2267–2274.

Kirk, H., Vrieling, K., Pelser, P.B. & Schaffner, U. 2012. Can plant resistance to specialist herbivores be explained by plant chemistry or resource use strategy? *Oecologia* 168: 1043–1055.

Konechnaya, G.Yu. 1994. *Senecio* L. Pp. 52–63 in: Tzvelev, N.N. (ed.), *Flora evropeiskoi chasti SSSR*, vol. 7. St. Petersburg: Nauka.

Langel, D., Ober, D. & Pelser, P.B. 2011. The evolution of pyrrolizidine alkaloid biosynthesis and diversity in the Senecioneae. *Phytochem. Rev.* 10: 3–74.

Liu, J.-S. & Schardl, C.L. 1994. A conserved sequence in internal transcribed spacer 1 of plant nuclear rRNA genes. *Pl. Molec. Biol.* 26: 775–778.

Lowe, A.J. & Abbott, R.J. 2000. Routes of origin of two recently evolved hybrid taxa: *Senecio vulgaris* var. *hibernicus* and York radiate groundsel (Asteraceae). *Amer. J. Bot.* 87: 1159–1167.

Matthews, V.A. 1975. *Senecio* L. Pp. 145–168 in: Davis, P.H., *Flora of Turkey and the East Aegean Islands*, vol. 6. Edinburgh: Edinburgh University Press.

Mayol, M. & Rosselló, J.A. 2001. Why nuclear ribosomal DNA spacers (ITS) tell different stories in Quercus. *Molec. Phylogen. Evol.* 19: 167–176.

Menitsky, G.L. & Konechnaya, G.Y. 2001. Survey of Caucasian *Senecio* (Asteraceae) species. *Bot. Zhurn. (Moscow & Leningrad)* 86(2): 88–101.

Nomura, N., Takaso, T., Peng, C.-I., Kono, Y., Oginuma, K., Mitsui, Y. & Setoguchi, H. 2010. Molecular phylogeny and habitat diversification of the genus *Farfugium* (Asteraceae) based on nuclear rDNA and plastid DNA. *Ann. Bot. (Oxford)* 106: 467–482.

Nordenstam, B. 1989. *Senecio* L. Pp. 59–95 in: Rechinger, K.H. (ed.), *Flora Iranica, Compositae VII*. Graz: Akademische Druck- und Verlagsanstalt.

Nordenstam, B. 2007a. Senecioneae. Pp. 208–241 in: Kadereit, J.W. & Jeffrey, C. (eds.), *The families and genera of vascular plants*, vol. 8, *Flowering plants: Eudicots; Asterales*. Berlin: Springer.

Nordenstam, B. 2007b. *Jacobaea* combinations. P. 181 in: Greuter, W. & Raab-Straube, E. von (eds.), Euro+Med Notulae, 3. *Willdenowia* 37: 139–189.

Nordenstam, B. & Greuter, W. 2006. *Jacobaea* Mill. Pp. 711–713 in: Greuter, W. & Raab-Straube, E. von (eds.), Euro+Med Notulae, 2. *Willdenowia* 36: 707–717.

Pan, Y., Shi, S., Gong, X. & Kuroda, C. 2008. A natural hybrid between *Ligularia paradoxa* and *L. duciformis* (Asteraceae, Senecioneae) from Yunnan, China. *Ann. Missouri Bot. Gard.* 95: 487–494.

Pelser, P.B., Gravendeel, B. & Van der Meijden, R. 2002. Tackling speciose genera: Species composition and phylogenetic position of *Senecio* sect. *Jacobaea* (Asteraceae) based on plastid and nrDNA sequences. *Amer. J. Bot.* 89: 929–939.

Pelser, P.B., Gravendeel, B. & Van der Meijden, R. 2003. Phylogeny reconstruction in the gap between too little and too much divergence: The closest relatives of *Senecio jacobaea* (Asteraceae) according to DNA sequences and AFLPs. *Molec. Phylogen. Evol.* 29: 613–628.

Pelser, P.B., Van den Hof, K., Gravendeel, B. & Van der Meijden, R. 2004. The systematic value of morphological characters in *Senecio* sect. *Jacobaea* (Asteraceae) as compared to DNA sequences. *Syst. Bot.* 29: 790–805.

Pelser, P.B., de Vos, H., Theuring, H.C., Beuerle, T., Vrieling, K. & Hartmann, T. 2005. Frequent gain and loss of pyrrolizidine alkaloids in the evolution of *Senecio* sect. *Jacobaea* (Asteraceae). *Phytochemistry* 66: 1285–1295.

Pelser, P.B., Veldkamp, J.-F. & Van der Meijden, R. 2006. New combinations in *Jacobaea* Mill. (Asteraceae-Senecioneae). *Compositae Newslett.* 44: 1–11.

Pelser, P.B., Nordenstam, B., Kadereit, J.W. & Watson, L.E. 2007. An ITS phylogeny of tribe Senecioneae (Asteraceae) and a new delimitation of *Senecio* L. *Taxon* 56: 1077–1104.

Pelser, P.B., Kennedy, A.H., Tepe, E.J., Shidler, J.B., Nordenstam, B., Kadereit, J.W. & Watson, L.E. 2010. Patterns and causes of incongruence between plastid and nuclear Senecioneae (Asteraceae) phylogenies. *Amer. J. Bot.* 97: 856–873.

Pelser, P.B., Abbott, R., Comes, H.P., Milton, J., Moeller, M., Loosely, M., Cron, G., Barcelona, J., Kennedy, A.H., Watson, L.E., Barone, R., Hernández, F. & Kadereit, J.W. 2012. The genetic ghost of an invasion past: Colonization and extinction revealed by historical hybridization in *Senecio*. *Molec. Ecol.* 21: 369–387.

Posada, D. 2008. jModelTest: Phylogenetic model averaging. *Molec. Biol. Evol.* 25: 1253–1256.

Rambaut, A. 2009. FigTree, version 1.3.1. http://tree.bio.ed.ac.uk/software/

Ree, R. 2008. Gapcode.py, version 2.1. http://www.reelab.net/home/software

Reichenbach, H.G.L. 1831–1832. *Flora germanica excursoria*, [vol. 1(3)]. Leipzig: apud Carolum Cnobloch.

Reichenbach, H.G. 1853. *Icones florae germanicae et helveticae*, reimp. col., vol. 16(1). Leipzig: sumptibus Ambrosii Abel.

Ronquist, F., Huelsenbeck, J.P. & Van der Mark, P. 2005. MrBayes 3.1 manual draft 5/26/2005. http://mrbayes.sourceforge.net/manual.php

Rouy, G. 1903. Composées. Pp. 130–375 in: Rouy, G. & Foucaud, J., *Flore de France*, vol. 8. Asnières: G. Rouy; Paris: Les Fils d'Émile Deyrolle.

Schischkin, B.K. 1961. *Senecio* L. Pp. 699–788 in: Schischkin, B.K. & Bobrov, E.G. (eds.), *Flora of the USSR*, vol. 26, *Compositae*. Moscow, Leningrad: Akademiya Nauk SSSR.

Shaw, J., Lickey, E.B., Beck, J.T., Farmer, S.B., Liu, W., Miller, J., Siripun, K.C., Winder, C.T., Schilling, E.E. & Small, R.L. 2005. The tortoise and the hare II: Relative utility of 21 noncoding chloroplast DNA sequences for phylogenetic analysis. *Amer. J. Bot.* 92: 142–166.

Simmons, M.P. & Ochoterena, H. 2000. Gaps as characters in sequence-based phylogenetic analyses. *Syst. Biol.* 49: 369–381.

Taberlet, P., Gielly, L., Pautou, G. & Bouvet, J. 1991. Universal primers for amplification of three non-coding regions of chloroplast DNA. *Pl. Molec. Biol.* 17: 1105–1109.

White, T.J., Bruns, T., Lee, S. & Taylor, J. 1990. Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. Pp. 315–332 in: Innis, M., Gelfand, D., Sninsky, J. & White, T.J. (eds.), *PCR protocols: A guide to methods and applications.* San Diego: Academic Press.

Wiebe, E.I. 2000. The annotated check-list of the tribe Senecioneae Cass. (Asteraceae) in Siberia. *Turczaninowia* 3: 58–63.

Willkomm, H.M. 1865. *Senecio* L. Pp. 111–124 in: Willkomm, H.M. & Lange, J.M.C. (eds.), *Prodromus florae Hispanicae*, vol. 2. Stuttgart.

Wissjulina, E.D. 1962. *Senecio* L. Pp. 371–411 in: Wissjulina, E.D. (ed.), *Flora URSR*, vol. 11. Kiev: Vydavnyctvo Akademii Nauk Ukrajinskiej RSR.

Appendix 1. Voucher specimens and GenBank accession numbers (3′*trnK*, 5′*trnK*, *trnL*, *trnT-L*, ITS; - denotes a missing sequence; – denotes an interval corresponding to the ITS clones; * denotes newly generated accession numbers; + denotes specimens revised by J. Calvo.

Crassocephalum crepidioides S. Moore, cultivated, *Pelser cult. 354* (L), AF459991, AF460050, AF460138, AF460090, AF459968. ***Jacobaea abrotanifolia*** Moench, cultivated from Slovakia, Tatranska Lomnica, *Pelser cult. 309* (L), AF460019, AF460080, AF460164, AF460111, AF459956. ***Jacobaea adonidifolia*** (Loisel.) Pelser & Veldkamp, cultivated, *Pelser cult. 324* (L), AF460018, AF460079, AF460157, AF460110, AF459955. ***Jacobaea alpina*** (L.) Moench, cultivated, *Pelser cult. 8* (L), AF460017, AF460078, AF460163, AF460109, AF459954. ***Jacobaea ambigua*** (Biv.) Pelser & Veldkamp, 10 Jul 1969, *Fokkinga s.n.* (L), AF459974, AF460032, AF460122, -, AF459927. ***Jacobaea analoga*** (DC.) Veldkamp, cultivated, *Pelser cult. 167* (L), AF459980, AF460038, AF460128, AF460091, AF459947. ***Jacobaea aquatica*** G. Gaertn., B. Mey. & Scherb., Spain, Cosgaya, collado Llesba hacia Valdeloso, 9 Jul 2005, *I. Álvarez 1979 & J.I. Yagüe*$^{+}$ (MA), JX894896*, JX894969*, JX895041*, JX895114*, JX895222–JX895228*. ***Jacobaea auricula*** (Bourg. ex Coss.) Pelser, Spain, Albarca, 21 Jul 2007, *J. Calvo 1179* specimen 135^{+} (MA), JX894963*, JX895035*, JX895108*, JX895175*, JX895179–JX895193*; Spain, Colmenar de Oreja, 18 Apr 2009, *J. Calvo 3512 & S. Hantson* specimen 9^{+} (MA), JX894964*, JX895036*, JX895109*, JX895176*, -; Spain, Chinchón, 18 Apr 2009, *J. Calvo 3520 & S. Hantson* specimen 11^{+} (MA), JX894965*, JX895037*, JX895110*, JX895177*, -; Spain, Borox, 19 Apr 2009, *J. Calvo 3526 & S. Hantson* specimen 10^{+} (MA), JX894966*, JX895038*, JX895111*, JX895178*, -. ***Jacobaea boissieri*** (DC.) Pelser, Spain, Granada, Sierra Nevada, road N of Capileira, 18 Apr 1985, *Leidse Botanische Excursie 1985 nº 238* (L), AY156980, AF548769, AY155614, AY155626, AY155603. ***Jacobaea cannabifolia*** (Less.) E. Wiebe, cultivated, *Jeffrey s.n.* (11 Aug 1993; MJG), AF460011, AF460072, AF460156, AY155627, AF459949. ***Jacobaea carniolica*** Schrank, Italy, Lombardia, Sondrio/Bergamo, Passo di Porcile, 18 Aug 2000, *Tribsch & al. 112* (WU), AY156981, AF548770, AY155615, AY155628, AY155604. ***Jacobaea cilicia*** (Boiss.) B. Nord., Turkey, between Divriği and Arapgir, 15 Jul 1982, *M. Nydegger 17168*$^{+}$ (MA), JX894953*, JX895025*, JX895098*, JX895168*, JX895427–JX895433*. ***Jacobaea delphiniifolia*** (Vahl) Pelser & Veldkamp, *Dutartre 19770* (RNG), AY156982, AF548771, AY155616, -, AY327538. ***Jacobaea erucifolia*** (L.) G. Gaertn., B. Mey. & Scherb., Netherlands, *Pelser 124* (L), AF460009, AF460070, AF460155, AF460104, AF459944. ***Jacobaea gallerandiana*** (Coss. & Durieu) Pelser, Algeria, Bouira wilaya, Djurdjura, 4 Jul 1985, *A. Dubuis, L. Faurel & Ramoun 18643* (RNG), AY327529, AY327528, AY327527, AY327526, AY327531. ***Jacobaea gigantea*** (Desf.) Pelser, Algeria, Alger wilaya, near d' Oued-el-Alleug, 5 Jun 1965, *A. Dubuis & L. Faurel 5702* (L), AY156983, AF548772, AY155617, AY155629, AY155606. ***Jacobaea gnaphalioides*** (Spreng.) Veldkamp, Royal Botanical Garden Edinburgh *cult. C331* (L), AY156984, AF548773, AY155618, AY155630, AY155607. ***Jacobaea incana*** (L.) Veldkamp, Italy, col du Petit-Saint-Bernard, 27 Jul 2000, *A. Tribsch 81* (L), AY156985, AF548774, AY155619, AY155631, AY155609. ***Jacobaea inops*** (Boiss. & Balansa) B. Nord., Turkey, Tomarza, 12 Jul 2008, *B. Bani 6560* specimen 60^{+} (MA), JX894894*, JX894967*, JX895039*, JX895112*, JX895434–JX895440*; Turkey, Tomarza, 12 Aug 2005, *Budak 1991, Aksoy & Hamzaoğlu* specimen 1112 (Yozgat Türkiye Florası Herbaryumu), JX894957*, JX895029*, JX895102*, -, JX895505*; Turkey, Mittlerer Taurus, 24 Jul 1992, *P. Hein 56* specimen 1073^{+} (B), JX894958*, JX895030*, JX895103*, -, JX895504*. ***Jacobaea kirghisica*** (DC.) E. Wiebe, Kazakhstan, Pavlodar region, Bajanaulsky area, 3 km. to the West from Egendi-bulak kolhoz, 1 Aug 1955, *N.N. Tzvelev, A.V. Kalinina, Z.V. Karamisheva & A.D.Dogadova* specimen 68^{+} (MO), JX894954*, JX895026*, JX895099*, -, JX895498–JX895502*, (68–2, -, -, -, -, JX895486–JX895497*); Russia, Republic of Bashkortostan, Ufa, Chishmi station, 18 Jul 1915, *I.V. Novopokrovskiy 1240 & V.N. Yakovlev* specimen 75^{+} (S), -, -, -, -, JX895470–JX895485*. ***Jacobaea leucophylla*** (DC.) Pelser, Spain, Girona, Aiguaneix, 21 Jul 2001, *A. Tribsch 187* (L), AY156988, AF548777, AY155622, AY155634, AY155611. ***Jacobaea maritima*** (L.) Pelser & Meijden, cultivated from Spain, Mallorca, Badia de Palma, *Pelser cult. 257* (L), AF460012, AF460073, AF460158, AF460105, AF459950. ***Jacobaea maroccana*** (P.H. Davis) Pelser, Morocco, High Atlas, S from Marrakech, Oukaimeden, 25 Jul 1997, *S.L. Jury 18107* (RNG), AY327535, AY327534, AY327533, AY327532, AY327537. ***Jacobaea minuta*** (Cav.) Pelser & Veldkamp, Spain, Zaragoza, near the summit of La Sierra de Vicort, 10 Jun 1991, *D. Gómez, Martínez & C. Aseginolaza 67791* (L), AF459977, AF460035, AF460125, AY155635, AF459938. ***Jacobaea othonnae*** C.A. Mey., Georgia, Kartli, Borjomi region, Takra-Tskara, Bakuriani, *H.H. Schmidt & al. 2787* (MO), AY156989, AF548778, AY155623, AY155636, AY155612. ***Jacobaea paludosa*** subsp. ***lanata*** (Holub) B. Nord. & Greuter, Russia, Nóvgorod region, Selishchi, 4 Aug 2010, *J. Calvo 4931*$^{+}$ (MA), JX894959*, JX895031*, JX895104*, JX895171*, JX895211–JX895221*. ***Jacobaea paludosa*** subsp. ***paludosa*** (L.) P. Gaertn., B. Mey. & Scherb., Latvia, pr. Daugavpils, 6 Aug 2010, *J. Calvo 4933* specimen 32^{+} (MA), JX894962*, JX895034*, JX895107*, JX895174*, -; Russia, Leningrad region, Lisiy Nos, 30 Jun 2010, *J. Calvo 4921, N. N. Tzvelev & A. Stanislavsky* specimen 29^{+} (MA), JX894960*, JX895032*, JX895105*, JX895172*, JX895201–JX895210*; Russia, Pskov region, pr. Novoye Nikol'skoye, 5 Aug 2010, *J. Calvo 4932* specimen 31^{+} (MA), JX894961*, JX895033*, JX895106*, JX895173*, -. ***Jacobaea pancicii*** (Degen) Vladimir. & Raab-Straube, Bulgaria, Vitosha, Bitritsa reserve, 5 Sep 1978, *N. Andreev. s.n.* (L), AF459975, AF460033, AF460123, AY155637, AF459934. ***Jacobaea persoonii*** (De Not.) Pelser, Italy, Piemonte, Cuneo, Viozene, 23 Jul 2000, *Schönswetter & Tribsch 4671* (L), AY156990, AF548779, AY155624, AY155638, AY155613. ***Jacobaea sandrasica*** (P.H. Davis) B.Nord. & Greuter, Turkey, Muğla, Köyceğiz, Ağla üzeri, Sandras dağı, 16 Jul 2005, *Budak 1723, Aksoy & Hamzaoğlu* (Yozgat Türkiye Florası Herbaryumu), JX894897*, -, JX895042*, -, JX895503*. ***Jacobaea subalpina*** (W.D.J. Koch) Pelser & Veldkamp, Slovakia, Tatranska Lomnica, *Pelser 307* (L), AF459999, AF460058, AF460144, AF460096, AF459929. ***Jacobaea uniflora*** (All.) Veldkamp, Italy, Aosta, Val di Gressoney, Lac Gabiet, 23 Jul 2001, *A. Tribsch 191* (L), AY156991, AF548780, AY155625, AY155639, AY155608. ***Jacobaea vulgaris*** Gaertn., cultivated from Netherlands, Meijendel, *Pelser cult. 6* (L), AF460007, AF460068, AF460153, AF460102, AF459941. ***Kleinia neriifolia*** Haw., cultivated, *Pelser cult. 216* (L), AF460024, AF460085, AF460169, AF460116, AF459962. ***Othonna capensis*** L.H. Bailey, cultivated, *Pelser cult. 106* (L), AF460022, AF460083, AF460167, AF460114, AF459960. ***Packera aurea*** (L.) Á. Löve & D. Löve, N America, *E.B. Knox 880* (MICH), AF460021, AF460082, AF460166, AF460113, AF459959. ***Senecio cadiscus*** B. Nord. & Pelser, South Africa, 1968, *Rourke 1118* (S), GU817434, GU817599, GU817980, JX895113*, GU818506. ***Senecio castagneanus*** DC., Turkey, Izmir-Kemalpasa, 23 May 1991, *Aksoy 359* specimen 1115 (Yozgat Türkiye Florası Herbaryumu), -, -, -, -, JX895508*; Turkey, Bursa, Uludağ-Soğukpinar, *M. Nydegger 15128* specimen 63^{+} (G), JX894917*, JX894989*, JX895062*,

Appendix 1. Continued.

JX895133*, -. ***Senecio doria*** L., Spain, Barrios de Luna, 24 Jul 2009, *J. Calvo 3962* specimen 15^{+} (MA), JX894916*, JX894988*, JX895061*, JX895132*, -; Spain, Arreo, 16 Jul 2005, *L.M. Ferrero & L. Medina 2823* specimen 70^{+} (MA), JX894914*, JX894986*, JX895059*, JX895130*, JX895265–JX895277*. ***Senecio doria* × *Senecio pyrenaicus***, Spain, Carrocera, 26 Jul 2009, *J. Calvo 4059*$^{+}$ (MA), JX894915*, JX894987*, JX895060*, JX895131*, -. ***Senecio doriiformis*** DC., Turkey, Ala Dağlari, 13 Aug 1992, *P. Hein 104* specimen 1079 (B), -, -, -, -, JX895507*; Turkey, Niğde, Ala Dağlar, 9 Aug 1992, *V. Vašák s.n.* specimen 67^{+} (BR), JX894899*, JX894971*, JX895044*, JX895116*, -. ***Senecio doronicum*** (L.) L., Andorra, Ordino, 30 Aug 2002, *C. Aedo 8630 & al.* specimen 53^{+} (MA), JX894922*, JX894994*, JX895067*, JX895138*, -; Croatia, Hoher Velebit, 23 Jul 1907, *E. Janchen & B. Watzl s.n.* specimen 55^{+} (WU), JX894926*, JX894998*, JX895071*, JX895142*, JX895307–JX895312*; France, col de Gleize, 02 Jun 2011, *C. Aedo 18427* specimen 64^{+} (MA), JX894937*, JX895009*, JX895082*, JX895152*, JX895319–JX895325*; France, Jura, 17 Aug 2010, *J. Calvo 4982* specimen 42^{+} (MA), JX894923*, JX894995*, JX895068*, JX895139*, JX895313–JX895318*; France, pr. col du Galibier, 20 Aug 2010, *J. Calvo 5000* specimen 43^{+} (MA), JX894924*, JX894996*, JX895069*, JX895140*, -; France, col du Galibier, 20 Aug 2010, *J. Calvo 5030* specimen 44^{+} (MA), JX894925*, JX894997*, JX895070*, JX895141*, JX895326–JX895340*; Italy, Alpes-Maritimes, Limonetto, 25 May 2010, *J. Calvo 4666 & A. Unió* specimen 27^{+} (MA), JX894936*, JX895008*, JX895081*, JX895151*, JX895455–JX895469*; Italy, Rieti, 19 Aug 1965, *H. Merxmüller 20731& J. Grau* specimen 56^{+} (M), JX894928*, JX895000*, JX895073*, JX895143*, JX895341–JX895347*; Slovenia, Zatrep, 04 Aug 1973, *T. Wraber s.n.* specimen 47^{+} (B), JX894927*, JX894999*, JX895072*, -, -; Spain, peña Cerreos, 25 Jul 2009, *J. Calvo 4000* specimen 39^{+} (MA), JX894919*, JX894991*, JX895064*, JX895135*, JX895355–JX895369*; Spain, peña Cerreos, 25 Jul 2009, *J. Calvo 4012* specimen 3^{+} (MA), JX894920*, JX894992*, JX895065*, JX895136*, -; Spain, peña Ubiña, 25 Jul 2009, *J. Calvo 4020* specimen 40^{+} (MA), JX894921*, JX894993*, JX895066*, JX895137*, -; Switzerland, Valsorey, Grand Combin, 12 Jul 1990, *E. Valdés-Bermejo 12016* specimen 36^{+} (MA), JX894918*, JX894990*, JX895063*, JX895134*, -. ***Senecio elegans*** L., South Africa, Flat Bed beach, 5 Dec 2006, *Cron & Goodman 687* (J), GU817525, GU817691, GU818064, -, GU818642. ***Senecio eriopus*** Willk., Spain, Benalmádena, 14 May 2009, *J. Calvo 3547* specimen 37^{+} (MA), JX894929*, JX895001*, JX895074*, JX895144*, JX895278–JX895291*; Spain, Alhaurín el Grande, 15 May 2009, *J. Calvo 3565* specimen 4^{+} (MA), JX894930*, JX895002*, JX895075*, JX895145*, -; Spain, Algodonales, 17 May 2009, *J. Calvo 3607* specimen 38^{+} (MA), JX894931*, JX895003*, JX895076*, JX895146*, -; Morocco, jbel Dersa, 10 Apr 2009, *J. Calvo 3492 & I. Espejo* specimen 6^{+} (MA), JX894941*, JX895013*, JX895086*, JX895156*, -. ***Senecio eubaeus*** Boiss. & Heldr., Greece, Euboea, Troupio, 24 Jun 1969, *A. Fokkinga s.n.*$^{+}$ (L), JX894932*, JX895004*, JX895077*, JX895147*, JX895236–JX895245*. ***Senecio flavus*** (Decne.) Sch. Bip., Algeria, Guelta, 8 Feb 2003, *F. Ehrendorfer s.n.* specimen 548 (Comes), -, EF042172, DQ208176, DQ208184, -; Namibia, Farm Hanchabfontein, 4 Sep 1972, *H. Merxmüller & W. Giess 28206* specimen 32 (M), DQ208168, -, -, -, GU818643. ***Senecio franchetii*** C. Winkl., Afghanistan, Samangan, 14 May 1972, *I. Kukkonen 6210* specimen 69^{+} (H), JX894933*, JX895005*, JX895078*, JX895148*, -; Tajikistan, pass Kargisht, between Zagara and Hozratino ranges, 13 Jun 1986, *R.V. Kamelin 1078, N. Safarov, Halipov* specimen 851^{+} (U), -, -, -, -, EF538337. ***Senecio gramineus*** Harv., Lesotho, Sehlabathebe Nat'l Park, 1 Dec 1978, *F.K. Hoener 2104* (WAG), GU817529, GU817695, GU818068, -, GU818650. ***Senecio gregorii*** F. Muell., Australia, *D.E. Albrecht 7091* (NT), GU817530, GU817696, GU818069, -, GU818651. ***Senecio hispidulus*** A. Rich., Australia, Victoria, Upper Beaconsfield, 30 Oct 2006, *I.R. Thompson 908* (MEL), JX894895*, JX894968*, JX895040*, -, JX895506*. ***Senecio inaequidens*** DC., cultivated from Germany, Dullmen, *Pelser cult. 9* (L), AF460008, AF460069, AF460154, AF460103, AF459943. ***Senecio kolenatianus*** C.A. Mey., Turkey, Gümüshane, 25 Jun 2001, *A. Herrero & al. 1585* specimen 52^{+} (MA), JX894942*, JX895014*, JX895087*, JX895157*, JX895246–JX895252*; Turkey, Rise, Ovit Dagi Geçidi, 29 Jun 2001, *S. Nisa & al. 917* specimen 51^{+} (MA), JX894943*, JX895015*, JX895088*, JX895158*, -. ***Senecio lagascanus*** DC., France, Rodez, 27 Jun 2011, *J. Calvo 5600* specimen 72^{+} (MA), JX894907*, JX894979*, JX895052*, JX895124*, JX895348–JX895354*; Portugal, Montejunto, 13 May 2010, *J. Calvo 4608* specimen 5^{+} (MA), JX894949*, JX895021*, JX895094*, JX895164*, -; Spain, La Jana, 28 May 2011, *T. Buira, J. Calvo 5550 & D. Mesa* specimen 58^{+} (MA), JX894945*, JX895017*, JX895090*, JX895160*, -; Spain, Soria, Arévalo de la Sierra, Dehesa Mata, 24 Jun 1978, *A. Segura Zubizarreta 16941* specimen 100^{+} (B), -, -, -, -, JX895509*. ***Senecio lopezii*** Boiss., Portugal, Monchique, 12 May 2010, *J. Calvo 4560* specimen 23^{+} (MA), JX894948*, JX895020*, JX895093*, JX895163*, -; Spain, San Roque, 16 May 2009, *J. Calvo 3595* specimen 1^{+} (MA), JX894946*, JX895018*, JX895091*, JX895161*, -; Spain, los Morrones, 16 May 2009, *J. Calvo 3604* specimen 22^{+} (MA), JX894947*, JX895019*, JX895092*, JX895162*, JX895253–JX895264*. ***Senecio macedonicus*** Griseb., Bulgaria, Plovdiv, Dobrostan, 1 Jul 2004, *A. Herrero & al. 2337* specimen 33^{+} (MA), JX894950*, JX895022*, JX895095*, JX895165*, -; Greece, Mt. Orvilos area, 23 Jul 1981, *Strid & al. 19343* specimen 1092^{+} (B), -,-,-,-, JX895510*. ***Senecio mairetianus*** DC., Mexico, Atlautla, Tlamacas, 18 Oct 1976, *J. García 151* (L), EF537942, EF042178, EF538128, -, EF538359. ***Senecio nemorensis*** L., Romania, Argeş, 8 Aug 2009, *C. Aedo 16783* specimen 18^{+} (MA), JX894951*, JX895023*, JX895096*, JX895166*, -; Romania, Prahova, 9 Aug 2009, *C. Aedo 16818* specimen 19^{+} (MA), JX894952*, JX895024*, JX895097*, JX895167*, -; cultivated, *Pelser s.n.* specimen 102 (L), -, -, -, -, AF459937. ***Senecio nevadensis*** Boiss. & Reut., Spain, Sierra Nevada, 30 Aug 1985, *R. Vogt 4172*$^{+}$ (B), GU817537, GU817704, GU818077, -, GU818664. ***Senecio olympicus*** Boiss., Turkey, Geyik Dağlari, 20 Jul 1992, *P. Hein 49* specimen 1097^{+} (B), -, -, -, -, JX895511*; Turkey, Uludağ bei Bursa, 24 Aug 1992, Hörandl 4775 & Hadaček specimen 62^{+} (WU), JX894898*, JX894970*, JX895043*, JX895115*, -. ***Senecio paulsenii*** subsp. ***khorasanicus*** (Rech. f. & Aellen) B. Nord., Iran, Khorasan, Robāṭ Sefīd, 07 May 1975, *K.H. Rechinger 51314*$^{+}$ (MA), JX894900*, JX894972*, JX895045*, JX895117*, -. ***Senecio paulsenii*** O. Hoffm. subsp. ***paulsenii***, Pakistan, Chitral, 26 May 1958, *J.D.A. Stainton 2517*$^{+}$ (UPS), JX894901*, JX894973*, JX895046*, JX895118*, JX895229–JX895235*. ***Senecio perralderianus*** Coss., Algeria, djebel Babor, 15 Jun 1984, *D. Podlech 39340*$^{+}$ (L), -, -, -, -, EF538365. ***Senecio provincialis*** (L.) Druce, France, Caussols, 24 May 2010, *J. Calvo 4659 & A. Unió* specimen 28^{+} (MA), JX894935*, JX895007*, JX895080*, JX895150*, JX895399–JX895412*; France, Caussols, 24 May 2010, *J. Calvo 4660 & A. Unió* specimen 26^{+} (MA), JX894938*, JX895010*, JX895083*, JX895153*, -; France, Caussols, 24 May 2010, *J. Calvo 4661 & A. Unió* specimen 25^{+} (MA), JX894939*, JX895011*, JX895084*, JX895154*, -; France, Caussols, 24 May 2010, *J. Calvo 4662 & A. Unió* specimen 24^{+} (MA), JX894940*, JX895012*, JX895085*, JX895155*, JX895370–JX895383*; Spain, La Morera de Montsant, 26 May 2009, *J. Nogués & J. Calvo 3642* specimen 2^{+} (MA), JX894934*, JX895006*, JX895079*, JX895149*, -. ***Senecio provincialis* × *Senecio lagascanus***, Spain, La Segarra, 25 May 2009, *J. Pedrol & J. Calvo 3622* specimen 21^{+} (MA), JX894944*, JX895016*, JX895089*, JX895159*, JX895413–JX895426*. ***Senecio pseudoorientalis*** Schischk., Turkey, Kayseri, 24 Jul 2005, *Budak 1868 & Aksoy* specimen 1127 (Yozgat Türkiye Florası Herbaryumu), -, -, -, -, JX895512*; Turkey, Gümüşane, 20 Jul 1981, *M. Nydegger 16993* specimen 74^{+} (MA), JX894902*, JX894974*, JX895047*, JX895119*, -. ***Senecio pyrenaicus*** L., Spain, Peña Prieta, 10 Jul 2005, *I. Álvarez 1985 & J.I. Yagüe* specimen 65^{+} (MA), JX894903*, JX894975*, JX895048*, JX895120*, -; Spain, peñones de San Francisco, 20 Jun 2009, *J. Calvo 3923* specimen 13^{+} (MA), JX894904*, JX894976*, JX895049*, JX895121*, -; Spain, Navacerrada, 19 Jul 2009, *J. Calvo 3953 & S. Hantson* specimen 12^{+} (MA), JX894905*, JX894977*, JX895050*, JX895122*, -; Spain, Lena, 25 Jul 2009, *J. Calvo 3993* specimen 14^{+} (MA), JX894906*, JX894978*, JX895051*, JX895123*, -; Spain, Salamanca, *Navarro & Valle 11839* specimen 412^{+} (L), AF459981, AF460039, -, -, AF459948; Spain, Ribera de Cardós, *Huisman & Vermeulen 161* specimen 482 (L), -, -, -, -, EF53837. ***Senecio racemosus*** (M. Bieb.) DC., Turkey, Kars-Susuz, 05 Jul 1957, *Davis 30623 & Hedge* specimen 57^{+} (E), JX894956*, JX895028*, JX895101*, JX895170*, JX895194–JX895200*; Turkey, between Arpaçay and Başgedikler, 25 Jul 1981, *Raus 4445* specimen 46^{+} (B), JX894955*, JX895027*, JX895100*, JX895169*, -. ***Senecio scopolii*** subsp. ***floccosus*** (Bertol.) Greuter, Italy, Abruzzo, 30 Jun 2002, *C. Aedo 8287* specimen 34^{+} (MA), JX894908*, JX894980*, JX895053*, -, -; Italy, Gran Sasso d'Italia, 29 May 1997, *R. Vogt 15446* specimen 1106 (B), -, -, -, -, JX895513*. ***Senecio scopolii*** Hoppe & Hornsch. subsp. ***scopolii***, Croatia, Učka, 31 May 2010, *J. Calvo 4715 & A. Unió* specimen 41^{+} (MA), JX894909*, JX894981*, JX895054*, JX895125*, JX895384–JX895398*; Italy, San Giovanni Rotondo, 04 Apr 2011, *J. Calvo 5212 & A. Quintanar* specimen 45^{+} (MA), JX894910*, JX894982*, JX895055*, JX895126*, -. ***Senecio tauricola*** V.A. Matthews, Turkey, Karanfil, 15 Jul 1966, *Bisby 92* specimen 71^{+} (E), JX894911*, JX894983*, JX895056*, JX895127*, -; Turkey, Ermenek-Karaman, 18 Jul 2005, *Budak 1735, Aksoy & Hamzaoğlu* specimen 1113 (Yozgat Türkiye Florası Herbaryumu), GU817549, GU817716, GU818087, -, GU817570. ***Senecio transylvanicus*** Boiss., Romania, Retezat Mountains, 21 Aug 2002, *C. Sîrbu s.n.*$^{+}$ (MA), JX894912*, JX894984*, JX895057*, JX895128*, JX895292–JX895306*. ***Senecio trapezuntinus*** Boiss., Turkey, Trabzon, 2006, *Budak 2011* (Yozgat Türkiye Florası Herbaryumu), -, -, -, -, JX895514*. ***Senecio umbrosus*** Waldst. & Kit., Romania, Prahova, 9 Aug 2009, *C. Aedo 16820*$^{+}$ (MA), JX894913*, JX894985*, JX895058*, JX895129*, JX895441–JX895454*. ***Senecio vulgaris*** L., Germany, Mainz, Rheinallee, I-2004, *P. Comes s.n.* specimen 550 (Comes), -, -, -, DQ208185, -; cultivated from Austria, *Pelser cult. 188* specimen 188 (L), AF459995, AF460054, AF460141, -, AF459924.

also to Prof. G. Wagenitz for discussion on valid publication of the name *F. vulgaris*, to Dr. A. Herrero for his continuous support and help, and to Dr. J.H. Wiersema for his helpful comments.

This work was partially supported by the Spanish Dirección General de Investigación Científica y Técnica through the research projects CGL2008-02982-C0302 and CGL2009-07555, by the Junta de Castilla y León through the project SA142A08, and by the Catalan government ("Ajuts a grups consolidats" 2009/SGR/00439). The first author was supported by a research grant financed by the Spanish Dirección General de Investigación Científica y Técnica.

(2010) Proposal to conserve the name *Senecio gerardi* against *Inula provincialis* (*S. provincialis*) (*Compositae*)

Joel Calvo, Inés Álvarez & Carlos Aedo

Real Jardín Botánico, CSIC, Plaza de Murillo 2, 28014 Madrid, Spain
Author for correspondence: *Joel Calvo, jcalvo@rjb.csic.es*

(2010) ***Senecio gerardi*** Godr. & Gren. in Grenier & Godron, Fl. France 2: 122. Nov 1850 [*Dicot.: Compos.*], nom. cons. prop. Lectotypus (hic designatus): France, Provence-Alpes-Côte d'Azur, Var, montagne Sainte-Victoire, *Castagne* (NCY No. 013523).

(=) *Inula provincialis* L., Sp. Pl.: 884. 1 Mai 1753, nom. rej. prop. Lectotypus (hic designatus): France, "Collendaneis Galloprovinciae", Herb. Burser VI: 127 (UPS).

Senecio gerardi Godr. & Gren. is a species distributed in NE Spain, SE France and NW Italy. It is a perennial herbaceous plant morphologically close to *S. doronicum* (L.) L. and characterized by bearing short supplementary bracts widened at the base, leaves abruptly attenuate and tomentose beneath, and solitary to few capitula. It grows in calcareous mountains with some thermophile influence.

Senecio gerardi has consistently been accepted and widely used in the taxonomic literature from its publication in 1850, e.g., by Willkomm (in Willkomm & Lange, Prodr. Fl. Hispan. 2: 115. 1865), Nyman (Consp. Fl. Eur.: 354. 1879), Rouy & Camus (Fl. France 7: 328. 1901), Coste (Fl. Descr. France 2: 308. 1903), Briquet & Cavillier (in Burnat, Fl. Alpes Marit. 6: 36. 1916), Chater & Walters (in Tutin & al., Fl. Eur. 4: 197. 1976), Pignatti (Fl. Ital. 3: 124. 1982), and Bolòs & Vigo (Fl. Països Catalans 3: 845. 1995). In most of these cases, this taxon is included in *S. doronicum* s.l., and the epithet "*gerardi*" is used at infraspecific ranks. [It should be noted that, if published as "*gerardi*", epithets formed from the name Gerard or Gérard, which dates at least to the Early Middle Ages when Latin was the international language of Europe and thus has a well-established Latinized form, are not correctable under ICBN Art. 60.11 (see Rec. 60C.2, McNeill & al. in Regnum Veg. 146. 2006).]

In preparing a revision of *Senecio* sect. *Crociseris* (Rchb.) Boiss., we realized the names *S. provincialis* (L.) Druce (in Rep. Bot. Exch. Club Soc. Brit. Isles 3: 423. 1914), based on *Inula provincialis* L., and *S. gerardi* are synonymous, the former having priority over *S. gerardi*. Nevertheless, *S. provincialis* has scarcely been used in taxonomic works. It was only used by Kerguélen (Index Synon. Fl. France: 168. 1993) and Greuter (in Greuter & Von Raab-Straube, Med-Checklist 2: 712. 2008), both including *S. gerardi* as a synonym of *S. provincialis*.

In the protologue of *Inula provincialis*, Linnaeus (Sp. Pl.: 884. 1753) cited Burser's herbarium VI: 127 and indicated "Habitat in Collendaneis Galloprovinciae". According to Jarvis (Order out of Chaos: 591. 2007), Burser's specimen kept at UPS is the only original material, although Jarvis wrongly references the sheet (i.e., Herb. Burser VI: "123" instead of VI: 127). In any case, the sheet corresponds undoubtedly to *S. gerardi*, showing short supplementary bracts widened at the base, and leaves abruptly attenuate and tomentose beneath, all diagnostic characters to discriminate from *S. doronicum*. The sheet includes a whole plant with a solitary capitulum and young basal leaves on the left side of the sheet. The handwritten label includes the name "Jacobaea rotundifolia incana Bauh.", the locality "In Collendaneis Galloprovinciae", and the number "127". Thus, the mentioned sheet is designated as lectotype of the name *Inula provincialis*.

On the other hand, the protologue of *S. gerardi* mentions several localities "Hab. Mende, à la Margueride, Causse-Mejean au-dessus de Monteil; serre du Bouquet près de Nimes; mont Sainte-Victoire (*Castagne*); Toulon; Prades dans les Pyrénées-Orientales". Since Godron is the author of *Senecio* in *Flore de France*, it is feasible to designate the lectotype on Godron's material. According to Stafleu & Cowan (in Regnum Veg. 94: 961. 1976) the main set of Godron's collection is kept at NCY, but there is also Godron material at AUT, BR, FI, GOET, P, and W. The curators of NCY, P, BR, and FI kindly replied to our request to examine this material. Among these available collections, we have found two sheets of potential type material, one at P and the other at NCY. The first one (P No. 00697590, as photo!) contains two specimens, the one on the left corresponds to a Godron collection labelled in his handwriting, dated 1850 but without locality. The second one (NCY No. 013523, as photo!) corresponds to a Castagne collection labelled in Godron's handwriting, including locality ("Ste. Victoire") but without date. The locality perfectly matches the information provided in the protologue; consequently, we prefer to select as lectotype this last-mentioned specimen. It contains one plant with a solitary capitulum in fruit. It is interesting to note that the first identification by Castagne is *Serratula nudicaulis* DC., and subsequently Godron wrote "falsi" next to Castagne's identification and he added "Senecio gerardi nob". In the protologue Godron also mentioned this.

In summary, the name *S. provincialis* has rarely been used. Therefore, in order to preserve nomenclatural stability in accordance with ICBN Art. 14.2, conservation of the name *S. gerardi* over *S. provincialis* is here proposed. If the proposal were to be rejected, the name *S. provincialis* would have to replace the widespread usage by botanists of *S. gerardi*, which would be highly undesirable.

Acknowledgements

The curators of the herbaria mentioned in the text are thanked for their valuable help with the location and loans of *Senecio* collections. We are also grateful to Carine Denjean-Drechsler (curator of NCY), Mats Hjertson (curator of UPS), and Edwinstaël Ramanantsoa (P) for kindly sending photographs of the type material. Special thanks go to F. Muñoz Garmendia for his nomenclatural advice. This work was financed by *Flora Iberica* project (CGL2008-02982-C03-01/CLI), and by a Ph.D. grant (JAE-Pre, CSIC).

(2011) Proposal to conserve the name *Euphorbia acuta* Engelm. against *E. acuta* Bellardi ex Colla (*Euphorbiaceae*)

Paul E. Berry,[1] Victor Steinmann[2] & Ya Yang[1]

1 *Herbarium and EEB Department, University of Michigan, 3600 Varsity Drive, Ann Arbor, Michigan 48108, U.S.A.*

2 *Instituto de Ecología, A.C., Centro Regional del Bajío, Apdo. Postal 386, 61600 Pátzcuaro, Michoacán, Mexico*

Author for correspondence: *Paul E. Berry, peberry@umich.edu*

(2011) ***Euphorbia acuta*** Engelm. in Emory, Rep. U.S. Mex. Bound. 2(1): 189. 1–20 Apr 1859 [*Dicot.: Euphorb.*], nom. cons. prop.
Typus: U.S.A., "N. Mex.", 1851, *Wright 1839* (MO).

(H) *Euphorbia acuta* Bellardi ex Colla, Herb. Pedem. 5: 132. 6–30 Apr 1836, nom. rej. prop.
Typus: *Bellardi*? [deest].

The name *Euphorbia acuta* Bellardi ex Colla was published in *Herbarium Pedemontanum* (Colla, l.c.), with a short and vague morphological description. The reference to "umbella 4-fida" is sufficient to place the species within *Euphorbia* L. subg. *Esula* Pers. because this is the only infrageneric taxon in northern Italy that possesses pseudoumbellate inflorescences. However, none of the remaining characteristics are diagnostic, and based solely on the description it is not possible to attribute this name to any of the numerous species of *Euphorbia* subg. *Esula* that occur in the region. No precise collection information is provided in the protologue, but reference is made to a specimen in the Bellardi Herbarium. This herbarium is now housed at TO, as is the Colla Herbarium. A search in both these collections for a possible type of *E. acuta* Bellardi ex Colla failed to locate any specimen to which this name could be attributed (L. Guglielmone, pers. comm.). Likewise, in a detailed account of the 3167 species represented in the Herbarium Pedemontanum (TO-HP), Montacchini & al. (in Allionia 39: 9–37. 2003) listed 28 species of *Euphorbia*, but there was no mention of *E. acuta*. In his brief protologue, Colla (l.c.) wrote that the original material was in poor condition, and it appears not to have survived until present. Therefore, it is impossible to ascertain what species *E. acuta* Bellardi ex Colla represents, and thus the name is best treated as nomen dubium. We are aware of only two publications in which *E. acuta* Bellardi ex Colla was included, and both are general checklists of a bibliographic nature: Govaerts & al. (World Checkl. Bibliogr. Euphorb.: 862. 2000) and Oudejans (World Catal. Sp. Publ. Tribe Euphorb. Geogr. Distr.: 41. 1990). In the former, the name was treated as an unplaced synonym. It has apparently never been mentioned in any Flora or revision of *Euphorbia* subsequent to its original publication. In particular, it is worth emphasizing that the name was not cited in the only complete monograph of the genus (Boissier in Candolle, Prodr. 15(2): 3–188. 1862) nor in the treatments of *Euphorbia* for *Flora Europaea* (Smith & Tutin in Tutin & al., Fl. Europ. 2: 213–226. 1968) and *Flora d'Italia* (Pignatti, Fl. Ital. 2: 26–50. 1982), despite the name being presumably based on a plant from the Piedmont region of Italy.

Twenty-three years after the publication of *Euphorbia acuta* Bellardi ex Colla, Engelmann (l.c.) applied the specific epithet to a species collected in western Texas or eastern New Mexico, United States. This name and the alternative *Chamaesyce acuta* (Engelm.) Millsp. (in Field Mus. Nat. Hist., Bot. Ser. 2: 407. 1916) have since been applied to a well-characterized species of *Euphorbia* known from limestone outcrops of southern New Mexico and western Texas, as well as the adjacent states of Chihuahua and Coahuila, Mexico. Specimens determined and filed under this name occur in numerous herbaria. Furthermore, the species is a phylogenetically important one, because molecular data demonstrate that it forms part of a small clade of three species that is sister to all of the remaining nearly 300 species of *Euphorbia* subg. *Chamaesyce* sect. *Anisophyllum* Roeper (the former genus *Chamaesyce*; Y. Yang, in prep.). It is also one of just three species in the section that has a C_3 or transitional C_3-C_4 photosynthetic system, whereas all remaining species presumably share the C_4 photosynthetic system (R. Sage, in prep.). The epithet has been widely used in floristic literature in the United States and northeastern Mexico, both under *Euphorbia* (e.g., Watson in Proc. Amer. Acad. Arts 18: 150. 1883; Hemsley, Biol. Cent.-Amer., Bot. 4: 85. 1887; Wheeler in Amer. Midl. Naturalist 30: 480. 1943; Johnston in Correll & Johnston, Man. Vasc. Pl. Texas: 971. 1970; in Wrightia 5: 136. 1975; Mayfield in Sida 14: 573. 1991) or its segregate *Chamaesyce* (e.g., Webster in J. Arnold Arbor. 48: 425. 1967; Mayfield in Phytologia 75: 181. 1993; Jones & al., Vasc. Pl. Texas: 109. 1997; Turner & al., Atlas Vasc. Pl. Texas 1: 281. 2003; Poole & al., Rare Pl. Texas: 79, 206. 2007; Jercinovic in New Mexico Botanist Newslett. 40: 4. 2007). This name also appears in Boissier's (l.c.: 18) monograph of the genus, the revision of *Euphorbia* subg. *Chamaesyce* in the United States (Wheeler in Rhodora 43: 176–178. 1941) where a lectotype was selected, as well as a number of anatomical, cytological, and molecular phylogenetic studies (Webster & al. in Taxon 24: 28, 32. 1975, in Amer. J. Bot. 69: 411. 1982; Powell in Ann. Missouri Bot. Gard. 65: 602. 1978; Urbatsch & al. in Amer. J. Bot. 62: 497. 1982; Jordon & Hayden in Collect. Bot. (Barcelona) 21: 83, 84. 1992; Simmons & Hayden in Brittonia 49: 163. 1997; Steinmann & Porter in Ann. Missouri Bot. Gard. 89: 462, 473. 2002; Bruyns & al. in Taxon 55: 401. 2006; Park & Jansen in J. Pl. Biol. 50: 646, 648. 2007; Steinmann & al. in Anales Jard. Bot. Madrid 64: 127. 2007; Zimmermann & al. in Pl. Syst. Evol. 286: 48. 2010).

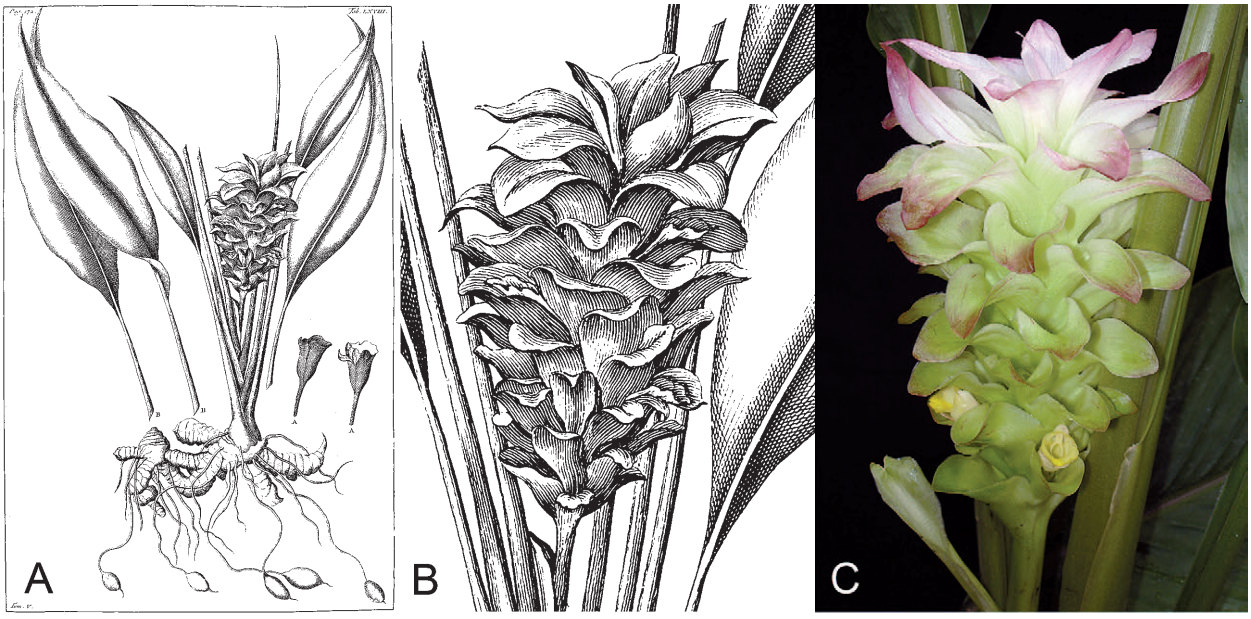


Fig. 1. A, Original illustration from Rumphius, Herb. Amboin. 5: tab. 68. 1747; **B,** detail of the inflorescence (ibidem, courtesy of National Museum Prague); **C,** inflorescence of *Curcuma euchroma* (photographed from *Ardiyani 53* at RBG Edinburgh, living collections Acc. No. 19990606).

classic work used in the region for identification of *Zingiberaceae*. Since the inception of the name *C. euchroma* by Valeton, it has been accepted and used in the following works: Backer & Bakhuizen (Fl. Java 3: 72. 1968), De Padua & al. (Medic. Poison. Pl. 1: 215. 1999), Guzman & Siemonsma (Spices: 113. 1999), Newman & al. (in Blumea, Suppl. 16: 64. 2004). This limited use is, however, simply because there are no other recent works on the genus *Curcuma* or family *Zingiberaceae* from this region; no other name has been adopted for the species. The name was accepted also by Prana (1977) and Ardiyani (2002) in their Ph.D. theses.

In the original description of *C. euchroma* Valeton says he prepared the description from three cultivated specimens namely *Heyne 449* (from Modjokerto under the name *Kunir batok*; [typo err., recte *Heyne 49*], *Heyne 52* (from Kediri as *Temoe prit*), and *Heyne s.n.* (from Madura, Soemenep under the name *Temoe lati*; the specimens of this last collection, even though the fact is not mentioned by Valeton, bear the number *Heyne 87*). All three collections were located at BO (*Heyne 49*, 3 sheets; *Heyne 52*, single sheet; *Heyne 87*, 5 sheets), from which we have selected *Heyne 49* (Acc. No. BO 166758) with two inflorescences and dissected flower as lectotype, the remaining two sheets with leaves and inflorescences as isolectotypes.

Curcuma euchroma is grown and also occurs in a semi-wild state in Java and adjacent areas and its name is currently and unambiguously used. It is also likely to occur in cultivation in other parts of the Indian subcontinent and SE Asia. Based on Art. 11.4 of the ICBN (McNeill & al. in Regnum Veg. 146. 2006), a new combination based on *Erndlia subpersonata* should be adopted as the name for this taxon. Creating such a combination would, however, lead to an undesirable change of the name of this rather common, well-known and cultivated species, of which rhizomes are sometimes used medicinally as a substitute for those of *C. longa* (De Padua & al., l.c.). In order to maintain nomenclatural stability we therefore propose to conserve the name *C. euchroma* Valeton against the older *E. subpersonata* Giseke, a name overlooked until now.

(2024) Proposal to conserve the name *Solidago doronicum* (*Senecio doronicum*) (*Compositae*) with a conserved type

Joel Calvo, Inés Álvarez & Carlos Aedo

Real Jardín Botánico, CSIC, Plaza de Murillo 2, 28014 Madrid, Spain
Author for correspondence: *Joel Calvo, jcalvo@rjb.csic.es*

(2024) ***Solidago doronicum*** L., Sp. Pl.: 880. 1 Mai 1753 [*Dicot.: Compos.*], nom. cons. prop.
Typus: Switzerland, Graubünden, Upper Engadine, above St. Moritz, 46°30′N 9°50′E, Jul 1873, *Ball* (US No. 291492), typ. cons. prop.

Senecio doronicum (L.) L. is a species distributed mainly through the Cantabrian Range, Pyrenees, Massif Central, Alps, Apennines, and Dalmatian Mountains. It is a perennial herbaceous plant characterized by bearing supplementary bracts a half to as long as principal bracts, rarely longer (ratio supplementary bracts

length/principal bracts length = 0.45–1.21), leaves glabrescent to arachnoid, and 1–4(–9) capitula. It is a species with a high variability, mainly in number of capitula, indumentum of involucre and number of supplementary bracts, and also indumentum and shape of leaves. In our taxonomic revision of *Senecio* sect. *Crociseris* (Rchb.) Boiss., we distinguish three *S. doronicum* taxa, which probably need to be treated as different subspecies. The first one including the populations from Cantabrian Range, Pyrenees, and Massif Central, characterized by bearing (7–)10–15(–18) supplementary bracts covered with scattered scabrid-arachnoid trichomes, and 1(–3) capitulum. The leaves are narrowly lanceolate and gradually attenuate, glabrescent to scattered scabrid-arachnoid above, and scattered scabrid-arachnoid beneath. The second taxon corresponds to populations from the Alps that correspond to what is traditionally ascribed as *S. doronicum*. Moreover, the high number of floristic works in the Alps region supports the mentioned statement. This taxon is characterized by bearing (9–)14–22(–26) supplementary bracts with arachnoid indumentum, sometimes more or less floccose, and usually 2–4 capitula, sometimes solitary. The leaves are abruptly attenuate with arachnoid indumentum, sometimes slightly floccose. The last one includes populations from Carinthia (Austria) to the Dalmatian Mountains, and central and southern Appenines. This taxon is characterized by bearing (9–)14–18(–24) supplementary bracts, longer than the typical form, glabrescent or covered with scattered scabrid trichomes, 2–4 capitula, rarely solitary, and leaves glabrescent or covered with scattered scabrid trichomes.

In preparing the nomenclatural revision of *Senecio* sect. *Crociseris* (Rchb.) Boiss., we realized the lectotype of *Solidago doronicum* L. (LINN No. 996.63) designated by Kadereit in Taxon 47: 367 (1998) corresponds to *Senecio gerardi* Godr. & Gren. (in Grenier & Godron, Fl. France 2: 122. 1850; nom. cons. prop.—see Taxon 60: 602–603. 2011). This species is morphologically close to *Senecio doronicum* but its shorter supplementary bracts widened at the base allow separating easily the two species. The leaf shape and indumentum are other characters that differentiate both species. *Senecio doronicum* bears leaves long-attenuate, glabrescent or arachnoid beneath, ± concolor; while *S. gerardi* bears leaves abruptly attenuate, tomentose beneath, usually ± discolor. Using these characters the lectotype LINN No. 996.63 matches undoubtedly to *S. gerardi*.

Since *Senecio doronicum* has consistently been accepted and widely used in the taxonomic literature from its publication in 1753, e.g., by Jacquin (Fl. Austriac. 5: 53. 1778), Reichenbach (Fl. Germ. Excurs. 1: 245. 1831–1832), W. Koch (Syn. Fl. Germ. Helv. 2: 390. 1837), Candolle (Prodr. 6: 357. 1838), Godron (in Grenier & Godron, Fl. France 2: 121. 1850), Nyman (Consp. Fl. Eur.: 354. 1879), Hegi (in Schinz & Keller, Fl. Schweiz: 538. 1899–1900), Rouy & Camus (Fl. France 7: 328. 1901), Coste (Fl. Descr. France 2: 308. 1903), Hegi (Ill. Fl. Mitt.-Eur. 6: 751. 1928), Chater & Walters (in Tutin & al., Fl. Eur. 4: 197. 1976), Pignatti (Fl. Ital. 3: 124. 1982), Greuter (in Greuter & Raab-Straube, Euro+Med Plantbase, http://www.emplantbase.org, accessed June 2011), it is appropriate to conserve its basionym with a conserved type to preserve this usage.

To see if any original material matches the current concept of this name we examined the protologue of *Solidago doronicum*, where Linnaeus (Sp. Pl.: 880–881. 1753) cited the following synonyms:

- "Doronicum foliis lanceolatis alternis dentatis: caulinis amplexicaulibus, caule ramoso. *Roy. lugdb.* 160. *Sauv. monsp.* 84"
- "Doronicum longifolium hirsutie asperum. *Bauh. pin.* 185"
- "Doronicum II, Austriacum I. *Clus. hist.* 2. *p.* 17"

The first polynomial synonym cites the botanists Royen and Sauvages. Since Sauvages refers to Royen's polynomial, one could search for a suitable specimen among the Royen collection kept at L, which Linnaeus saw during his time in the Netherlands (Jarvis, Order out of Chaos: 153, 184. 2007). The guide of Van Royen Herbarium (Thijsse & Veldkamp, 2003) contains several specimens of *Senecio*, *Solidago*, and *Doronicum*. We examined eight photos of *Senecio* sp. and *Solidago* sp. from this collection but no one corresponds to *Senecio doronicum*. The second synonym cited by Linnaeus is associated with one sheet of Herb. Burser X: 22 (UPS), which corresponds to *Doronicum clusii* (All.) Tausch. The third synonym refers to a Clusius drawing that corresponds to *Doronicum* sp. Consequently, the lack of suitable original material leads us to typify *Solidago doronicum* on a new specimen. Since the traditionally typical subspecies of *Senecio doronicum* is distributed mainly through the Alps, it is desirable to propose material from this region for the conserved type. Among the available material, we have tried to select a specimen that demonstrates the mentioned characters of this taxon from the Alps. A Ball specimen from Switzerland collected in July 1873 above St. Moritz, Upper Engadine, Grisons Canton is selected. The sheet contains one plant with three capitula with arachnoid supplementary bracts. The basal leaves are arachnoid beneath, glabrescent above, and cauline leaves arachnoid in both faces. The specimen is kept at US, but we were not able to find duplicates.

Therefore, in order to preserve nomenclatural stability in accordance with ICBN Art. 14.2, we propose to conserve *Solidago doronicum* with this conserved type. If the proposal is rejected, the name *Senecio doronicum* must be applied to *Senecio gerardi* and another name, *Senecio barrelieri* Gouan (Ill. Observ. Bot.: 68. 1773) (the epithet of the earlier heterotypic synonym *Doronicum incanum* L. 1753 is not available in *Senecio*, being preoccupied by *S. incanus* L. 1753), would replace the widespread usage of *S. doronicum*, which would be highly undesirable.

Acknowledgements

The curators of the herbaria mentioned in the text are thanked for their valuable help with the location and loans of *Senecio* collections. We are also grateful to Gerard Thijsse (curator of L) for kindly sending photographs of the potential type material, David J. Harris (curator of E), David J. Mabberley (curator of K), and Jonathan Gregson (curator of BM) for their efforts in attempting to locate duplicates. Special thanks go to Félix Muñoz Garmendia and Alberto Herrero for their nomenclatural advice. This work was financed by *Flora Iberica* project (CGL2008-02982-C03-01/CLI), and by a Ph.D. grant (JAE-Pre, CSIC).

Amendment to: "(2024) Proposal to conserve the name *Solidago doronicum* (*Senecio doronicum*) (*Compositae*) with a conserved type" by Joel Calvo, Inés Álvarez & Carlos Aedo in *Taxon* 60(4): 1215–1216

In the original proposal, a Ball specimen (US-291492) collected above St. Moritz in Switzerland in 1873 was proposed to become the conserved type of *Solidago doronicum*. This was objected to by some stakeholders because it had no duplicates in herbaria in Europe, to which the species is native. Therefore, a more appropriate specimen has been selected and is herein substituted as the proposed conserved type:

Typus: France, Haute-Savoie, Bonneville, Brezon, près de la Glacière [46°02′N 6°25′E], Jul 1848, *Bourgeau 129* (P-3777644; isotypi, BM-810151, G-308097, K, LE, MPU-19494, P-3777665, P-3777666, P-3777667), typ. cons. prop.

Joel Calvo
Real Jardín Botánico, CSIC,
Plaza de Murillo 2, 28014 Madrid, Spain
jcalvo@rjb.csic.es

(2025) Proposal to conserve the name *Senecio paucifolius* (*Compositae*) with a conserved type

Joel Calvo, Inés Álvarez & Carlos Aedo

Real Jardín Botánico, CSIC, Plaza de Murillo 2, 28014 Madrid, Spain
Author for correspondence: *Joel Calvo, jcalvo@rjb.csic.es*

(2025) ***Senecio paucifolius*** S.G. Gmel., Reise Russland 1: 171. 1770–1774 [*Dicot.: Compos.*], nom. cons. prop.
Typus: Kazakhstan, Songaria, 1843, Schrenk (LE; isotypi: G No. 162808, LISU No. 53583, WU), typ. cons. prop.

Senecio paucifolius S.G. Gmel. is a species distributed in the Ukraine, European Russia, western Siberia and Kazakhstan (north of Aralo-Caspian and Balkhash Lake region). It is a perennial herbaceous plant characterized by bearing a racemose or narrowly paniculate inflorescence, semiamplexicaul cauline leaves, a stem base covered with brown fibrous remnants of dead leaves, and pubescent achene ribs. It grows in lime meadows, sheep's fescue steppes, and occasionally on solonchaks (salt marshes). *Senecio paucifolius* is closely related to *S. racemosus* (M. Bieb.) DC., distributed in eastern Anatolia, northern Iraq, western Iran, and the Caucasus region. The most diagnostic character to differentiate the taxa is the indumentum of the achenes. *Senecio paucifolius* has unicellular trichomes along the entire achene ribs, while in *S. racemosus* achenes are glabrescent to covered with trichomes in the upper part only.

Senecio paucifolius has consistently been accepted and widely used in the taxonomic literature from its publication between 1770 and 1774, e.g., by Schischkin (in Schischkin & Bobrov, Fl. USSR 26: 733. 1961), Wissjulina (in Bordzilowski, Fl. URSR 11: 375. 1962), Roldugin (in Pavlov, Fl. Kazakh. 9: 152. 1966), Czerepanov (Addit. Corrig. Fl. URSS: 94. 1973), Adylor & Zuckerwanik (in Vvedensky & Kamelinio, Consp. Fl. Asiae Mediae 10: 435. 1993), Konechnaya (in Tzvelev, Fl. Evrop. Chasti SSSR 7: 62. 1994), Greuter (in Greuter & Raab-Straube, Euro+Med Plantbase, http://www.emplantbase.org, accessed June 2011).

Gmelin (1770–1774) in his *Reise durch Russland* briefly described *Senecio paucifolius* as "plant three feet long with smooth, round and straight stem. Alternate leaves, separate from each one among one or two inches, sessile, a bit concave, serrate margin and blunt apex." As he did not cite any diagnostic character, the information provided does not discriminate *S. paucifolius* from other similar species. Moreover, he did not provide any indication of specimens. According to Stafleu & Cowan (in Regnum Veg. 94: 958. 1976), Gmelin material is kept at LE, OXF, and BM. We have studied the LE collection and have not found any potential type material, and the curators of OXF and BM were also unsuccessful in similar searches.

Given that Gmelin included a plate with detailed drawings of the ligulate flower, tubular flower, and stem base (Reise Russland 1: t. 38, fig. 2. 1770–1774), there is original material for this name. However, a careful examination of the plate showed that it does not correspond well to the current concept of this species and do not support the usage of the name. Firstly, the number of ligulate flowers is low (5–6), one character used by Chater & Walters (in Tutin & al., Fl. Eur. 4: 196. 1976) to separate *Senecio* sect. *Doria* from *S.* sect. *Crociseris*, both closely related. The low number of ligulate flowers is characteristic of *S.* sect. *Doria*, because in *S.* sect. *Crociseris* the number ranges from 10 to 22, rather high. Secondly, the base of the caulinar leaves is attenuate, not semiamplexicaul, and the stem base does not seem to bear brown fibrous remnants of dead leaves. Moreover, the leaves do not strongly decrease in size up the stem, another character close to *S.* sect. *Doria*, not sect. *Crociseris*. Therefore, it seems feasible that Gmelin's drawing could correspond to another species, even a member of another section, probably to *S. nemorensis* L. s.l. This being the only element available for lectotypification, it becomes necessary to conserve the name *S. paucifolius* with a conserved type to preserve its current usage.

Gmelin described *Senecio paucifolius* during a trip through the southern European part of USSR, but did not specify the locality or the region, so no priority can be assigned to a particular location in proposing a type for conservation. We prefer to select a specimen that presents all the diagnostic characters and, secondly, that has duplicates deposited in several main herbaria. Among the available material, the selected specimen is an 1843 Schrenk collection from Songaria, Kazakhstan. The sheet contains two plants with narrowly paniculate inflorescence, semiamplexicaul cauline leaves, stem base covered with brown fibrous remnants of dead leaves, and achenes pubescent along ribs. The proposed type is kept at LE!, and we have located the following duplicates: G No. 162808!, LISU No. 53583!, WU!.

If *Senecio paucifolius* were to be rejected under Art. 56 of the ICBN (McNeill & al. in Regnum Veg. 146. 2006), it would be replaced by *S. kirghisicus* DC. (Prodr. 6: 362. 1838), a later heterotypic synonym of *S. paucifolius* used only by Krasnoborov (Fl. Sibiriae 13: 167. 1997), and Chater & Walters (l.c.). Both include the name *S. paucifolius* as a synonym, the former sensu "auct., non S.G. Gmel." and the latter sensu "Schischkin, non S.G. Gmelin". Oddly, Schischkin (l.c.) accepted *S. paucifolius* in a sense corresponding to the current concept of this species; probably a wrong interpretation by Chater & Walters. These authors treat *S. paucifolius* as a synonym of *S. doria* subsp. *kirghisicus* (DC.) Chater.

Alternatively, by conserving the widely used name *Senecio paucifolius* with a conserved type, we can avoid the unnecessary confusions that would have been created by this rejection and remove any uncertainty surrounding the application of this name. Therefore, in order to preserve nomenclatural stability in accordance with ICBN Art. 14.2, we propose to conserve *S. paucifolius* with a conserved type.

Acknowledgements

The curators of the herbaria mentioned in the text are thanked for their valuable help with the location and loans of *Senecio* collections. We are also grateful to the staff of LE, Jacek Wajer (assistant curator of BM) for kindly sending photographs of the potential type material, and Serena Marner (curator of OXF). Special thanks go to Félix Muñoz Garmendia and Alberto Herrero for their nomenclatural advice, and also to Roman Ufimov for his help in obtaining bibliographic information from LE. This work was financed by *Flora Iberica* project (CGL2008-02982-C03-01/CLI), and by a Ph.D. grant (JAE-Pre, CSIC).

Nordic Journal of Botany 30: 127–128, 2012
doi: 10.1111/j.1756-1051.2011.01233.x,

Subject Editor: Alexander Sennikov. Accepted 16 August 2011

Lectotypification of two Linnaean names in Compositae

Joel Calvo, Inés Álvarez and Carlos Aedo

J. Calvo (jcalvo@rjb.csic.es), I. Álvarez and C. Aedo, Real Jardín Botánico, CSIC. Plaza de Murillo 2, ES-28014 Madrid, Spain.

The Linnaean names *Doronicum incanum* and *Senecio byzantinus* are typified in this paper.

Senecio sect. *Crociseris* (Rchb.) Boiss. includes around 33 taxa, distributed mainly in Eurasia. Members of this section are perennial herbs characterized by bearing radiate capitula with 10–30 ligulate flowers, involucre with supplementary bracts, and leaves usually undivided and decreasing in size up the stem. In preparing a revision of this group, we realized that there are five species in the section described by Linnaeus: *Cineraria aurea*, lectotypified by Marhold et al. (2003, p. 377), *Solidago doronicum*, lectotypified by Kadereit in Jarvis and Turland (1998, p. 367), *Inula provincialis* lectotypified by Calvo et al. (2011, p. 602), and the remaining *Doronicum incanum* and *Senecio byzantinus* which are lectotypified here.

Doronicum incanum L. Sp. Pl. 886 (1753)

'Habitat in Alpibus Helveticis, Pyrenaeis'.
Original elements: herb. Burser X: 29 (UPS).

Type: herb. Burser X: 29 (UPS, lectotype designated here).

In the protologue of *Doronicum incanum*, Linnaeus (1753, p. 886) cited the following material:

- *"Doronicum foliis lanceolatis denticulatis subtus tomentosis, caule unifloro. Roy. Lugbd. 160. Sauv. meth. 84"*.
- *"Doronicum helveticum incanum. Bauh. pin. 185. Scheuch. alp. 33"*.

The first polynomial synonym cites the botanists Royen and Sauvages. Both of them refer to Bauhin's polynomial. It is thus feasible to look for original material among the Bauhin collections kept at UPS. The second polynomial synonym compiled by Linnaeus "*Doronicum helveticum incanum*" cites Bauhin and Scheuchzer. According to Jarvis (2007, p. 485), Burser's specimen kept at UPS is the only available original material, and it matches perfectly with the protologue. Therefore, herb. Burser X: 29 (UPS) is designated as lectotype of the name *D. incanum*.

Doronicum incanum is a heterotypic synonym of *Senecio doronicum* (L.) L. This name has scarcely been used in taxonomic works. Nevertheless, it is necessary to note the existence of two illegitimate homonyms under the Art. 53.1 of the ICBN, *D. incanum* Hill (1761, p. 58) and *D. incanum* Lam. (1786, p. 315). *Doronicum incanum* Hill is a heterotypic synonym of *D. clusii* (All.) Tausch, and *D. incanum* Lam. is a homotypic synonym of *Trichocline incana* (Lam.) Cass., a plant described from Montevideo, Uruguay.

Senecio byzantinus L. Sp. Pl. 871 (1753)

'Habitat Byzantii'.
Original elements: herb. Linn. 348.7 (S); herb. Linn. 348.9 (S).

Type: herb. Linn. 348.7 (S, lectotype designated here).

Linnaeus only cited Royen's polynomial name in his description of *Senecio byzantinus*. The guide to the Van Royen Herbarium (Thijsse and Veldkamp 2003) contains several species of *Senecio*, all potential type specimens. We examined six pictures of *Senecio* sp. from this collection but no one corresponds to *S. byzantinus*. According to Jarvis (2007, p. 839), the original material of *S. byzantinus* is kept at S-Linn. Within this collection there are only two sheets, S-Linn. 348.7 and S-Linn. 348.9 (Jarvis annotated by mistake 348.11, which corresponds to *Oresbia heterocarpa* Cron & B. Nord., instead of 348.9). Both sheets carry plants cultivated at *Hortus Upsalensis*. On the sheet S-Linn. 348.7 appear the number 25 handwritten before *byzantinus*, corresponding to the 'Species Plantarum' reference number, and thus it could be considered as original material. The other sheet (S-Linn. 348.9) seems to belong to the same gathering, but in this case the specimen has no capitula and the number 25 is missing. In addition, we have seen two sheets kept at LINN that would be potential type material (LINN-996.64 and LINN-996.65).

The first one is a Schultz (Karl Heinrich 'Bipontinus') specimen and the second one corresponds to a specimen cultivated at *Hortus Upsalensis*. None of these could be original material because the number 25 is missing. Therefore, among the available material and in accordance with Jarvis (2007, p. 839), we discard the sheets without the 'Species Plantarum' reference number, designating herb. Linn. 348.7 (S) as the lectotype of *S. byzantinus*. *Senecio byzantinus* is a heterotypic synonym of *S. paludosus* L. subsp. *paludosus*.

Acknowledgements – The curators of the herbaria mentioned in the text are thanked for their valuable help with the location and loans of *Senecio* collections. We are also grateful to M. Hjertson (curator of UPS) for kindly sending photographs of the type material. Special thanks go to F. Muñoz Garmendia, G. López González and A. Herrero for his nomenclatural advice. This work was financed by 'Flora Iberica' project (CGL2008-02982-C03-01/CLI), and by a PhD grant (JAE-Pre, CSIC).

References

Calvo, J. et al. 2011. Proposal to conserve the name *Senecio gerardi* against *Inula provincialis* (*S. provincialis*) (Compositae). – Taxon 60: 602–603.

Hill, J. 1761. The vegetable system 2. – London.

Jarvis, C. E. 2007. Order out of chaos: Linnean plant names and their types. – Linn. Soc. Lond.

Jarvis, C. E. and Turland, N. J. (eds). 1998. Typification of Linnaean specific and varietal names in the Compositae (Asteraceae). – Taxon 47: 347–370.

Lamarck, J. B. A. P. 1786. Encyclopédie méthodique. – Botanique 2.

Linnaeus, C. 1753. Species plantarum. – Impensis Laurentia Salvi, Stockholm.

Marhold, K. et al. 2003. Taxonomy and nomenclature of *Senecio paludosus* (Compositae) in Europe. – Ann. Bot. Fenn. 40: 373–379.

Thijsse, G. and Veldkamp, J. F. 2003. The guide of Van Royen herbarium. – Natl Herb. Netherlands.

Four New Combinations in Eurasian *Senecio* L. (Compositae, Senecioneae)

Joel Calvo, Inés Álvarez & Carlos Aedo

Real Jardín Botánico-CSIC, Plaza de Murillo 2, 28014 Madrid, Spain
Author for correspondence: *Joel Calvo, jcalvo@rjb.csic.es*

Abstract

The combinations *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo, *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo, *Senecio macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo, and *Senecio racemosus* subsp. *kirghisicus* (DC.) J. Calvo are proposed. *Senecio doronicum* var. *longifolius* Willk., *Senecio orientalis* Ten., *Senecio barckhausiaefolius* Boiss. & Heldr., and *Cineraria glabrata* Ledeb. are lectotypified.

Key words: Asteraceae, combination, Compositae, Eurasia, lectotypification, *Senecio*, Senecioneae.

As a result of a taxonomic revision of the *Senecio* sect. *Crociseris* (Rchb.) Boiss. based on ca. 5500 herbarium specimens from 48 herbaria, a few nomenclatural adjustments are needed. A monograph of the section is currently being prepared, comprising 28 species and 8 subspecies distributed from the western Europe and north-western Africa to Middle Asia. The following new combinations are proposed.

Senecio doronicum (L.) L. is a perennial herbaceous plant characterized by bearing 1--4(9) capitula, supplementary bracts usually as long as the principal ones, and leaves glabrescent to arachnoid. It is distributed widely through the southern European mountain ranges, from Cantabrian to septentrional Dinaric Alps. As frequent in species with a wide distribution, intraspecific variability is expectedly high, mainly in number of capitula, indumentum of involucre and number of supplementary bracts, and also shape and indumentum of leaves. Such variability follows geographical patterns, and in most cases these populations can be easily distinghished morphologically, therefore, in the taxonomic treatment of *Senecio* sect. *Crociseris* (unpublished) three subspecies are recognized. *Senecio doronicum* subsp. *doronicum* embraces the populations from the

Alps, corresponding to what is traditionally ascribed as *S. doronicum*. This taxon is characterized by bearing (1)2--4(7) capitula, (9)14--22(26) supplementary bracts, weakly arachnoid to floccose, and leaves covered with scattered arachnoid trichomes above, arachnoid to floccose beneath. *Senecio doronicum* subsp. *longifolius* corresponds to those populations from Cantabrian Range, Pyrenees, and Massif Central, characterized by displaying 1(3) capitulum, (7)10--15(18) supplementary bracts with scattered arachnoid trichomes on the margin, and leaves glabrescent above with scattered scabrid-arachnoid trichomes beneath. *Senecio doronicum* subsp. *orientalis* includes the populations from eastern Alps to the septentrional Dinaric Alps, and central Appenines. This taxon is characterized by bearing (1)2--4(9) capitula, (9)14--18(24) supplementary bracts with scattered arachnoid trichomes, and leaves glabrescent on both faces, rarely with scattered scabrid-arachnoid trichomes beneath.

Senecio doronicum* subsp. *longifolius (Willk.) J. Calvo, comb. et stat. nov. Basionym: *Senecio doronicum* var. *longifolius* Willk. [*longifolia*], Oesterr. Bot. Z. 41: 4. 1891. TYPE: Spain, Catalonia, Vall d'Aran, lago de Toro (Viella), [42º38'N 0º43'E], July 1873, *M. Compañó s.n.* (lectotype, designated here, COI-37582 image).

The original material of *S. doronicum* var. *longifolius* is doubtless. It corresponds to a Compañó collection identified in Willkomm's handwriting.

Senecio doronicum* subsp. *orientalis (Ten.) J. Calvo, comb. et stat. nov. Basionym: *Senecio orientalis* Ten., Fl. Napol. 2: 222. 1820, nom. illeg., non Mill. 1768 (ICBN, Art. 53.1). TYPE: Italy, Lazio, Rieti, Accumoli, M. di Accumoli, [42º43'N 13º11'E], *A. Orsini s.n.* (lectotype, designated here, NAP image).

In the protologue of *S. orientalis*, Tenore cited "Luogo natale, ec. Nasce sui monti di Principato Ulteriore e degli Abruzzi, a Bagnoli, alla Maiella". According to Stafleu & Cowan (1986) the main set of Tenore's collection is kept at NAP. The curator of this herbarium kindly replied to our request to examine this material. There appear to be several syntype collections represented among this material, but the best-preserved specimen most closely matching protologue is a Orsini's collection from Monti di Accumoli, currently at Lazio, but belonging to Abruzzi during the Kingdom of the Two

Sicilies. It is interesting to note that the first identification by Orsini is *S. doronicum*, and subsequently Tenore erased it and added “orientalis” and “Orsini”.

Senecio macedonicus* subsp. *barckhausiaefolius (Boiss. & Heldr.) J. Calvo, comb. et stat. nov. Basionym: *Senecio barckhausiaefolius* Boiss. & Heldr., Diagn. Pl. Orient. ser. 2, 6: 101. 1859. TYPE: Greece, Attica Periphery, Sterea Ellas, Patéras Óros, m. Patéras Atticae, [38º07'N 23º18'E], 27 May 1856, *J. Guicciardi 3197* (lectotype, here designated, G-150319 image).

Senecio macedonicus Griseb. is a robust plant from Bulgaria and Greece, characterized by bearing ovate-lanceolate synflorescence bracts, similar to the upper leaves, and supplementary bracts of the involucre lanceolate to linear-oblong, sometimes with scarious margin. It is a variable species mostly with regard to the abundance of indumentum, and leaves shape. Regarding to the latter, we recognize two subspecies, *S. macedonicus* subsp. *macedonicus* and *S. macedonicus* subsp. *barckhausiaefolius.* This latter differs from the former by displaying leaves irregularly pinnatipartite, instead of entire, crenate or slightly dentate. In fact, the subspecific epithet *barckhausiaefolius* probably refers to the pinnatifid leaves that display several species of the genus *Barckhausia* DC., ascribed within *Crepis* L.

Senecio macedonicus subsp. *barckhausiaefolius* is only known from few localities located in Attica and Peloponnese (Greece). It is worthwhile to mention that the few available collections, except the type, have been identified under the heterotypic name *S. macedonicus* var. *pinnatilobatus* Halácsy.

Senecio racemosus* subsp. *kirghisicus (DC.) J. Calvo, comb. nov. *Cineraria glabrata* Ledeb., Icon. Pl.: 22, tab. 94. 1829, nom. illeg., non Swartz 1806 (ICBN, Art. 53.1). *Cineraria auriculata* Ledeb., Fl. Altaic. 4: 105. 1833, nom. subst. *Senecio kirghisicus* DC., nom. nov., non *S. auriculatus* Burm. f., Prodr. 6: 362. 1838. *Senecio doria* subsp. *kirghisicus* (DC.) Chater, Bot. J. Linn. Soc. 68: 276. 1974. *Jacobaea kirghisica* (DC.) E. Wiebe, Turczaninowia 3: 62. 2000. TYPE: Kazakhstan, Altai [Kara-su stream according *ind. loc.*, 49º41’N 74º58’E], *C.F. Ledebour s.n.* (lectotype, here designated, LE).

Senecio kirghisicus is a species known from Ukraine, European Russia, west-southern Siberia, and Kazakhstan. It is an herbaceous perennial characterized by bearing a racemose or narrowly paniculate inflorescence, semiamplexicaul cauline leaves, and the stem base covered with brown fibrous remnants of dead leaves. On the base of our taxonomic treatment, we realized that only the achenes indumentum is useful to discriminate from *S. racemosus* (M. Bieb.) DC., which is distributed along eastern Turkey, northern Syria, northern Iraq, western Iran, and the Caucasus region. *Senecio kirguisicus* has unicellular trichomes along the entire achene ribs, while in *S. racemosus* achenes are glabrescent to covered with trichomes in the upper part only. Such morphological similarity led to Ledebour (1843-1946) to synonymy both taxa under the name *S. racemosus.* Moreover, have to be noted that the collections belonging to this taxon were identified under the name *S. racemosus* until Schischkin (1961) retrieved the name *S. paucifolius* S.G. Gmel., which again confirms the closest relation between them. Taking into account that their ranges are notably well delimited, and in most cases it is possible to distinguish each other, we consider more appropriate to subordinate them as subspecies. Because *Cineraria racemosa* M. Bieb. (1798), basyonim of *S. racemosus*, has priority over *S. kirghisicus*, the combination *S. racemosus* subsp. *kirghisicus* is needed.

In the protologue of *S. kirghisicus*, Candolle included the synonym *C. glabrata* Ledeb. The *ind. loc.* "rivulum Kara-tsu deserti Kirguisorum" is exactly the same that Ledebour cited in the protologue of *C. glabrata*, and the Candolle's description only added the number of ligulate flowers, probably on the base of the Ledebour's plate. In fact, the lack of any indication at the end of the protologue of *S. kirguisicus* suggests that Candolle neither studied fresh material nor dry material. Therefore, it seems evident that Candolle was only transferring *C. glabrata* within *Senecio*. Knowing the existence of *S. glabratus* Sw. (1806), he chose the epithet *kirguisicus* referring the distribution indicated by Ledebour, being a *nomina novum*. Oddly, he did not compile the name *C. auriculata*, a name that Ledebour published in 1833 to replace its *Cineraria glabrata*. Since Burman named *Senecio auriculatus* for a plant from Java at 1768 [= *Emilia sonchifolia* var. *javanica* (Burm. f.) Mattf. according to Pruski (2012)], the name is blocked in *Senecio*. Although the plate included in the original description is completly explanatory and includes detailed drawings, we have located a Ledebour's original collection kept at LE. The sheet contains two synflorescences and several basal leaves,

labelled in Ladebour's handwriting (Lipschitz & Vassilczenko, 1968) with the same information: 'Solidago glabrata, Prodr. fl. alt.'. It is interesting to note that subsequently he erased 'Solidago' and added 'Cineraria'. The locality and date are lacking, but the first identification proves that it was collected before the publication of *C. glabrata*. Therefore, the mentioned sheet is designated as lectotype of the name *S. kirghisicus*.

Acknowledgements

The curators of the herbaria mentioned in the text are thanked for their valuable help with the location and loans of *Senecio* collections. We are very grateful to Jorge Paiva and Annalisa Santangelo for kindly sending photographs of the potential type material. Special thanks go to Félix Muñoz Garmendia and John Pruski for their several advices. This work was financed by *Flora Iberica* project (CGL2011-28613-C03-01), and by a Ph.D. grant of JC (JAE-Pre, CSIC).

References

Calvo, J., I. Álvarez & C. Aedo. 2011. (2025) Proposal to conserve the name *Senecio paucifolius* (*Compositae*) with a conserved type. Taxon 60(4): 1217.

Ledebour, C.F. 1843-1946. Flora Rossica, vol. 2. Stuttgartiae.

Lipschitz, S.J. & I.T. Vassilczenko. 1968. Herbarium Centrale URSS. Leningrad.

Pruski. J.F. 2012. Compositae of Central America–III. The genera *Crassocephalum*, *Emilia*, *Erechtites*, and *Gynura* (Senecioneae: Senecioninae), with emphasis on their style branches. Phytoneuron (in press).

Schischkin, B.K. 1961. *Senecio* L. Pp. 699--788 *in* B.K., Schischkin & E.G., Bobrov, Flora of the USSR, vol. 26, Compositae. Moscow, Leningrad.

Stafleu, F. A. & Cowan, R. S. 1986. Taxonomic literature. Regnum vegetabile 115.

Conclusiones

1) *Senecio* sect. *Crociseris* es una de las cuatro principales secciones de *Senecio* en el ámbito de Eurasia y el norte de África. Comprende hierbas rizomatosas, distribuidas principalmente del oeste de Europa y noroeste de África al oeste asiático, desde el nivel del mar hasta aproximadamente los 4300 m de altitud.

2) Para la revisión taxonómica de *S.* sect. *Crociseris* se han estudiado alrededor de 5500 pliegos de herbario, correspondientes a los aproximadamente 45 táxones que en la literatura previa se aceptaban dentro de la sección. El nuevo tratamiento taxonómico que se propone reconoce 28 especies y 8 subespecies. Representa la primera revisión exhaustiva de la sect. *Crociseris*.

3) *Senecio provincialis* (L.) Druce y *S. lagascanus* DC., tradicionalmente subordinados a *S. doronicum* (L.) L., se consideran entidades específicas. Dentro de *S. doronicum*, se proponen tres subespecies: *Senecio doronicum* subsp. *doronicum*, *Senecio doronicum* subsp. *longifolius* (Willk.) J. Calvo, y *Senecio doronicum* subsp. *orientalis* (Ten.) J. Calvo.

4) Se propone la nueva combinación *S. racemosus* subsp. *kirghisicus* (DC.) J. Calvo. *Senecio macedonicus* var. *pinnatilobatus* Halácsy se eleva a rango subespecífico, siendo el nombre prioritario *S. macedonicus* subsp. *barckhausiaefolius* (Boiss. & Heldr.) J. Calvo. De las tres subespecies que se aceptaban en *S. paludosus* L., solo reconocemos *S. paludosus* subsp. *paludosus* y S. *paludosus* subsp. *lanatus* Holub. *Senecio paludosus* subsp. *angustifolius* Holub se sinonimiza a la subsp. *paludosus*.

5) *Senecio ruthenensis* Timb.-Lagr. & Mazuc de Francia y *S. lusitanicus* (Cout.) R. Pérez-Romero de Portugal han sido sinonimizados a *S. lagascanus* DC. *Senecio ovatifolius* Boiss., *S. pisidicus* Boiss. & Heldr. y *S. tmoleus* Boiss. de Anatolia a *S. kolenatianus* C.A. Mey., *S. olympicus* Boiss., y *S. castagneanus* DC. respectivamente. *Senecio bertramii* Post de Líbano a *S. cilicius* Boiss., y *S. delbesianus* Arènes de Siria a *S. racemosus* subsp. *racemosus*.

6) En el ámbito ibérico, las entidades subespecíficas descritas dentro de *S. auricula* Bourg. ex Coss. y *S. pyrenaicus* L. no se reconocen por la inconsistencia de los caracteres que las definían.

7) Análisis filogenéticos basados en secuencias ITS y de cloroplasto sugieren que la sect. *Crociseris* es un grupo parafilético. Aunque el cloroplasto tiene una resolución limitada dentro de la sección, la información ITS desvela tres grandes grupos con significación geográfica: europeo, anatólico y asiático. Las especies de la *sect. Doria* incluidas en el estudio resultan estar relacionadas con el grupo europeo. La complejidad taxonómica de la sección se pone de manifiesto con resultados que sugieren complicados patrones de hibridación.

8) En el estudio nomenclatural se han recopilado 132 nombres heterotípicos (321 incluyendo sus combinaciones más los nombres dudosos o excluidos), de los cuales 75 se han lectotipificado. Los nombres *Senecio pyrenaicus* and *S. scopolii* han sido neotipificados. Dos lectotipificaciones corresponden a nombres de Linnaeus: *S. byzantinus* y *Doronicum incanum*, este último sinónimo heterotípico de *S. doronicum*. Los nombres *S. gerardi* Godr., *S. doronicum*, y *S. paucifolius* S.G. Gmel. se propusieron a conservar.

9) Se ha realizado un intenso trabajo de campo, principalmente en la Península Ibérica, Alpes y Marruecos, que ha permitido estudiar in situ la variabilidad de 10 táxones de la sección, lo que ha permitido recolectar un total de 102 especímenes de herbario depositados en el herbario MA.

10) Se han preparado mapas de distribución de todas las especies basados en las colecciones estudiadas, las cuales han sido previamente georeferenciadas.

11) Se han elaborado ilustraciones para 20 táxones, 9 de los cuales ilustrados por primera vez. Para los restantes, se han recopilado las referencias bibliográficas de las ilustraciones más representativas.