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EDITORIAL

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Welcome to the Lamiales Newsletter. This edition contains a directory of researchers and their interests. This directory is by no means complete. Indeed there are people on our mailing list who are not included in it simply because we do not know their particular interest. The directory will be constantly updated and

will be available to all readers. If you would like to be added to it please send details of your interests to the editors.

At the moment we need more articles for inclusion. We would like to receive summaries of current research, comments on published articles, or general thoughts on the current directions of Lamiales research. For example the trend towards greater emphasis on cladistic studies, especially of molecular data should be helping to clarify problem areas in the classification of the Lamiales while there is a vast scope for research into a whole range of biologically (?or taxonomically) active compounds. Much taxonomic work is needed on the *Teucrioideae* and *Viticoideae*. We need your support with articles on such issues.

In the next issue we hope to include articles on economic uses of Lamiales, nutlet anatomy, a systematic arrangement of genera in the Lamiales, and Brazilian Labiatae. How about some contributions on the position of the *Pogostemoideae* or *Lavandula*, or further thoughts on the origins of the hexacolpate pollen grain and the *Nepetoideae* (see Pozhidaev, A. Grana 31: 361- 379 (1992)).

The proceedings of the first Advances in Labiate Science conference have now been published (available from the Royal Botanic Gardens, Kew at the extremely reasonable price of £26.70 including postage). We should now perhaps look ahead to the next Lamiales Conference, the date and venue of which still have to be decided. Anyone got any thoughts? □

SPANISH LABIATAE: A SOURCE FOR NATURAL ANTIOXIDANT COMPOUNDS

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The members of the Labiatae are well known from the phytochemical view point, by their essential oils. For this reason, many species (mainly from the subfamily *Nepetoideae* Erdtman) are industrially exploited. In addition, many species are used as spices for seasoning of different foods. Important spices in Spain are *Rosmarinus officinalis*, *Salvia officinalis*, *Thymus vulgaris*, *Thymus piperella*, *Mentha* sp., *Origanum vulgare*, *Satureja montana* and *Origanum marjorana*. However, Labiatae species also contain substantial amounts of flavonoid aglycones and glycosides, which have interesting biological activities (Barberán, 1986). These flavonoids are generally responsible, at least partly, for the antioxidant properties of these spices which extend the keeping time of various foods. In many cases, the flavonoids present in the Labiatae are responsible for the pharmacological activity of those species used in traditional medicine. For these reasons, the study of Labiatae flavonoids is of interest.

During the last ten years we have been looking at the flavonoid composition of Spanish Labiatae, and generally clear ➤

correlations between the chemical features of the flavonoids and the systematics of the different genera have been found. Thus, the presence of flavone p-coumaroyl-glucosides and 8-hydroxylated flavones 7-allosyl-glucosides (in non-acetylated, monoacetylated and diacetylated forms) are characteristic compounds of many members of the subfamily Lamioideae (Tomás-Barberán and Gil, 1992), including *Sideritis*, *Stachys*, *Galeopsis*, *Ballota*, *Marrubium*, *Phlomis* and *Leonurus* species. The presence of flavonoid p-coumaroyl-glucosides in the genus *Anisomeles* has also been fully documented, and for this reason the occurrence of this type of flavonoid in species of the related genus *Pogostemon* should be tested. On the other hand, the occurrence of lipophilic externally located flavonoid aglycones with an A-ring substitution pattern 5,6-dihydroxy-7,8-dimethoxyflavone, including the flavones thymonin, thymusin and pebrellin among others, is restricted to some related genera of the subfamily *Nepetoideae* such as *Thymus*, *Mentha*, *Satureja*, *Micromeria*, *Acinos*, *Origanum*, etc. (Tomás-Barberán et al., 1988; Tomás-Barberán and Wollenweber, 1990).

The 8-hydroxylated flavone glycosides of the *Lamioideae* have shown antioxidant activities (Ríos et al. 1992), as did the 5,6-dihydroxy-7,8-dimethoxy flavonoid aglycones from the *Nepetoideae* (Miura and Nakatani, 1989). This is probably the most interesting activity of flavonoids as free radical scavengers. Both types of flavonoids therefore have applications as antioxidants in pharmaceutical preparations, in cosmetics or when added to foods. Extracts from these plants can also be used for these purposes. In this case it is not necessary to isolate

the active flavonoids, since the extracts, which are non-toxic, could be added to foods as spice extracts, which are not considered as food additives. It is interesting that the plant wastes of the industrial extraction of essential oils, are a valuable source for such flavonoid extracts. After the removal of the essential oils by steam distillation, the remaining plant material still contains the unaltered flavonoids, and these could be later extracted by other procedures to get the antioxidant flavonoids.

It is important to show that such chemotaxonomical studies provide very interesting data for industries which are concerned in the recovery of such active substances.

References

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MIURA, K. & NAKATANI, N. (1989). Antioxidative activity of the flavonoids from thyme (*Thymus vulgaris* L.). *Agric. Biol. Chem.*, 53: 3043-3045.

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RECENT RESEARCH ON THE GENERA JUNELLIA AND GLANDULARIA IN SOUTH AMERICA

Silvia Botta

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Junellia Mold. is a genus with about 47 species inhabiting the Andino-Patagonian region of South America. This genus which displays its maximum diversity in the Patagonian region of Argentina, is a member of tribe *Verbeneae* together with *Verbena*, *Glandularia*, *Hierobotana*, *Urbania* and *Tamonea*. In a previous paper (Botta, 1989) the delimitation of *Junellia* from these genera was discussed and an infrageneric classification proposed.

In continuation of this study, a recent paper (Botta, unpublished) presents descriptions of species, illustrations and maps showing their geographical distribution, together with a dichotomous key based on gross morphological characters. Phylogenetical relations between the species are also discussed. SEM observations were made on leaves, stems, mericarps and pollen of several species.

In collaboration with Peter Brandham (Royal Botanic Gardens, Kew, UK) chromosome numbers were counted in seven species of *Junellia* from South America (Botta & Brandham, 1993). The basic numbers $x = 9$ and $x = 10$ occur, with diploids and tetraploids of each, although one tetraploid lacked a single chromosome. The findings sup-

port the separation of *Junellia* from *Verbena* and the affinity of *Glandularia*.

In a taxonomic study of the genus *Glandularia* J.F.Gmel. (Botta, in press) eight taxa are recognized in the subgenera *Paraglandularia* (*G. crithmifolia* (Gillies et Hook.) Schnack et Covas, *G. hookeriana* Covas et Schnack) and *Glandularia* (*G. araucana* (Philippi) Botta, *G. aurantiaca* (Speg.) Botta, *G. flava* (Gillies et Hook.) Covas et Schnack, *G. platensis* (Sprengel) Schnack et Covas, *G. macrosperma* (Sprengel) Troncoso and *G. parodii* (Covas et Schnack). New synonymy is established and two new combinations made. The Patagonian species are described and illustrated; the data on karyology, distribution maps, a list of the examined herbarium material and vernacular names are given for each taxon. In many cases nomenclatural problems and affinities between the species are also analysed. Observations on leaves, stems and pollen with SEM were made. A list of doubtful species is provided.

References

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Botta, S. M. & Brandham, P. (1993). The taxonomic significance of chromosome number in *Junellia* (*Verbenaceae*). *Kew Bull.* 48: 143-150

Botta, S. M. (in press). Notas en el género *Glandularia* (*Verbenaceae-Verbenoideae*) III: Estudio de las especies patagónicas. *Parodiana* 8 (in press - 1993).

THE FLAVONOID AGLYCONES OF SCUTELLARIA L. SPECIES

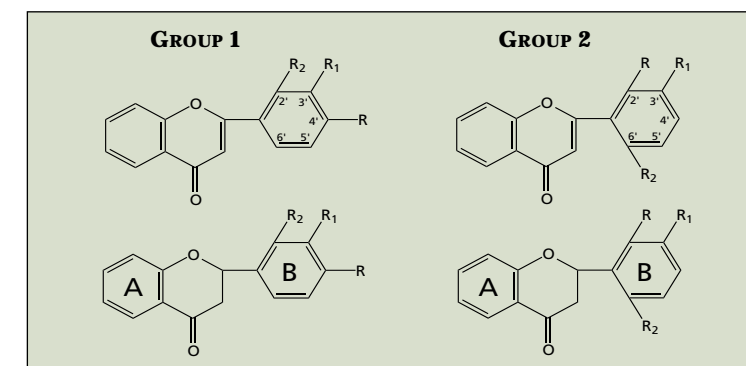
I. I. Chemesova

Komarov Botanical Institute, St. Petersburg, 197376, Russia

The genus *Scutellaria* L. comprises 360 species distributed throughout the world. Until now, the flavonoid aglycone composition of only 27 species of this genus have been studied. Analysis of literature up to 1992 shows that *Scutellaria* species produce unusual flavonoid aglycones. To provide a means of classifying them, the flavonoid and dihydroflavonoid aglycones found in species of *Scutellaria* are divided into two groups according to substitutions in the B ring: Group 1 with substitutions (OCH₃ or OH) at the 4' (for example: apigenin, scutellarein, luteolin, cartamidin etc.); and Group 2 without substitution at the 4' position (for example: chrysin, baicalein, 3, 5, 7-trimethoxyflavanon, 5, 7, 2'-trihydroxy-6'-methoxyflavone etc.).

cule: Group 1 flavonoid aglycones are represented by 16 compounds; Group 2 by significantly more, 56 compounds (41 of which are one- and two-substituted B ring flavonoids). In some species Group 2 flavonoids are dominant, for example, in *S. amoena* Wright. - 13 compounds, *S. baicalensis* Georgi. - 32, *S. discolor* Colebr. - 13, *S. viscidula* Bunge. - 7.

Among the Group 2 flavonoids, compounds completely lacking B ring substitutes and compounds with 2'-substitution tend to show biological activity. Studies have been made on the antithrombic, cytotoxic actions of 5, 2'-dihydroxy - 6, 7, 8, 6' - tetramethoxyflavone. The accumulation of these unusual flavonoids by



As a result of comparison of these groups it can be seen that flavonoid aglycones of both groups have similar distributions. Group 1 flavonoids are found in 20 of the 27 species studied, and Group 2 flavonoids are found in 24 of the 27 species. However, Group 2 flavonoids have more varied substitutions in the mole-

Scutellaria species could prove interesting for a chemotaxonomic analysis of the genus. The great variety of substitutions in molecules of 2'-type flavonoid aglycones distinguishes the genus *Scutellaria* from other genera. Moreover, species of *Scutellaria* are likely to have flavonoids of value in pharmacology.

DIRECTORY OF LAMIALES RESEARCH

The directory below lists people who are working on particular tribes and genera of the Lamiales. The groups are listed in alphabetical order, tribes and families are listed before genera. Taxonomic delimitations, as far as possible, follow P.D. Cantino, R.M. Harley & S.J. Wagstaff *Genera of Labiatae: Status and Classification* in Harley R.M., Reynolds T., eds. *Advances in Labiate Science*. Kew: Royal Botanic Gardens, Kew, 1992: 511—522. Addresses of people listed can be found in the mailing list included in this newsletter.

The codes following the person's name represent the subjects the person is interested in and at the end of the codes the geographic area of their interest is given. The codes are as follows; Taxo = taxonomy, Phyl = phylogeny, Cyto = cytology, Anat = anatomy, Repro = reproductive biology, Biog = biogeography, Palyn = palynology, Plant = plant-insect interactions, Hort = horticulture, Ecol = ecology, Ethno = ethnobotany, Econ = economic botany, Chem = chemistry, Terp = terpenoids, Flav = flavonoids, Phen = phenolics, Lipi = lipids, Irid = iridoids, DNA = DNA, Beta = betains.

This directory is not comprehensive. If you wish to be added to the directory database please send details of your research to the editors. If you have an E-mail address please send it to us.

AJUGOIDEAE

Cantino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Rimpler, H. Taxo, Phyl, Chem: Irid, World

Winterhalter, C. Taxo, Phyl, Plant, Chem: Terp, Irid, World

CHLOANTHOIDEAE

Conn, B. Taxo, Phyl, Anat, Chem: Terp, Australia

Munir, A.A. Taxo, Australia

HYPTIDINAE

Cole, M.D. Plant, Chem: Terp, Flav, Phen, Irid, World

Harley, R.M. Taxo, Phyl, Cyto, Repro, Biog, Palyn, Plant, Neotropics

LABIATAE

Abu Asab, M. Taxo, Phyl, Palyn, World

Alizar, G. Taxo, Phyl, Mediterranean

Başer, K.H.C. Ethno, Econ, Chem: Terp, Turkey & neighbours

Bassagoda, M.J. Taxo, Ethno, Uruguay

Blunden, G. Phyl, Chem: Terp, Beta, Europe

Cantino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Charlwood, B.V. Chem: Terp, Flav, Phen, Irid, World

Chen Sau Soon, Chem: Terp, World

Clement, R.A. Taxo, Phyl, China, Himalaya

Conn, B. Taxo, Phyl, Anat, Chem: Terp, Australia

Deans, S.G. Plant, Econ, Chem: Terp, Flav, Phen, Lipi, Enzy, World

Diez, M.J. Repro, Palyn, Iberian Pen.

Evans, W.C. Ethno, Econ, Chem: World

Fokina, G. Plant, Chem: Terp, Irid, World

Galambosi, B. Repro, Hort, Econ, World

Gill, L.S. Taxo, Cyto, Anat, Repro, Ethno, Econ, West Africa

Harley, R.M. Taxo, Phyl, Cyto, Repro, Biog, Palyn, Plant, World, Neotropics

Hedge, I.C. Taxo, S.W. Asia, Madagascar

Heinrich, M. Ethno, New World

Hussein, H.A. Taxo, Anat, World

Jancic, R. Taxo, Balkans

Jensen, S.R. Chem: Phen, Irid, World

Khanam, M. Taxo, Bangladesh

León Arencibia, M.C. Taxo, Palyn, Macaronesia

La-Serna Ramos, I.E. Taxo, Palyn, Macaronesia

Marin, P.D. Anat, Chem: Flav, Lipi, Balkans

Massimo, M. Chem: Terp, Lipi, Italy

Máthé I. Chem: Terp, Flav, Phen, Irid, World

Meuse, A.D.J. Repro, Plant, World

Morton, J.K. Taxo, Cyto, Repro, Biog, Palyn, North America

Olmstead, R. Phyl, Chem: DNA, World

Paz, E.A. Taxo, Ethno, Uruguay

Paton, A. Taxo, World, Africa

Perrin, A. Anat, Chem: Terp, Lipi, World

Phillipson, P. Taxo, Biog, Madagascar

Preece, T. U.K.

Press, R. Taxo, Europe, Macaronesia

Piozzi, F. Chem: Terp, Flav, World

Ramamoorthy, T.P. Taxo, Chem: Terp, Mexico

Rejdali, M. Taxo, Ethno, Chem: Terp, Flav, Morocco

Retief, E. Taxo, Southern Africa

Richardson, P.M. Chem: Terp, Phen, World

Robins, R.J. Econ, Chem: Terp, DNA, Enzy, World

Santos, A. Taxo, Repro, Biog, Canary Islands

Schellingerhout, J.H.D. Hort, World

Sesebe Demissew, Taxo, Ethno, Tropical & S. Africa

Sivarajan, V.V. Taxo, Ethno, Chem: India

Svoboda, K.P. Plant, Chem: Terp, DNA, World

Thoppil, J.E. Taxo, Cyto, Chem: Terp, India

Todorovic, B. Taxo, Anat, Ecol, Mediterranean

Tomás-Barberán, F.A. Chem: Flav, Phen, World

Tümen, G. Taxo, Anat, Palyn, Chem: Terp, Turkey

Tyagi, B.R. Taxo, Cyto, Repro, Ethno, Econ, Chem: World

Wagstaff, S. Taxo, Phyl, Hort, Chem: DNA, World

Welman, M. Taxo, Southern Africa

Willemse, R.H. Taxo, World

Winterhalter, C. Taxo, Phyl, Plant, Chem: Terp, Irid, World

Yuan, Z.-X. Chem: Terp, Beta, World

Yong-Kang, Y. Taxo, Phyl, Anat, Palyn, Chem: World

LAMIOIDEAE

Cole, M.D. Plant, Chem: Terp, Flav, Phen, Irid, World

Übera, J.L. Taxo, Repro, Chem: Terp, Mediterranean

MENTHEAE

Kokkini, S. Taxo, Chem: Terp, Balkans

Shavarda, A.L. Chem: Terp, Flav, Phen, Central Asia

Wagstaff, S. Taxo, Phyl, Hort, Chem: DNA, World

NEPETEAE

Budantsev, A.L. Taxo, Phyl, Anat, Repro, Biog, Chem: Terp, World

OCIMEAE

Harley, M.M. Palyn, World

Harley, R.M. Taxo, Phyl, Cyto, Repro, Biog, Palyn, Plant, Neotropics

Paton, A. Taxo, Phyl, Biog, Palyn, World

Phillipson, P. Taxo, Biog, Madagascar

Ryding, O. Taxo, Phyl, Anat, World

Simmonds, M. Taxo, Phyl, Plant, Chem: Terp, Flav, Phen, Amin, World

PLECTRANTHINAE

Aye, T.T. Taxo, Anat, Palyn, Chem: Flav,

Morton, J.K. Taxo, Cyto, Repro, Biog, Palyn, Africa

PROSTANTHEREAE

Conn, B. Taxo, Phyl, Anat, Chem: Terp, Australia

SCUTELLARIOIDEAE

Cantino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Cole, M.D. Plant, Chem: Terp, Flav, Phen, Irid, World

Yong-Kang, Y. Taxo, Phyl, Anat, Palyn, Chem: China

TEUCRIOIDEAE

Cantino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Conn, B. Taxo, Phyl, Anat, Chem: Terp, Australia

Falk, U. Taxo, Phyl, Chem: Irid, World

Mabberley, D.J. Taxo, Phyl, S.E. Asia

Rimpler, H. Taxo, Phyl, Chem: Irid, World

Yong-Kang, Y. Taxo, Phyl, Anat, Palyn, Chem: East Asia

VERBENACEAE

Abu Asab, M. Taxo, Phyl, Palyn, World

Atkins, S.A. Taxo, World

Bassagoda, M.J. Taxo, Ethno, Uruguay

Budantsev, A.L. Taxo, Phyl, Anat, Repro, Biog, Chem: Terp, Vietnam

Cantino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Cole, M.D. Plant, Chem: Terp, Flav, Phen, Irid, World

Conn, B. Taxo, Phyl, Anat, Chem: Terp, Australia

Jensen, S.R. Chem: Phen, Irid, World

Mabberley, D.J. Taxo, Phyl, S.E. Asia

Múlgura de Romero, M.E. Taxo, South America

Munir, A.A. Taxo, Australia

Olmstead, R. Phyl, Chem: DNA, World

Paz, E.A. Taxo, Ethno, Uruguay

Retief, E. Taxo, Southern Africa

Richardson, P.M. Chem: Terp, Phen, World

Rimpler, H. Taxo, Phyl, Chem: Irid, World

Sesebe Demissew, Taxo, Ethno, Tropical & S. Africa

Stirton, C. Taxo, Southern Africa

Wagstaff, S. Taxo, Phyl, Hort, Chem: DNA, World

Winterhalter, C. Taxo, Phyl, Plant, Chem: Terp, Irid, World

Yuan, Z-X. Chem: Terp, Beta, World

Yong-Kang, Y. Taxo, Phyl, Anat, Palyn, Chem: World

VERBENEAE

Atkins S.A. Taxo, Phyl, World

Botta, S. Taxo, Phyl, Cyto, Anat, Repro, Biog, Palyn, Ecol, South America

VITICOIDEAE

Canino, P.D. Taxo, Phyl, Anat, Biog, Palyn, World

Falk, U. Taxo, Phyl, Chem: Irid, World

Mabberley, D.J. Taxo, Phyl, S.E. Asia

Rimpler, H. Taxo, Phyl, Chem: Irid, World

Winterhalter, C. Taxo, Phyl, Plant, Chem: Terp, Irid, World

ACANTHOMINTHA

Bauder, E.T. Ecol, N.America

ACHYROSPERMUM

Phillipson, P. Taxo, Biog, Madagascar

ACINOS

Morales, R. Taxo, Chem: Terp, World

AGASTACHE

Compton, J. Taxo, Biog, Plant, Hort, New World

AJUGA

Simmonds, M. Taxo, Phyl, Plant, Chem: Terp, Flav, Phen, Amin, World

AMASONIA

Falk, U. Taxo, Phyl, Chem: Irid, World

ANISOMELES

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

BYSTROPOGON

De la Torre, W.W. Taxo, Macaronesia

La-Serna Ramos, I.E. Taxo, Palyn, Macaronesia

CALAMINTHA

Morales, R. Taxo, Chem: Terp, World

Ubera, J.L. Taxo, Repro, Chem: Terp, Mediterranean

CARYOPTERIS

Abu Asab, M. Taxo, Phyl, Palyn, World

CEDRONELLA

León Arencibia, M.C. Taxo, Palyn, Macaronesia

CLERODENDRUM

Herman, P. Taxo, Phyl, Southern Africa

Mabberley, D.J. Taxo, Phyl, S.E. Asia

Rueda, R. Taxo, Phyl, Neotropics

Steane, D. Taxo, Phyl, Chem: DNA, World

DURANTA

Sanders, R. Taxo, Caribbean

ERIOPE

Harley, R.M. Taxo, Phyl, Cyto, Repro, Biog, Palyn, Plant, Neotropics

Johnson, M. Cyto, South America

GLECHOMA

Pelling, V.J. Taxo, Ecol, World

HYPTIS

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

Gutierrez Luis, J. Plant, Chem: Terp, Flav, Phen, DNA, Enzy, South America

Harley, R.M. Taxo, Phyl, Cyto, Repro, Biog, Palyn, Plant, World

Heinrich, M. Ethno, New World

Johnson, M. Cyto, South America

LAMIUM

Pelling, V.J. Taxo, Ecol, World

LANTANA

Sanders, R. Taxo, Caribbean

Stirton, C. Taxo, Southern Africa

LAVANDULA

Andrews, S. Taxo, Hort, Chem: Terp, World

De la Torre, W.W. Taxo, Macaronesia

Fernandez, P.H. Taxo, Repro, Mediterranean

García Vallejo, M.C. Taxo, Chem: Terp, Flav, Phen, SW Europe

León Arencibia, M.C. Taxo, Palyn, Macaronesia

La-Serna Ramos, I.E. Taxo, Palyn, Macaronesia

Soriano Cano, M.C. Plant, Chem: Terp, Phen, Lipi, Mediterranean

Ubera, J.L. Taxo, Repro, Chem: Terp, Mediterranean

Upson, T. Taxo, Phyl, Biog, Chem: DNA, Old World

LEONOTIS

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

Edwards, T.J. Taxo, Cyto, Repro, Chem: Terp, Flav, Amin, Southern Africa

Norris, F.M. Taxo, World

Vos, W.T. Taxo, Cyto, Repro, Chem: Terp, Flav, Amin, Southern Africa

LEONURUS

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

Krestovskaja, T.V. Taxo, Biog, Palyn, Old World

LEUCAS

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

LIPPIA

Múlgura de Romero, M.E. Taxo, South America

LYCOPUS

Weakley, A. Taxo, North Carolina

MARRUBIUM

Seybold, S. Taxo, Iran

MELISSA

Hose, S. Chem: Terp, Europe

Ubera, J.L. Taxo, Repro, Chem: Terp, Mediterranean

van den Berg, T. Chem: Terp, Europe

Zängelein, A. Chem: Terp, Europe

MENTHA

Chambers, H.L. Taxo, Cyto, Hort, Econ, World

Harley, R.M. Taxo, Cyto, Biog, World

Jancic, R. Taxo, Balkans

Kite, G.C. Chem: Terp, Phen, Irid, World

Kokkini, S. Taxo, Chem: Terp, World

Morton, J.K. Taxo, Cyto, Repro, Biog, Palyn, World

Robins, R.J. Econ, Chem: Terp, DNA, Enzy, World

Tucker, A.O. Taxo, Chem: Terp, World

Voirin, B. Chem: Terp, Flav, Phen, World

MICROMERIA

De la Torre, W.W. Taxo, Macaronesia

Morales, R. Taxo, Chem: Terp, World

Pérez de Paz, P.L. Taxo, Ecol, Chem: Terp, Macaronesia

NEPETA

Goetghebeur, P. Taxo, Chem: World

La-Serna Ramos, I.E. Taxo, Palyn, Macaronesia

OCIMUM

Aluri, R.J.S. Taxo, Phyl, Repro, Chem: Flav, Phen, World

Maleci Bini, L. Taxo, Anat, Palyn, Mediterranean

Paton, A. Taxo, Phyl, Palyn, Biog, World

Simmonds, M. Taxo, Phyl, Plant, Chem: Terp, Flav, Phen, Amin, World

PETREA

Rueda, R. Taxo, Phyl, World

PHLOMIS

Alizar, G. Taxo, Phyl, World

Zielinski, J. Taxo, Biog, S.W.Asia

PLECTRANTHUS

Aye, T.T. Taxo, Anat, Palyn, Chem: Flav,

Kite, G.C. Chem: Terp, Phen, Irid, World

Morton, J.K. Taxo, Cyto, Repro, Biog, Palyn, Africa

Paton, A. Taxo, Phyl, Biog, Africa

Simmonds, M. Taxo, Phyl, Plant, Chem: Terp, Flav, Phen, Amin, World

POGOGYNE

Bauder, E.T. Ecol, N.America

McMillan, S. Taxo, Phyl, Biog, Palyn, Chem: DNA, S.W. USA, Mexico

POGOSTEMON

Bhatti, R. Taxo, Phyl, Anat, Biog, Plant, Chem: Terp, Phen, World

Ingrouille, M. Taxo, Anat, Biog, Palyn, Plant, World

PYCNANTHEMUM

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PYCNOSTACHYS

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