NOTES ON THE GENUS NEPETA L. (LAMIACEAE, NEPETOIDEAE)

Z. Jamzad

Received 21.06.2009. Accepted for publication 02.12.2009

Jamzad, Z. 2009 12 31: Notes on the genus *Nepeta* L. (*Lamiaceae, Nepetoideae*). - *Iran. J. Bot. 15(2): 141-145.* Tehran.

The species belonging to *Nepeta* sect. *Psilonepeta* Benth. recognized by K.H. Rechinger in Flora Iranica are revised. *Nepeta bazoftica* Jamzad is described as a new species in this section. It is characterized by a broad ovate, petiolate leaf, deeply cordate at base, with shallowly crenate-dentate margins; a lax pedunculate cyme; calyx throat with a ring of hairs inside; corolla long exserted from the calyx. The new species is closely related to *N. archibaldii* and belongs to a natural group of species partly recognized by Bentham in sect. *Psilonepeta,* characterized by a straight to slightly curved calyx, throat straight, with an internal ring of hairs; corolla clearly exserted from calyx, with a deflexed lower lip. *Nepeta iranshahrii* previously recognized in sect. *Capituliferae* and *N. pinetorum* of sect. *Schizocalyx* share the same floral characteristics and are considered in the same group. Furthermore, *N. scrophularioides* Rech. f. with an oblique calyx throat, without a hairy ring inside is excluded from sect. *Psilonepeta* and is considered as a synonym of *N. fissa* C. A. Mey**.**

Ziba Jamzad. Research Institute of Forests and Rangelands, P. O. Box 13185-116, Tehran, Iran.

Key words. Nepeta, Lamiaceae, new species. Taxonomy, Iran.

یادداشت هایي در مورد جنس **Nepeta L.** زیر خانواده **Nepetoideae** ، از خانواده نعنا

زیبا جم‌زاد، دانشیار پژوهش مؤسسه تحقیقات جنگلها و مراتع کشور.

گونه‌های جنس *Nepeta* که توسط پروفسور رشینگر در فلورا ایرانیکا در بخش Sect. *Psilonepeta* منظور گردیده‌اند مطالعه و مرور گردیدند. گونه *N. bazoftica* Jamzad به عنوان گونه جدید برای علم گیاهشناسی شرح داده می‌شود. این گونه با داشتن برگهای تخم مرغی پهن، دمبرگ‌دار، با قاعده عمیقاً قلبی و در حاشیه با دندانه‌های کم عمق؛ گل‌آذین گرزن تنک؛ کاسه گل در گلو با یک حلقه کرک و جام گل بلند، از کاسه خارج شده، مشخص می‌گردد. گونه جدید با گونه *N. archibaldii*| قرابت دارد و متعلق به گروه طبیعی گونه‌هایی است که تعدادی از آنها قبلاً توسط بنتهام در بخش *Psilonepeta* طبقه‌بندی گردیده بودند که با داشتن کاسه گل راست تا کمی خمیده، با حلقه کرک درون لوله؛ جام گل با لوله بلند و از کاسه بیرون آمده و لب پائینی به طرف پائین خمیده مشخص می‌گردند. گونه *N. iranshahrii* که قبلاً در بخش Sect. *Capituliferae* و گونه *N. pinetorum* که در بخش sect. *Schizocalyx* قرار داده شده بودند دارای مشخصات ذکر شده در بالا بوده و بنابراین در مجموعه آنها منظور می‌گردند. به علاوه گونه *N. scrophularioides* که دارای کاسه با گلوی مورب و فاقد حلقه کرک می‌باشد از این گروه حذف می‌شود و به عنوان مترادف با گونه *N. fissa* معرفی می‌گردد.

Introduction

Nepeta L. is a member of the tribe *Mentheae* subtribe *Nepetinae* of subfamily *Nepetoideae* (*Lamiaceae*) with about 300 species. The species are mostly herbaceous perennials and annuals occurring mainly in Eurasia. It is one of the largest genera of *Lamiaceae* in Southwest Asia. In Iran, *Nepeta* is the largest member of the family with about 60% endemics. Rechinger (1982) recognized 63 species from Iran. Eleven new species were described by the present author and co-workers during 1982-2008 (Jamzad & Assadi, 1984; Jamzad, 1991, 1992, 1998, 1999, 2003, 2006**).** There have been two new records namely *N. trachonitica* Post (Jamzad 2006) and *N. leucostegia* Boiss. & Heldr. (Delghandi 1993). It is estimated that the number of species now reaches 80 (including new species and new records in preparation) in Iran.

The infra-generic classification of *Nepeta* has long been problematic. Different authors have had different, incongruent classifications. The latest works on the infra-generic classification of the genus (Jamzad, 2001;

Jamzad et al. 2003) based on molecular techniques, provided a new classification which could be linked with the flower architecture of the species. Section *Psilonepeta* was circumscribed by Bentham (1848) with specific floral characters: calyx tubular, straight, or slightly curved at the apex; throat straight with a ring of hairs inside; corolla long exserted from the calyx tube. He recognized three species in this section, namely *N. depauperata* Benth, *N. laxiflora* Benth. and *N. oxyodonta* Boiss.. In later works, more species with these characters were described and considered in section *Psilonepeta* or other sections (Bunge, 1873; Aitchison & Hemsley, 1882; Bornmüller, 1899; Freitag, 1972; Rechinger,1982 and Jamzad, 1998).

The molecular study revealed that the species studied with such characters form a monophyletic group in the phylogram of *Nepeta* (Jamzad, 2003). In this account, these species and their morphological characters will be reviewed. A new species of this group is described and its close relatives are discussed.

Nepeta bazoftica Jamzad, **sp. nov. -** Fig. 1.
Nepeta archibaldii Rech. f. affinis sed foliis basalibus et caulinis petiolatis, late ovatis, basi profunde cordatis, margine indistincte grosse crenato-dentatis, inflorescentiis laxis, cymis pedunculatis, paucifloris.

Perennial, stems several, erect-ascending from a woody rootstock, 35 cm high, minutely glandular-papillose with scattered very long articulate crisped hairs. Leaves broad ovate, 15-25 mm long, 20-25 mm wide, deeply cordate at base, rounded at the apex, shallowly crenate, basal and cauline leaves petiolate; petioles 10-15 mm long; floral leaves sessile, rounded, ± amplexicaul, smaller than stem leaves. Inflorescence lax; cymes all pedunculate; peduncles 15-20 mm long, with few flowers, all distant. Bracts 3-3.5 mm long, 0.5 mm wide, linear-lanceolate, shorter than the calyx. Calyx 8.5-9 mm long, tubular, straight, slightly constricted at the throat, with a hairy ring inside, covered by minute papillose glandular and scattered long simple articulate hairs; teeth equal, 2-2.5 mm long, lanceolate, acute. Corolla pale blue, 15-16 mm long; tube long exserted, not resupinate; upper lip deeply lobed, 2 mm long; middle lobe of the lower lip 3.5-4 mm wide, with dark blue spots at the base. The upper stamens slightly exserted; the lowers included. Nutlets not seen.

Holotypus. Chaharmahale Bakhtiariy, Darreh Bazoft, Chebd, 1400 m, 15.05.1998, Mozaffarian 77892. (TARI).

The new species is closely related to *N. archibaldii* but differs from it in the characters summarized in table 1.

The other species distributed in Zardkuh, in Chaharmahale Bakhtiari province are *N. iranshahrii* Rech. f. , *N. laxiflora* Benth. and *N. sessilifolia* Bunge. It differs from *N. iranshahrii* which is a dwarf plant, inflorescence with many-flowered cymes close to each other making a terminal spike-like head. *Nepeta laxiflora* differs from the new species by having a minutely papillose glandular indumentum to ± glabrous, the leaf shape ovate-oblong, all petiolate, calyx with short equal teeth. *Nepeta sessilifolia* is distinctly different from the new species with its sessile cauline leaves and the flowers with long exserted stamens.

The new species belongs to the natural group of species considered in sect. *Psilonepeta* Benth. (Bentham, 1848 and Rechinger, 1982). They are mostly Iranian endemics, but a few are from Afghanistan and Pakistan. The Iranian species are *N. adenoclada* Bornm..; *N. archibaldii* Rech. f.; *N. dschuparensis* Bornm.; *N. depauperata* Benth. *; N. laxiflora* Benth.; *N. sessilifolia* Bunge; *N. oxyodonta* Boiss.; *N. allotria* Rech. f.; *N. makuensis* Jamzad and the Afghanistan and Pakistan species are *N. pinetorum* Aitch. & Hemsl. and *N. hedgei* Freitag.

The other species considered in this group by Rechinger (1982) are *N. denudata* Benth., *N. scrophularioides* Rech. f. and *N. trachonitica* Post.

The results of a phylogenetic study of the genus (Jamzad et al. 2003) showed that *N. denudata* is closely related to the species of sect. *Capituliferae* in contradiction to Briquet (1896) who placed it in an isolated monotypic section named sect. *Denudatae.*

Nepeta scrophularioides Rech. f. was also considered in sect. *Psilonepeta* by Rechinger (1982), but Budantsev (1993) recognized it in sect. *Schizocalyx* Pojark. A close study of the type specimen in the herbarium Iranian Research Institute of Plat Protection (IRAN) and specimens collected from the type locality showed that the characteristics of *N. scrophularioides* fall within the variation range of *N. fissa* C.A. Mey. which is a widely distributed species in N, NW, C and S Iran. It is also present in Turkey and Caucasus. It is characterized with an oblique calyx throat and deeply cleft lower lip of the calyx; corolla with a concave, crenate middle lobe of the lower lip, with the margin reflexed upwards. The corolla tube is long, exserted from the calyx. *Nepeta fissa* is a variable species, variation in leaf size, shape and indumentum; clayx indumentum and size and corolla size is observed (Hedge, 1962). I did not find any significant differences between *N. fissa* and *N. scrophularioides*, so they are recognized specifically identical and *N. scrophularioides* is considered as a synonym of *N. fissa* as designated below:

Fig. 1. *Nepeta bazoftica* (× 0.63); flower and corolla (× 2.5); calyx (× 3.8).

Tabl. 1. The diagnostic characters of *Nepeta bazoftica* and *N. archibaldii.*

Nepeta archibaldii	*Nepeta bazoftica*
Basal leaves with short petiole (up to 5 mm); cauline leaves sessile.	Basal and cauline leaves with longer petioles (10-15 mm).
Leaves ovate, cordate at the base; floral leaves acute, serrate.	Leaves broadly ovate to ± orbicular, deeply cordate at the base; floral leaves rounded, indistinctly crenate.
Branches covered with non glandular articulate hairs and a lax papillose glandular indumentum.	Branches covered with scattered long crisped non glandular articulate hairs, densely minute stipitate glands and minute papillose glandular indumentum.
Inflorescence lax, upper cymes ± close, rather dense.	Inflorescence very lax; cymes all distant, few-flowered.

New synonym

Nepeta fissa C.A. Mey., Verz. Pfl. Cauc. 93 (1831).
Syn. *N. scrophularioides* Rech. f., Fl. Iranica, 150: 161 (1982), **syn. nov.**

A close study of the floral morphology and inflorescence showed that *Nepeta trachonitica* is close to *N. betonicifolia* C. A. Mey. of the section *Cataria* Bantham, so should be transferred to that group. Furthermore, Rechinger (1982) described *N. iranshahrii* Rech. f., from Zardkuh in Bakhtiari province and recognized it in sect. *Capituliferae* (Benth.) Pojark. Members of this section are characterized by a head-like inflorescence, calyx without an annulus in throat and middle lobe of the lower lip of the corolla concave, with an entire reflexed margin. The type specimen of *N. iranshahrii* at the IRAN herbarium was examined, it has a calyx with a hairy ring in the throat and lower lip of the corolla is deflexed, the characters that belongs to sect. *Psilonepeta*. So this species is excluded from sect. *Capituliferae* and transferred to the *N. laxiflora* group of species which has been circumscribed as sect. *Psilonepeta*. *Nepeta pinetorum* Aitch. & Hemsl. was described from Afghanistan. It was considered in sect. *Eunepeta* Boiss. subsect. *Longiflorae* Boiss. (Aitchison, 1882). They noted the dissimilarity of the calyx to the members of subsect. *Longiflorae* Boiss. but referring to the general characteristics they decided to place it in this subsection. In a close study of specimens collected from Afghanistan, I came to conclusion that *N. pinetorum* is closely related to the species of *Nepeta laxiflora* group (sect. *Psilonepeta*).

Most of the species of *Nepeta* sect. *Psilonepata* have been included in the genus *Lophanthus*, a mainly Central Asian genus by Levin (1941) and subsequently by Budantsev (1992) and in Kubitski's Families and Genera of Flowering plants (2004). *Lophanthus* has been treated as a separate genus. The phylogenetic study of *Nepeta* (Jamzad et al., 2003) suggested that this group of species belongs to *Nepeta*, but no formal taxonomic/nomenclatural change was made. They share most morphological and molecular characters with *Nepeta* and seem to be a derived group within the genus *Nepeta*. The resupinate flower which is one of the characteristics of the genus *Lophanthus* is only present in *N. allotria* Rech. f. and *N. makuensis* Jamzad & Mozzaf.

Bentham (1848) divided *Lophanthus* into two sections: sect. *Chiastandra* distributed in North America, characterized by a terminal spike inflorescence, not resupinate flowers and upper stamens declined; sect. *Resupinaria* with one species distributed in China, characterized by lax pedunculate axillary cymes, resupinate flowers with upper stamens ascending. The species of sect. *Chiastandra* were transferred to *Agastache* Clayt. ex Gronov. (1762). The genus *Lophanthus* as is circumscribed today includes species of sect. *Resupinaria* with about 20 species described after Bentham, distributed in China, Central Asia and Afghanistan. The morphological characters support the close relationships between *Nepeta* sect. *Psilonepeta* and *Lophanthus*. However, further studies by examining the DNA sequences of all *Lophanthus* species are needed to reveal the relationships among the *Lophanthus* species and the *Nepeta* species of sect. *Psilonepeta*, to be able to decide the inclusion of these two groups either in *Nepeta* or in *Lophanthus.*

The Iranian species belonging to this group are mostly distributed at high altitudes in western Iran, but two (*N. dschuparensis* and *N. depauperata*) are in southern Iran, one in NW (*N. makuensis*) and one in the north (*N. allotria*). They grow in mountainous habitats, in crevices of rocks, slopes and foothills.

Acknowledgments

I wish to thank authorities of the herbarium IRAN for letting me to study the type specimens of *Nepeta* spp. Thanks are due to Mr. Ian Hedge for his valuable suggestions and corrections of manuscript. I also thank Miss. Habibi for preparing the illustration.

References

Aitchison, J. E. T. & Hemsly, 1882: On the Flora of Kurram Valley & C. Afghanistan. Part II. -Journ. Linn. Soc. Bot. 19: 183.

Bentham, G. 1848: Labiatae in A. De Candolle (ed.). Prodromus Systematis Naturalis Regni Vegetabilis, 12: 27-603. -Treuttel and Wurtz, Paris.

Bornmüller, J.1899: Zwölf neue Nepeta arten aus Persien, Kurdistan und Kleinasien. -Bull. Herb. Boiss. 7: 234.

Briquet, J. 1896. Nepeta, Labiatae. In A. Engler and K. Prantl (eds.) Die Natürlichen Pflanzenfamilien, Teil 4, Abt.3 a: 235- 238. -W. Engelmann, Leipzig.

Budantsev, A. 1992. The system and synopsis of the genus Lophanthus (Lamiaceae) [in Russian]. -Botaničeskij žurnal SSSR, 77(9): 69-77.

Budantsev, A. 1993. A synopsis of the genus Nepeta (Lamiaceae) [in Russian]. -Botaničeskij žurnal SSSR, 78(1): 93-107.

Bunge, A. 1873: Labiatae Persicae. -Mém de l Académie de l impériale de Saint Pétersbourg, 7 (21, 1): 58.

Freitag , H. 1972: Interesting and New Labiatae and Capparidaceae from Afghanistan. -Notes Royal Bot. Gard. Edinb. 31: 352.

Gronovius, 1762: Labiatae in Flora of Virginia, 88. -Lugd. Batav.

Harley, R. M., Atkins, S., Budantsev, A., Cantino, P. D., Conn, B., Grayer, R., Harley, M. M., Kok, R., de, Krestovskaja, T., Morales, A., Paton, A. J., Ryding, O. & Upson, T. 2004: Labiatae. In Kadereit, J.W. (ed.) The Families and Genera of vascular Plants, vol. 7. 167-275. -Springer-Verlag, Berlin, Heidelberg, New York.

Hedge, I. C. 1962: Nepeta fissa and species allied to it. -Notes from the Royal Botanic Garden Edinburgh, 24: 51-71.

Jamzad, Z. & Assadi, A. 1984. New Species of the Genera Nepeta and Ajuga (Labiatae) from Iran. -Iran. J. Bot. 2(2): 95-102.

Jamzad, Z. 1991: Nepeta menthoides Boiss. & Buhse & species allied to it in Iran. -Iran. J. Bot. 5(1): 17-27.

Jamzad, Z. 1992: Two new Species from Labiatae in Iran. -Iran. J. Bot. 5 (2): 9-74.

Jamzad, Z. 1998: A new species of Nepeta L. (Labiatae) from Iran.- Iran. J. Bot. 7 (2): 249-253.

Jamzad, Z. 1999: Two new species of Nepeta L. (Labiatae) from Iran. -Iran. J. Bot. 8 (1): 43-48.

Jamzad, Z. 2001: A phylogenetic study of Nepeta L. (Lamiaceae). -Ph. D. thesis, Birkbeck College , University of London.

Jamzad, Z., Chase, M., Ingrouille, M, Simmonds M, and Jalili, A. 2003: Phylogenetic relationships among Nepeta L. (Lamiaceae) species and related genera based on sequence data from internal transcribed spacers (ITS) of nuclear ribosomal DNA. -Taxon 52: 21-32.

Jamzad, Z., Ingrouille, M, Simmonds, M. 2003. Three new species of Nepeta (Lamiaceae) from Iran. -Taxon 52: 93-98.

Jamzad, Z. 2006: New species and new record of Nepeta from Iran. -Iran. J. Bot. 11 (2): 143-148.

Levin, E. G.1941: The genus Lophanthus and its analogon Pseudolophanthus[in Russian]. -Trudy Bot. Inst. Akad. Nauk SSSR ser. 1, 5: 256-318.

Rechinger, K. H. 1982: Nepeta in K.H. Rechinger (ed.) Fl. Iranica, 150: 108-216. -Graz.