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Revision of the genus *Nepeta* L. (Lamiaceae) in Iraq

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Abstract: This paper revises the genus *Nepeta* for the family Lamiaceae for the Flora of Iraq project. We describe a new species, *Nepeta iraqensis*, and four new records *Nepeta congesta* subsp. *cryptantha*, *N. stricta*, *N. lamiifolia* and *N. iodantha* for Iraq. Lectotypes for six taxa are selected and comments on complex species are given. In addition, two new synonyms are given here for the first time. In all, we describe with identification keys, 19 taxa, three of which are endemic to Iraq.

Key words: Endemic, Iraq, Mentheae, new species, *Nepeta*, Nepetinae

1. Introduction

Nepeta L. (Linnaeus, 1753) is one of the largest genera of the family Lamiaceae (subfamily Nepetoideae, tribe Mentheae subtribe Nepetinae) (Harley et al., 2004). It consists of c. 300 species found mainly on mountains, steppes of temperate Eurasia and Macaronesia to East Tropical Africa (Harley et al., 2004; POWO, 2022; WCVF, 2022). The greatest diversity and species richness within the genus are found in two regions: Southwestern Asia, with 79 species and about 60% endemism and representatives of most sections in the western Himalayas, including the adjacent Hindu Kush (Jamzad, 2003; POWO, 2022). In Southwest Asia, after Iran with 80 species and a 60% endemism rate (Jamzad, 2009), the country with the highest species diversity is Turkey with 45 taxa and a 42% endemism rate (Dirmenci, 2012; Selvi et al., 2022). In Iraq, almost all taxa of *Nepeta* are distributed in northern Iraq where the borders of Turkey, Iran, and Iraq intersect (Bornmüller, 1899; Nábělek, 1926; Blakelock, 1949; Al-Rawi, 1964; Hedge, 1982; Rechinger, 1982; Dirmenci, 2012; Jamzad, 2012).

Indumentum, leaf shape and size, calyx and corolla characteristics are among the important morphological characteristics in distinguishing *Nepeta* species, but these characteristics can be variable and may not prove useful in all geographical regions (Hedge, 1962, 1982; Hedge and Lamond, 1968, 1980; Rechinger, 1982; Budantsev and Lobova, 1997; Kaya and Dirmenci 2008). Due to the

variability of morphological characters, many species with similar morphological characteristics have been described as new, especially in Turkey, the Caucasus, and Iran (Bentham, 1848; Boissier, 1879; Bornmüller, 1899; Dinsmore, 1933; Pojarkova, 1953; Feinbrun-Dothan, 1978). In recent years, however, several species have been placed in synonymy (Hedge, 1962, 1982; Rechinger, 1982; Budantsev, 1993; Dirmenci, 2012; Jamzad, 2012). With this study (*Nepeta* for the Flora Iraq) we had the opportunity to study the full range of distribution of *Nepeta* taxa found in Iraq and their distribution in the neighbouring countries, Iran and Turkey, to give a full picture of the characteristics and variations to revise the genus in Iraq.

2. Materials and methods

In this revision of *Nepeta* in Iraq, we prepared a list of *Nepeta* as given in various checklists, floras for Iraq and neighboring countries (Bunge, 1873; Boissier, 1879; Handel-Mazzetti, 1913; Nábělek, 1926; Dinsmore, 1933; Blakelock, 1949; Handel-Mazzetti and Zohary, 1950; Hedge, 1962; Al-Rawi, 1964; Feinbrun-Dothan, 1978; Rechinger, 1982; Hedge, 1982; Dirmenci, 2012; Jamzad, 2012; Taifour & El-Oqlah, 2017; POWO, 2022; WCPV, 2022). As a result 24 taxa names were found for *Nepeta* in Iraq. After examining type and other specimens at B, BAG, BM, BUH, E, G, K, L, LD, LE, P, S, W, WU and examining many specimens we determined that 19 taxa

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are found in Iraq, 3 of which are endemic. Descriptions, distributions, phenology and habitat notes, a distribution map (Figure 1), and figures for new and new records species (Figures 2–7), as well as an identification key for these 19 taxa is provided. Lectotypes are selected for taxa where several syntypes are present. Abbreviations used for the districts of Iraq: MAM Amadiya District; MRO Rowanduz District; MSU Sulimaniyah District; MJS: Jabal Sinjar District; FUJ: Upper Jazira District; FKI: Kirkuk District; DLJ: Lower Jazira District.

3. Results

3.1. Taxonomic treatment

NEPETA L., Sp. Pl.: 570 (1753); Harley et al. (2004). *Nepeta* L. in Kubitzki K. (ed.) Genera of Vascular Plants, Vol. 7: 250.

Synonyms: *Cataria* Adans., in Fam. Pl. 2: 192 (1763); *Saccilabium* Rottb., in Acta Lit. Univ. Hafn. 1: 294 (1778); *Saussuria* Moench, in Methodus: 388 (1794); *Vleckia* Raf., in Med. Repos., ser. 2, 5: 352 (1808); *Marmoritis* Benth., in Bot. Misc. 3: 377 (1833); *Oxynepea* Bunge, in Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 21(1): 58 (1878); *Schizonepeta* (Benth.) Briq. in H.G.A.Engler & K.A.E.Prantl, Nat. Pflanzenfam. 4(3a): 235 (1896); *Afridia* Duthie, in J. Bombay Nat. Hist. Soc. 11: 696 (1898); *Phyllophyton* Kudô, in Mem. Fac. Sci. Taihoku Imp. Univ. 2: 225 (1929); *Pseudolophanthus* Levin, in Trudy Bot. Inst. Akad. Nauk S.S.S.R., Ser. 1, Fl. Sist. Vyssh. Rast. 5: 294 (1941).

Perennial or annual herbs, aromatic, hermaphrodite, gynodioecious or dioecious. Stems erect, ascending or procumbent; eglandular or glandular. Leaves simple, entire or crenate to serrate, lowers \pm petiolate, upper usually sessile. Inflorescence thyrsoïd, cymes lax to congested, pedunculate or sessile, axillary, distant or crowded into spike-like or ovoid heads. Bracts leaf-like or reduced, sometimes longer than calyx. Bracteoles equal to longer than or shorter than calyces. Calyx tubular to campanulate, regularly 15-veined, actinomorphic to strongly 2-lipped, 5-lobed; upper lip tridentate; lower lip bidentate or rarely with lips entire, lobes subequal to unequal; throat straight to strongly oblique. Corolla 2-lipped, 5-lobed (2/3), blue, violet, pink, yellow or white; posterior lip straight or curved; anterior lip with median lobe concave or \pm flat, undulate or entire; tube included in or exerted from calyx, gradually or \pm abruptly dilating upwards. Stamens 4, rarely 2 with anterior pair absent, posterior (upper) pair longer than anterior (lower); anthers with widely divergent thecae, usually shorter than corolla. Style shortly 2-lobed, subequal. Nutlets ellipsoid to obovoid, rounded to acuminate, smooth to tuberculate, oblong to \pm spherical, trigonous, glabrous or hairy at apex, mucilaginous or not.

Three important geographical ways and areas can be mentioned regarding the diversification and distribution of *Nepeta* species in Iraq: 1) from the East Taurus Mountains in the direction of Zagros Mountains, that is, from west to east (for example *N. italica* L.), 2) from Caucasia towards to the Northern Iraq, that is, from north to south, this road is generally from the high mountains of eastern Turkey and western Iran to northern Iraq, the majority of species distribution in this direction (*N. betonicifolia* C.A.Mey., *N. congesta* Fisch. & C.A. Mey. subsp. *cryptantha* (Boiss. & Hausskn.) Dirmenci & Yıldız, *N. haussknechtii* Bornm., *N. lamiifolia* Willd., *N. nuda* L. subsp. *albiflora* (Boiss.) Gams, *N. stricta* (Banks & Sol.) Hedge & Lamond, *N. trautvetteri* Boiss. & Buhse) and, 3) species distributed in a narrower area between northern Iraq and western Iran (*N. australiana* Bornm., *N. menthioides* Boiss. & Buhse, *N. elymaitica* Bornm., *N. humilis* Benth., *N. iraqo-iranica* Haloob, Bordbar & Qader, *Nepeta iraqensis* Dirmenci, *N. macrosiphon* Boiss., *N. petraea* Benth.). Additionally, some species may follow both routes 1 and 2, like *N. cataria* L., *N. italica* L., and *N. nuda* L. subsp. *albiflora* (Boiss.) Gams.

3.2. Identification key to the species of *Nepeta* in Iraq

1. Annual 2
 - Perennial 4
2. Verticillasters congested into terminal elongated spike 15. **N. iraqo-iranica**
 - Verticillasters distant or upper 2–3 verticillasters approximate 3
3. Bracteoles 4–10 mm long, lanceolate to subulate; calyx 6–9.5 mm long, with a deep cleft to 1/2, teeth oblong to triangular-lanceolate, acuminate, mouth oblique; corolla 11–14 mm long 13. **N. humilis**
 - Bracteoles 4–7 mm long, lanceolate to linear-lanceolate, obtuse to acute at apex; calyx 4.5–6 mm long, cleft indistinct, teeth lanceolate, acute, mouth straight; corolla 7–10 mm long 14. **N. petraea**
4. Inflorescence thyrsoïd with wide-spreading branches arising from leaf axils; plants polygamous; calyx campanulate and straight 5
 - Inflorescence of distant, approximating or conferted verticillasters, rarely paniculate, if paniculately branched or thyrsoïd, flowers all hermaphrodite or all male-sterile; calyx not campanulate, straight or scarcely to clearly oblique 6
5. Plants pale green, or yellowish-green when dry; lower leaves crenate; bracteoles broadly elliptic to lanceolate; corolla white or cream; teeth as long as tube ..
 - 1. **N. congesta**
 - Plants tinged violet-blue at least at inflorescence (the same colour when dry); lower leaves entire; bracteoles narrowly elliptic to linear-subulate; corolla lilac to purple; calyx teeth shorter than or equalling tube 2. **N. stricta**

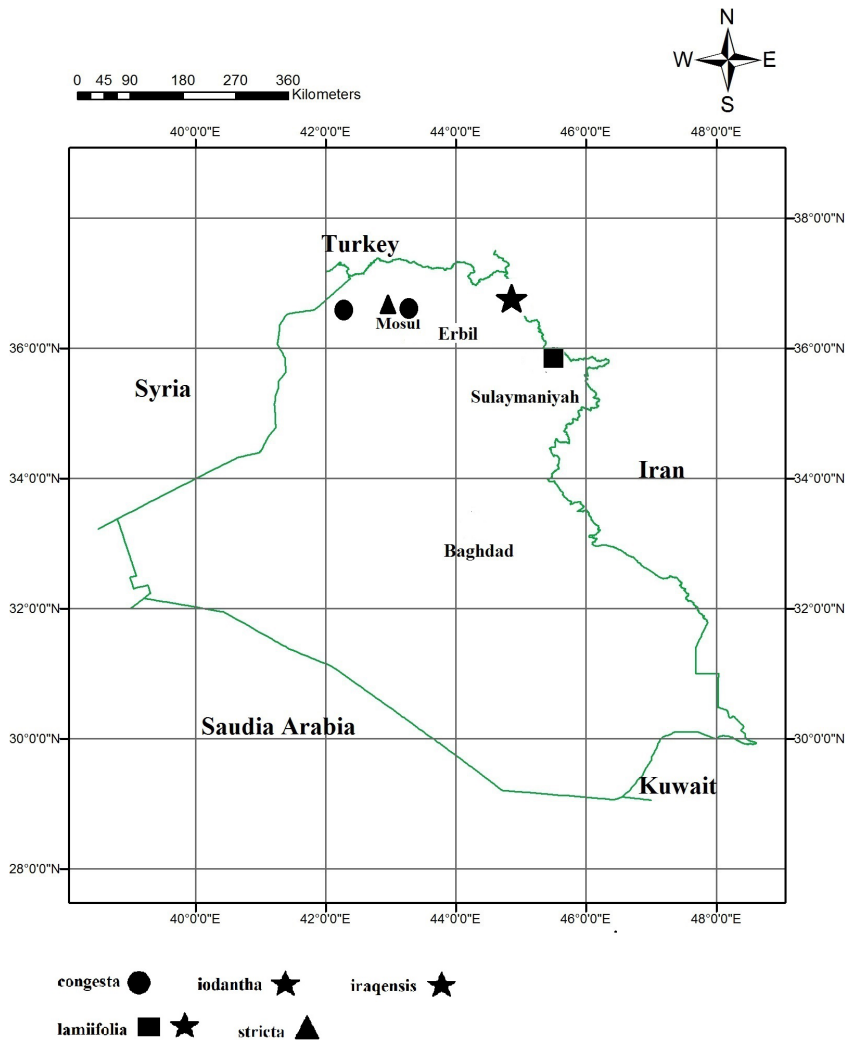


Figure 1. Distribution map of the new species and new records species for Iraq (*N. iordantha* is distributed in the area marked with both an asterisk and a square).

6. Flowers white with pink or purple dots on lower lip 7
 —Flowers deep reddish-purple, lilac to violet 9
 7. Bracteoles 6–12 long, ± equal to or longer than calyces, rigid and incurved; bracteoles and calyx teeth with wide white-membranous margins; calyx 6–10 mm long, teeth unequal, 3–4 mm long 3. *N. italica*
 —Bracteoles 2–5 mm long, shorter than calyces, not rigid and incurved; bracteoles and calyx teeth with narrow white-membranous margins; calyx 4–7 mm long; teeth 2–3 mm long 8
 8. Calyx tube straight with erect teeth of equal length; upper cauline leaves sessile 5. *N. nuda*
 —Calyx tube ± curved; teeth spreading, ± unequal; all leaves petiolate 4. *N. cataria*
 9. Whole plant stellate-tomentose or pluri-furcate hairy 10
 —Plants not above 11

10. All plant white-stellate tomentose; lower cauline leaves 1.5–3 × 0.8–2 cm, oblong to ovate-lanceolate, cuneate to narrowly rotundate at the base, crenate to obtuse-dentate at margins, acute at apex; usually longitudinally plicate 8. *N. menthoides*
 —All plant sparsely to densely short addressed pluri-furcate hairy; leaves 3–5.5 × 1.5–3 cm, ovate to lanceolate; subcordate to truncate or rarely ± cordate at base, crenate-dentate to dentate at margins; always flat ..
 9. *N. elymaitica*
 11. Whole plant eglandular, with sessile glands or with glandular papillae 12
 —Whole plant or at least axis of inflorescence with clearly viscid-stalked glandular hairs 6. *N. autraniana*
 12. Stems densely pilose to villose, leaves broadly ovate-orbicular; calyx straight and expanded at mouth, teeth broadly triangular 10. *N. iraqensis*

—Stems glabrescent to finely-pilose to villose; leaves oblong-elliptic to lanceolate or ovate to suborbicular; calyx usually curved, slightly to clearly oblique at mouth, teeth oblong to triangular 13

13. Calyx slightly to clearly bilabiate with a deep cleft on lower lip 14

—Calyx regular to slightly bilabiate without a deep cleft on lower lip 17

14. Inflorescence verticillate, verticillasters remote or approximate at above, or conferted into terminal heads 15

—Inflorescence lax with most cymes pedunculate 16

15. Inflorescence conferted into \pm sessile verticillasters or terminal heads; bracteoles 4–6 mm long, elliptic to linear-lanceolate; 19. *N. lamiifolia*

—All verticillasters remote, lower clearly pedunculate 1–1.5 cm long; bracteoles 2–4 mm long, linear to subulate 18. *N. iodantha*

16. Inflorescence lax, cymes all pedunculate, loosely flowered; calyx 8–12 mm long; corolla 20–26(–30) mm long 16. *N. macrosiphon*

—Inflorescence broad, loose panicle, sometimes repeatedly dichotomous or bostryciform; the axes of first order to 3 cm long or more; calyx 7–9 mm long; corolla 13–17 mm long 17. *N. trautvetteri*

17. Inflorescence an oblong ‘spike’; calyx 13–20 mm long; teeth 4–8 mm long, usually aristate; corolla 20–25 mm long, dark reddish-purple, tube narrow, straight 7. *N. trachonitica*

—Verticillasters remote or at least upper verticillasters condensed into a spike; calyx less than 13 mm; corolla less than 20 mm long, violet or violet-blue 18

18. Leaves spreading; all verticillasters usually remote or uppers approximate 12. *N. haussknechtii*

—Leaves \pm adpressed to stem; verticillasters condensed into a spike, sometimes lowers remote 11. *N. betonicifolia*

1. *Nepeta congesta* Fisch. & C.A.Mey. **subsp. cryptantha** (Boiss. & Hausskn.) Dirmenci & Yildiz, in A.Güner & al. (eds.), Türk. Bitkileri List.: 565 (2012) (Figure 2).

Synonyms: *Nepeta cryptantha* Boiss. & Hausskn., in Fl. Orient. [Boissier] 4: 669 (1879); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 366 (1933); *Glechoma cryptantha* (Boiss. & Hausskn.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta congesta* var. *cryptantha* (Boiss. & Hausskn.) Hedge & Lamond, in Notes Roy. Bot. Gard. Edinburgh 38: 43 (1980); Davis in Fl. Turkey [P.H. Davis] 7: 285–286 (1982); Jamzad in Flora Iran 76: 544 (2012); *Oxynepea involucrata* Bunge, in Mém. Acad. Imp. Sci. Saint Pétersbourg, Sér. 7, 21(1): 59 (1878); *Nepeta involucrata* (Bunge) Bornm., in Magyar Bot. Lapok 11: 9 (1912); Rechinger in Fl. Iranica [K.H. Rechinger]

150: 189 (1982); Feinbrun-Dothan in Fl. Palaest. 3: 116 (1978); *N. erivanensis* Grossh., in Beih. Bot. Centralbl. 44(2): 234 (1927).

Perennial herbs. Stems green to yellowish green, erect, 20–40(–50) cm tall, paniculately branched, with a \pm dense indumentum of spreading villous multicellular hairs, shorter hairs sometimes present, eglandular or with sessile glands and glandular papillose. Leaves ovate-oblong to elliptic, 2–4 \times 1–2 cm, lower leaves petiolate to 1.5 cm long, uppers sessile, crenate, uppermost rarely entire, truncate or cuneate at base, acute to obtuse at apex, \pm puberulous or villous with sessile glands at beneath, subglabrous above. Inflorescence a widely paniculately branched, pale green thyrse, flowers clustered, lower cymes pedunculate, uppers \pm sessile. Bracteoles elliptic to lanceolate, 5–12 mm long, shorter or longer than calyx, acuminate, pilose with sessile glands. Calyx \pm campanulate, 5–10 mm long, tube 3–4.5 mm long, veins very prominent, villous, with sessile glands and glandular papillose or not; teeth \pm equalling to tube, narrowly triangular, straight, rarely recurving. Corolla white or cream, 6–8(–9) mm long, shorter or longer than calyx teeth; hairy in throat. Nutlets broadly oblong, rounded-triangular, 2–2.2 \times 1.8–2 mm, usually finely tuberculate above.

Distribution: East and Southeast Turkey, Syria, Palestine, Lebanon, North Iraq, Iran, and Transcaucasus. It is distributed in North and Northwest of Iraq.

Examined specimens: Iraq. FUJ: Hammam Ali, Anders 2480 (W); Mosul, Omar & Hamid 36462 (K); Mesopotamia, Aucher-Eloy 1792 (syntype of *N. cryptantha*) (K); Midway Tal-Afar & Sinjar, by roadside, Omar & Hamid 36474 (K); 40 km E. of Sinjar, Rawi 33138 (K); FUJ/DLJ: Manayf, Omar & Hamid 36576 (K).

Habitat. Sandy soils, roadsides, clay soils, fallow or wheat fields; alt. 300–2100? m; fl. & fr. April to June.

Notes. *Nepeta congesta* was not mentioned by Rechinger (1982) in the Flora Iranica. *N. congesta* is divided into two subspecific taxa, subsp. *congesta* and subsp. *cryptantha* (Dirmenci, 2012). Subsp. *congesta* is usually glabrous to puberulous and distributed in central Anatolia, and is endemic to Turkey. Subsp. *cryptantha* usually has long-spreading multicellular hairs and has distribution in Iran, Iraq, Lebanon-Syria, Palestine, Transcaucasus, and Turkey too.

2. *Nepeta stricta* (Banks & Sol.) Hedge & Lamond, in Notes Roy. Bot. Gard. Edinburgh 38: 45 (1980) Davis in Fl. Turkey [P.H. Davis] 7: 286 (1982) (Figure 3).

Synonyms: *Satureja stricta* Banks & Sol., in A. Russell, Nat. Hist. Aleppo, ed. 2, 2: 255 (1794); *Glechoma calycina* (Fenzl) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta calycina* Fenzl, in Flora 26: 400 (1843); Feinbrun-Dothan, in Fl. Palaest. 3: 116 (1978).

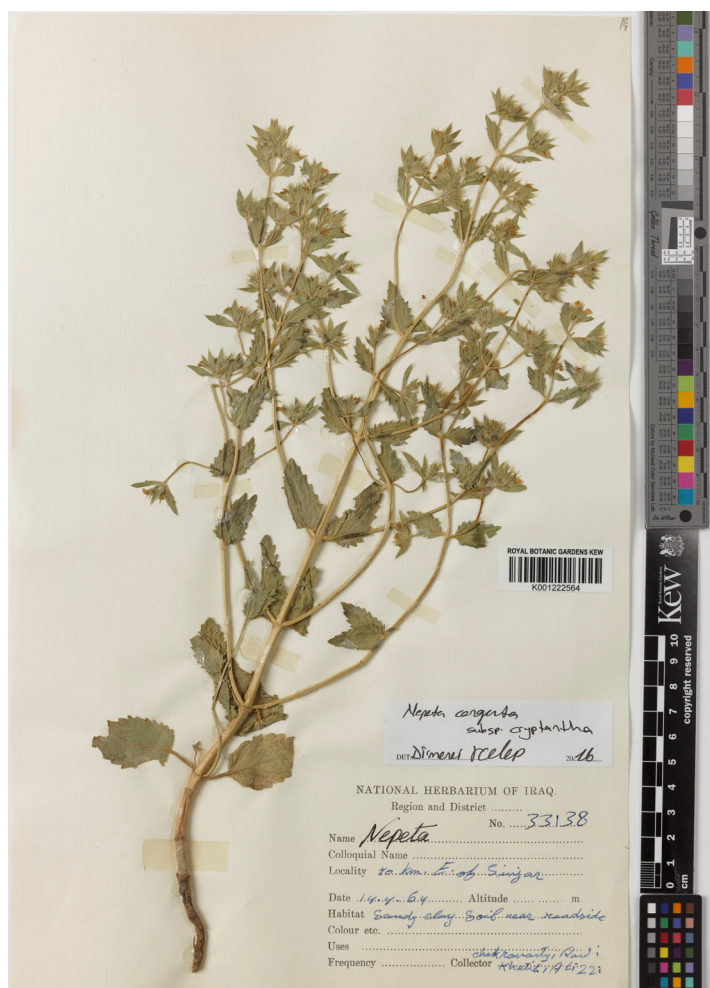


Figure 2. *Nepeta congesta* subsp. *cryptantha* (K001222564).

Perennial herbs. Stems several, 15–30 cm tall, divaricately branched, short puberulous to hirsute, and with sessile glands or not. Leaves ovate to oblong-elliptic, 1.2–3 × 0.5–1 cm, petiole shortens above, entire, truncate or cuneate at base, acute at apex, hirsute-puberulous, usually with sessile glands below and glandular papillose; floral leaves narrowly lanceolate, acute at apex, sessile. Inflorescence a widely branched thyrse, bluish-tinged or not, flowers clustered or lax. Bracteoles lanceolate-subulate, 4–6 mm long, shorter than or equalling to calyx. Calyx ±campanulate, 6–8 mm long, sparsely to densely puberulous to tomentose, hirsute; teeth 1–2 mm long, narrowly to broadly triangular, straight; hairy in throat. Corolla pale lilac to blue, 5–8 mm long, included in calyx. Stamens and style included in calyx. Nutlets not seen.

Distributon: Iran, Iraq, Lebanon-Syria, Palestine, Turkey. It is only known from one location in northern Iraq.

Examined specimens. Iraq. FUJ: Mosul, 1841, *Kotschy* 568.145!

Habitat. There is no habitat and altitude information. However, it is estimated to be grown in these areas: steppe, fallow, or cultivated fields; alt.; 300?; fl. & fr. April to June.

Notes. *Nepeta stricta* was not mentioned by Rechinger (1982) in the Flora Iranica. It is known only from two individuals collected by Kotschy around Mosul. These specimens (*Kotschy* 568.145) were seen in K herbarium. A brief description is given because the specimen amount is insufficient.

In Flora of Turkey (Hedge, 1982), the specimens included in this group were given under *Nepeta stricta*. It was divided into two varieties as var. *stricta* and var. *curvidens*. Mentioned here, *Kotschy* 568.145 belongs to var. *stricta*. Var. *curvidens* (was given as *N. curvidens* in Fl. Iran, 2012:545) has usually crenate leaf margins and recurved calyx teeth.

3. *Nepeta italica* L., in Sp. Pl.: 571 (1753); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 363 (1933); Rawi in Dep. Agr. Tech. Bull 14: 152 (1964); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 175 (1982); Hedge in Fl.

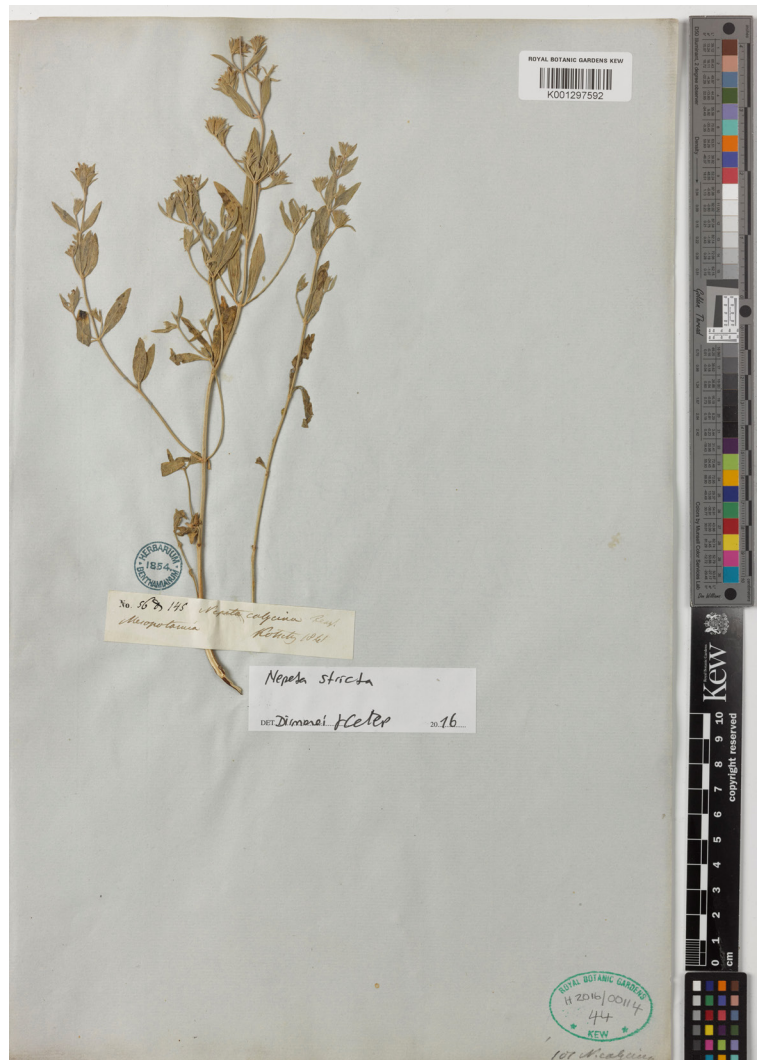


Figure 3. *Nepeta stricta* (K001207592).

Turkey [P.H. Davis] 7: 267 (1982); Taifour & El-Oqlah in Pl. Jordan Annot. Checkl.: 103 (2017).

Synonyms: *Nepeta orientalis* Mill., in Gard. Dict. ed. 8: n.º 10 (1768); *N. canescens* J.F.Gmel., in Syst. Nat. ed. 13[bis]: 900 (1792); *Cataria canescens* Moench, in Methodus: 388 (1794); *Nepeta incana* Willd., in Sp. Pl. 3: 52 (1800), nom. illeg.; *N. macrostachya* Jan ex Benth., in Labiat. Gen. Spec.: 736 (1835); *Glechoma italica* (L.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *G. canescens* (J.F.Gmel.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta teucrioides* Lam., in Encycl. 1: 711 (1785); *N. marruboides* Willd., in Enum. Pl.: 603 (1809); *N. italica* var. *incanescens* Fisch., in Index Seminum (LE, Petropolitanus) 7: 53 (1841); *N. leucostegia* Boiss. & Heldr. in P.E.Boissier, Diagn. Pl. Orient. 12: 62 (1853); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 363 (1933); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 175

(1982); Jamzad in Flora Iran 76: 469 (2012); *Glechoma leucostegia* (Boiss. & Heldr.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891).

Perennial, few to many stemmed from base, stems ascending to erect, flowering stems usually few branched, 20–90 cm tall, forming tufts, tomentose or adpressed pilose with sessile glands, densely glandular with papillose or \pm eglandular with pubescent to sublanate hairs and sessile glands above. Leaves ovate to ovate-oblong, 1.5–4 \times 1–3 cm, clearly petiolate, to 2 cm long; pubescent to canescent with numerous sessile glands and glandular papillose, cordate at base, crenate, acute to obtuse at apex; lower floral leaves longer than verticillasters. Inflorescence verticillate, verticillasters distant below, approximate above, many-flowered, scarcely pedunculate. Bracteoles linear-lanceolate to linear-elliptic, 6–12 \times 1–2 mm, usually as long as calyx,

often ± rigid and incurved, mucronate, usually with a ± broad white (sometimes purple) membranous margin; short hirsute with glandular. Calyx 6–10 mm long, ± tubular, slightly curved, scarcely oblique at mouth, tube green, shortly hirsute with glandular-papillose; teeth unequal, 3–4 mm long, linear-lanceolate, acuminate, white or purplish membranous margin. Corolla white, purple-spotted on lower lip, 11–13 mm long; tube narrow, wider above, curved, exerted from calyx, pubescent to pilose with glandular papillose; middle lobe of lower lip concave and irregularly crenate, bearded. Stamens 4, sometimes staminode, posterior ones sometimes slightly protruding; filaments glabrous. Style unequally bilobed, slightly or clearly exerted. Nutlets oblong, 1.7–2 × 0.8–1.2 mm, tuberculate.

Distribution: Italy, Greece, Syria, Lebanon, Turkey to North Iraq and Iran. It is widely distributed in various habitats of Northern Iraq.

Examined specimens: Iraq. MAM. Khantur mountain, NE of Zakho, near the top of mountainslope, with *Quercus*, *Rawi* 8591 (K, BAG) & 23413 (K, BAG) & 23466 (K, BAG); Mosul, ad confines Turciae prov. Hakkari, in ditone pagi Sharanish, in montibus calc. a Zakho septentrionem versus, Jabal Khantur, *Rechinger* 10840 (K, G, W); 25 km NE of Zakho, *Rawi* 23453 (K); Dohuk gorge, stony slopes, *Chapman* 26280 (K, BAG); Mosul, ad confines Turciae prov. Hakkari, Dohuk, in fissuris rupium calc., *Rechinger* 11490 (G, W); Dohuk, *Rawi* 8650 (K, BAG-photo); Aary, *Rawi* 8485 (K, BAG-photo); Gara, *Kotschy* 408 (K, W); Garadagh, *Rawi* 9260 (K, BAG-photo); Sarsang, slopes of Garadagh, *Chapman* 26440 (K); Gharadagh, *Rawi* 9260 (K); Agra, *Rawi* 11473 (K, BAG). MSU: Suleymaniya, Zewiya valley, pir omar Gudrum, *Rawi* 12071 (K, BAG); Kopi Karadagh, *Haines* 1067 (K); In montibus calcareis Avroman et Shahu, *Hausknecht* s.n. (BM, K); MRO: Kanurish, Qerna valley, N. of Pushtashan, *Serhang* & *Rawi* 26666 (K, BAG); MJS: Sinjar, Jebel Sinjar, north of the town, *Gillett* 11141 (K, BAG); Kursi, Jebel Sinjar, *Gillett* 10875 (K, BAG); Karsi, NW slope, *Omar*, *Khyat*, *Kaisi* 52460 (BAG); FUJ: Mosul, *Kotschy* 400 (K).

Habitat: In *Quercus* forests, rocky limestone, and volcanic slopes, dried stream beds, shady banks, roadsides; alt. 500–1900 m; fl. & fr.; May to July.

Notes. *Nepeta italica* is a widespread species in northern Iraq. The most important characters distinguishing this taxon from other species of *Nepeta* are margins of bracteoles and calyx teeth wide membranous and white or purple; bracteoles rigid, as long as calyx.

4. *Nepeta cataria* L., in Sp. Pl.: 570 (1753); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 363 (1933); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 141

(1982); Hedge in Fl. Turkey [P.H. Davis] 7: 267 (1982); Jamzad in Flora Iran 76: 493 (2012); Taifour & El-Oqlah in Pl. Jordan Annot. Checkl.: 103 (2017).

Synonyms: *Nepeta vulgaris* Lam., in Fl. Franç. 2: 398 (1779); *Cataria vulgaris* Gaterau, in Descr. Pl. Montauban: 105 (1789); *Glechoma cataria* (L.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta minor* Mill., in Gard. Dict. ed. 8: n.º 2 (1768); *Cataria tomentosa* Gilib., in Fl. Lit. Inch. 1: 78 (1782); *Nepeta ruderalis* Boiss., in Fl. Orient. 4: 643 (1879).

Perennial herbs. Stems erect, 30–100 cm tall, robust, branched above, retrorsely eglandular pilose with short hairs and sessile glands, glandular papillose above. Leaves ovate to triangular-ovate, 2–7 × 1–4 cm, clearly petiolate to 4 cm long, finely adpressed pilose with many sessile glands and glandular papillose, often greyish beneath, cordate or truncate at base, serrate at margins, acute at apex. Lower floral leaves clearly petiolate. Inflorescence widely paniculate, cymes pedunculate; verticillasters ± distant below, condensed above, many-flowered, flowers pedicellate. Bracteoles 2–4(–5) mm long, linear, clearly shorter than calyces. Calyx tubular, 5–7 mm long, ± curved, scarcely oblique or not at mouth, ± densely pilose-pubescent and with sessile glands; teeth linear-lanceolate, 2–3 mm long; hairy in throat. Corolla white with blue-violet spots, 6–8(–10) mm long, tube scarcely exceeding calyx or included in calyx, pilose with short hairs and sessile glands; middle lobe of lower lip concave and crenate, bearded. Stamens 4, included in the upper lip of corolla, sometimes sterile. Style unequally bilobed, included in corolla. Nutlets broadly ellipsoid to oblong, 1.3–1.5 × c.1 mm, dull, matt, obsolete to clearly tuberculate at apex, areole straight.

Distribution: Europe to South West and Central Asia, Himalayas to Korea. It grows in humid habitats of northern and northeastern Iraq.

Examined specimens: MAM: Kani-Masi, near water spring, *Botany Staff* 43883 (K); Sersang, *Haines* 1358-A (BUH, K); MSU: Suleymaniya, M. Avroman et M. Shahu, *Hausknecht* 778; FKI/DCA: between Khalis and Karkuk, gravely soil, *Rawi* et al. 19705 (BAG, K).

Habitat: Fallow fields, near the stream banks, moist areas; alt. 600–1500 m; fl. & from June to August.

5. *Nepeta nuda* L. subsp. *albiflora* (Boiss.) Gams, in G.Hegi, Ill. Fl. Mitt.-Eur. 5(4): 2372 (1927); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 365 (1933); *Rawi* in Dep. Agr. Tech. Bull 14: 153 (1964); Hedge in Fl. Turkey [P.H. Davis] 7: 272 (1982); Jamzad in Flora Iran 76: 537 (2012). —Lectotype (designated here by Dirmenci): “Plantae in prov. Musch ad radices australes Bimgoel montis ad Gumgum in districtu Wardo lectae, in valle Merga Sauk, 6000’, 21.08.1859, *Kotschy* 368 (G-BOISS [G00787649], isolectotypes. JE00018411, K)”

Synonyms: *Nepeta nuda* var. *albiflora* Boiss., in Fl. Orient. 4: 663 (1879); *N. marrubioides* Boiss. & Heldr. ex Benth. in A.P.de Candolle, Prodr. 12: 387 (1848), nom. illeg.; *Glechoma marrubioides* Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta bithynica* Bornm., in Mitth. Thüring. Bot. Vereins, n.f., 20: 41 (1905).

Perennial, a few to many stemmed from base, erect, 50–90 cm tall, simple or a few branched above, subglabrous to adpressed short eglandular pilose with sessile glands, sometimes glandular papillose above. Leaves ovate to ovate-oblong to elliptic-lanceolate, 1.5–7 × 1–3(–3.5) cm, sessile, adpressed pubescent with numerous sessile glands, crenate to dentate at margins, cordate or truncate at base; obtuse to acute at apex, veins prominent. Floral leaves sessile, lowers similar to leaves and usually longer than verticillasters, uppers short and lanceolate to elliptic-lanceolate. Inflorescence paniculate of numerous many-flowered verticillasters, rarely thyrsoid, verticillasters distinct below, approximate above, short pedunculate. Bracteoles linear-subulate with narrow white membranous margin, 2–3 mm long, shorter than calyx tube or teeth, subequal. Calyx tubular, 4–5(–7) mm long, yellowish-green, tube and mouth straight, adpressed eglandular-pilose with sessile glands, sometimes with glandular papillose; teeth 2–3 mm long, erect, linear-lanceolate to linear-oblong, blunt or acute, soft tipped, separated by rounded sinuses, often with membranous margins. Corolla white or cream, (6–)8–10(–15) mm long, included or slightly exserted from calyx; tube slightly curved, pilose; middle lobe of lower lip concave and crenate, bearded. Stamens 4, included in upper lip of corolla, sometimes sterile. Style unequally bilobed, slightly or clearly exceeding upper lip of corolla. Nutlets ovoid-oblong, 1.5–2.2 × 1–1.2 mm, tuberculate, prominently so at the apex with crowded projecting tubercles, brown, areole bilobed.

Distribution: Balkan Peninsula, Greece, Lebanon-Syria, Turkey, N. Iraq. It is distributed in northern and northeastern Iraq.

Examined specimens: Iraq. MAM: Mosul, ad confines Turciae prov. Hakkari, in ditone pagi Sharanish, in montibus calc. a Zakho septentrionem versus, in jugo Shiwarana inter Sharanish, *Rechinger* 10877 (G, W); 25 km NE of Zakho, Shivara Hina village, *Rawi* 23453 (K); MSU: Suleymaniya, Avroman Dagh, spur north of Biyara, *Gillett* 11818 (K); Kopi Karadagh, *Haines* 1159 (K); FUJ: Mossul, *Kotschy* 170 (K).

Habitat: Woodlands, meadows, streamsides, mountain steppes, field sides; alt. 1300–1650 m; fl. & fr. June to August.

Notes. It differs from its closest relative, *Nepeta cataria*, by being stem and floral leaves sessile.

For the first time, its first published name is *Nepeta nuda* var. *albiflora* (Boissier (1879:663)). It was described based on syntype samples belonging to 15 different collections. The syntypes given in the protologue are as follows: “Hab. in montanis et alpinis forma typica fere vulgator, Macedoniae mons Korthiati (Orph!), Scardus (Griseb.), Lydiae mons Tmolus (Boiss! Bal!) Lycia supra Elmalu (Bourg. 212!), Isauria (Heldr!), Cappadocia (Ky. Suppl. 207!), Armenia (Bourg! Ky’) et Pontus Lazicus ad Djimil 6000’ (Bal!). Tauria et regio Caucasia (Led. etc.), Persia borealis (Szov!), Mesopotamia (Noé. 170!), Libanus: 5–6000’ (Ehr! Ky. 294)”.

Syntype specimens with location information compatible with the protologue and names of the herbaria where they are stored are as follows: Turkey. Djimil, Rize province, Balansa 1522 [JE 00018413, JE 00018414, K], Balansa 868 [G00787650]; Baibout (Bayburt province) Bourgeau 208 [K000910881, JE 00018415], Bourgeau 687 [G00787651]; Elmalu (Elmalı, Antalya province) Bourgeau 212 [G00787661 (G-BOISS)]; Musch (Muş province), *Kotschy* 368: [G00787649 (G-BOISS), JE 00018411, K]; Asiae Minor (Turkey), *Kotschy* 1732 [G00787662 (G-BOISS), K]; Persia borealis (Iran), Szovits s.n. [G00787656 (G-BOISS), K]; Libanus (Lebanon), *Kotschy* 294 [G00787659 (G-BOISS)]; Ehrenberg 332 [G00787644 (G-BOISS)]

Also, among the syntype specimens of var. *albiflora*, Balansa 322 (K000938869 and JE00018412) and Boissier s.n. [G00787642(G-BOISS)] specimens were collected from Lydiae mons Tmolus. These specimens belong to *Nepeta nuda* subsp. *lydiae*, because Balansa 322 sample is a type specimen of it (holo. K000938869, iso. JE00018412).

Among the syntypes specimens determined above, *Kotschy* 368 sample collected from “Plantae in prov. Musch ad radices australes Bimgoel montis ad Gumgum in districtu Wardo lectae, in valle Merga Sauk, 6000’, 21.08.1859” was selected as Lectotype. There are also specimens from these samples in 3 different herbaria. Sample with *Kotschy* 368 [G00787649] in G (G-BOISS) herbarium was selected as Lectotype, while samples in JE00018411 and K (without barcode number) were selected as isolectotypes.

6. *Nepeta autraniana* Bornm., in Bull. Herb. Boissier 7: 248 (1899); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 178 (1982).

Type. Iraq, Riwandous (ad fines Pers.) in monte Handren (Handarin), 1300 m, 06.06.1893, *Bornmüller* 1684-a (holotype: B100277268-photo! isotype: K001222554).

Perennial herbs. Stems 60 cm tall or longer, erect, simple, paniculately branched above, quadrangular, sparsely to densely viscid glandular hairy. Leaves oblong,

ovate-oblong to lanceolate towards to inflorescence, 5–10 × 3–4 cm, green, sessile, auriculate-amplexicaule, crenate to coarsely crenate-dentate at margins, obtuse at apex, glandular papillose-hirtellous on both sides, densely sessile gland at beneath. Verticillasters many-flowered, cymes pedunculate, laxly spicate, and rarely interrupted. Bracteoles linear-lanceolate, 5–7 mm long, often as long as calyx tube or longer, partly purple membranous-margined, densely glandular papillae, ciliate. Pedicel short. Calyx 7–9 mm long, straight, mouth oblique, densely glandular hairy and papillate with sessile glands; teeth lanceolate-subulate, 3.5–4.5 mm long, subequal, violet hyaline-membranous. Corolla blue, 11–15 mm long, tube exerted from calyx, abruptly enlarged in throat, sparsely hairy and glandular papillose on tube, long hairy outside of the lips; middle lobe of lower lip concave and crenate-undulate, bearded. Stamens 4; anthers black, posterior ones subexserted. Style often protruding. Nutlet triangular-ovate, tuberculate.

Distribution: Endemic, known only from type location in Rawanduz.

Examined specimens: Iraq. Riwandus (ad fines Pers.) in monte Handren (Handarin), 1300 m, 06.06.1893, *Bornmüller* 1684-a (B, K)

Habitat: The habitat is not specified in the protologue and sheet label, but possibly a moist area.; alt. c. 1300 m; fl. & fr. June to?

Notes. In terms of general appearance and inflorescence, it is similar to *Nepeta nuda* subsp. *albiflora* in Iraq. However, it differs in its large leaves, longer calyx, corolla and bracteoles, and colour of the corolla. Also, with being viscid glandular, it is related to *N. nuda* subsp. *glandulifera* P.H.Davis endemic to Turkey, but differs with the above-mentioned features.

Nepeta autraniana is specified as the type specimen *Bornmüller* 1684-a in its protologue. Flora Iranica (Rechinger 1982:178) and Budantszev (1993) stated that the type specimen was stored in B. There is only one specimen in B (B100277268). However, another sample was found in K herbarium (K001222554) in 2022. The collector and collector number indicate it is *Bornmüller* 1684. However, all other information is exactly the same. At the same time, this specimen has the same morphological characteristics as the specimen mentioned in B. Apart from these two specimens, no other specimens of *N. autraniana* were found, even if they were collected later by other collectors. These two samples were considered to be identical samples, and it was decided that the sample stored in K (K001222554) is the isotype.

7. *Nepeta trachonitica* Post, in J. Linn. Soc., Bot. 24: 439 (1888); Dinsmore in Post, Fl. Syria, Palest. & Sinai ed. 2, 2: 364 (1933); Rawi in Dep. Agr. Tech. Bull 14:

153 (1964); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 162 (1982); Hedge in Fl. Turkey [P.H. Davis] 7: 279 (1982); Jamzad in Flora Iran 76: 523 (2012).

Synonyms: *Nepeta purpurea* Nábelek, Spisy Prír. Fak. Masarykovy Univ. 70: 55 (1926). —Lectotype (designated here by Dirmenci): Turkey. Hakkari: Mons Dwile supra pagum Hasitha dir. Gulamerik, in humosis alt. ca. 2100 m, 18.06.1910, *Nábelek* 1496 (SAV0002384, isolectotype: SAV0002383).

Perennial herbs. Stems 40–85 cm tall, single or a few stemmed from the same root, usually unbranched, erect, sturdy, quadrangular, glabrous, or very rarely finely pilose, eglandular. Leaves ovate-triangular to oblong-lanceolate, 3–7 × 2–4 cm, green, petiole to 25 mm long, medians and uppers subsessile to sessile, cordate to truncate at base, coarsely crenate-serrate, acute at apex, glabrous to finely eglandular-pilose. Inflorescence an (ovate-)oblong spike, 3–8 × 2–3.5 cm; verticillasters many-flowered, conferted, rarely the lowest one distant. Bracteoles linear-filiform to narrowly lanceolate, 5–8(–10) mm long, clearly shorter than calyces. Calyx 13–20 mm long, tubular, tube and mouth straight, pilose; teeth variable in length, 4–8 mm long, usually aristate, sparsely hairy between teeth. Corolla 20–25 mm long, dark reddish-purple, tube narrow, straight, clearly exerted from calyx, or subincluded, pilose and sparsely sessile glands; upper lip 2-lobed, 3.5–4 mm long; lower lip 3-lobed, 4–5 mm long; median lobe concave, crenate, bearded. Stamens 4, sometimes posteriors slightly protruding. Style included in corolla or slightly protruding. Nutlets ± oblong, trigonous, 2.5–3 × 1.5–2 mm, distinctly tuberculate.

Distribution: Southeast of Turkey, Syria, Lebanon, and North Iraq. Its distribution ranges from 1200 to 2000 m altitudes in the mountainous areas of northern Iraq.

Examined specimens: Iraq. MAM: Mosul, ad confines Turciae province Hakkari, in ditone pagi Sharanish in montibus calc. a Zakho septentrionem versus, *Rechinger* 10786 (K, W) & 10943 (BUH, W); Zawita, *Guest* 4464 (K); Khantur mountain, NE. of Zakho, *Quercus* zone, on mountain slope, *Rawi* 23381 (K); Khantur mountain, NE of Zakho, *Rawi* 23361 (BAG); MRO: Hawara Blinda mountain, *Kass & Nuri* 27816 (BAG, K)

Habitat: Rocky slopes, in *Quercus* scrub, steppe; alt.: 1200–2000 m.; fl. & fr. May to July.

Notes. *Nepeta trachonitica* differs from other species in its long calyx and calyx teeth, long and deep purple corolla, and congested inflorescence.

8. *Nepeta menthoides* Boiss. & Buhse, in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 174 (1860); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 143 (1982); Jamzad in Flora Iran 76: 484 (2012).

Perennial, scarcely hardened, all plant white-stellate tomentose. Many stemmed from base, 10–40 cm tall, stout, arcuate-ascending, short articulating, densely

foliate, simple to branched. Lower cauline leaves oblong to ovate-lanceolate, 15–30 × 0.8–20 mm, petiolate to 10 mm long, cuneate to narrowly rotundate at base, crenate to obtuse-dentate at margins, acute at apex, usually longitudinally plicate, white-stellate tomentose with sessile glands and glandular papillose; upper cauline leaves smaller, lanceolate, sessile, usually longer than verticillasters. Bracteoles linear-lanceolate, 5–7 mm long, as long as or shorter than calyx tube. Inflorescence verticillate, lower verticillasters remote, uppers approximate or spicate. Calyx subincurved, 6.5–8 mm long, mouth oblique, densely sellate-tomentose with sessile glands and glandular papillose; teeth triangular-lanceolate, 1.5–2.5 mm long; hairy in throat. Corolla violet-blue, 13–18 mm long, puberulous, tube included in calyx or exerted, abruptly expanded in throat, to 5 mm wide; upper lip 2 mm, emarginate; median lobe of lower lip c. 2.5 mm wide, concave, undulate, bearded. Stamens 4, included in corolla. Style unequally bilobed, exerted from corolla. Nutlet ovate-trigonal, glabrous.

Distribution: Northern Iraq to Western Iran. Distributed on the high mountain belt of the northern Iraq mountains.

Examined specimens: Iraq. MRO: Arbil, mons Helgurd ad confines Persiae, in valle supra pagum Nowanda, *Rechinger* 11470-a (G, K, W); mons Helgurd ad confines Persiae, in declivibus occidentalibus summi montis, schist, metamorph. et serpentini, *Rechinger* 11886 (W).

Habitat: On metamorphic and serpentine rocks; alt. 2600–3800 m; fl. & fr. August to September.

Notes. It is one of two species with stellate or forked hairs among the species distributed in Iraq. With these features, it is close to *N. elymaitica* but differs from it its conduplicate, stellate-tomentose, smaller leaves.

9. *Nepeta elymaitica* Bornm., in Russk. Bot. Zhurn. 1911: 6 (1911); *Rechinger* in Fl. Iranica [K.H. *Rechinger*] 150: 177 (1982); *Jamzad* in Flora Iran 76: 484 (2012).

Synonym: *Nepeta ludlow-hewittii* Blakelock, in Kew Bull. 4: 543 (1949 publ. 1950). (**syn. nov.**). —Lectotype (designated here by Dirmenci): Iraq, Erbil: Algird Dagh, among rocks, 3000–3300 m, 22.07.1932, *Guest & Ludlow-Hewitt* 2871 (K000910840); isolectotypes, K000910837, K000910838, K000910839)

Perennial, a few to many stemmed from woody rootstock. Stems erect or ascending, 20–50 cm tall, robust, sometimes a few branched above, leafy along all length, all plant sparsely to densely short adpressed pluri-furcate hairy with sparsely sessile glands, densely glandular papillose above. Leaves ovate to lanceolate, herbaceous, 3–5.5 × 1.5–3 cm, green to slightly greyish, subconcolor, veins pinnately reticulate; lower and middle cauline leaves petiolate, 10–15 mm long, with brown membranous scales at base, to 1 cm long, subcordate to truncate or

rarely ±cordate at base, crenate-dentate to dentate at margins, obtuse to acute at apex; floral leaves sessile, oblong-lanceolate. Verticillasters 3–7, many flowered, lower verticillasters remote, uppers approximate or spicate. Bracteoles linear to lanceolate-subulate, 5–7 mm long. Cymes shortly pedunculate, lower peduncles to 1 cm long. Flowers pedicellate to 3 mm long. Calyx tubular, 6–9 mm long, mouth oblique and expanded, sometimes purplish at mouth and teeth; upper teeth lanceolate, 1–2.5 mm long; lower teeth triangular, 1–3 mm long; hairy with glandular papillose in throat. Corolla violet-blue, 15–20 mm long, tube curved, distinctly exerted from the calyx, widened in the upper part, to 6 mm width, outside hairy; upper lip short, 2-lobed, emarginate; lower lip 3-lobed, median lobe wide-rotundate, bearded and papillose. Four stamens and style included in corolla, Nutlet oblong-trigonal, 2.5–2.8 × 1–1.2 mm, brown, densely glandular papillose.

Distribution: Northern Iraq to Western Iran. It is distributed on the high mountain belt of Qandil and Algird mountains in northern/northeastern Iraq.

Examined specimens: Iraq. MRO: Erbil, Ser Kurawa, among metamorphic and igneous rock, *Gillett* 9756 (BAG, K); Erbil, Algird Dagh, among rocks, *Guest & Ludlow-Hewitt* 2871 (Type of *N. ludlow-hewittii*) (K); Erbil, N.E. slopes of Arlgird Dagh, grannies in metamorphic and igneous rocks, *Gillet* 9567 (BAG, K). Algurd Dagh (Helgurd), *Haley* 137 (BM); N. of Helgurd range, E. of Berma sand lake, serpentine rocks, *Serhang & Rawi* 24775-A (K); Qandil range, *Serhang & Rawi* 24067 (K); montes Qandil ad confines Persiae, insaxosis calc. supra lacum Goam-e Kirmosoran, *Rechinger* 11123! (G, W); Perrish mountain, serpentine rocks, *Rawi* 24549 (K).

Habitat: Calcareous rocks, metamorphic and igneous and serpentine rocks; alt. 2900–3500 m; fl. & fr. July to August.

Notes. Type specimens of *Nepeta ludlow-hewittii*, described by Blakelock (1949), were examined in K herbarium. Four type specimens of *Nepeta ludlow-hewittii* (*Guest & Ludlow-Hewitt* 2871!, barcode numbers: K000910837–40 [4 sheets]) are in K herbarium. Original materials of *N. elymaitica* (B100277252! JE00005451-photo! JE00005452-photo! LE000016665-photo!) and other specimens collected from Iraq and Iran were examined. Almost all characters overlap with *N. elymaitica*. It has been concluded that it should be a synonym of *N. elymaitica*.

10. *Nepeta iraqensis* Dirmenci sp. nov. (Figure 4).

Type: Iraq, Qandil range, *Astragalus* zone, on S. site of mountain slope, 3880 m, 30.07.1957, *Rawi & Serhang* 24071 (holotype: K001222565) (Figure 4).

Diagnosis: *Nepeta iraqensis* is related to *Nepeta elymaitica* and *N. menthoides* in Iraq, but it can be easily distinguished from *N. elymaitica* by its all parts sparsely



Figure 4. Holotype of *Nepeta iraqensis* (K001222565).

to densely simple hairy (not pluri-furcate hairy); leaves broadly ovate to orbicular (not ovate-lanceolate), margins crenate (not crenate-dentate to dentate), apex rounded (not obtuse to acute), bracteoles 2-3 mm long (not 5-7 mm). It is distinguished from *N. menthoides* by its simple hairs (not white stellate-tomentose), leaves broadly ovate to orbicular and flat (not oblong to ovate-lanceolate and usually longitudinally plicate), base cordate (not cuneate to narrowly rotundate) and margins crenate (not crenate and obtuse-dentate), apex rounded (not acute), bracteoles 2-3 mm long (not 5-7 mm).

Perennial herbs. Stems erect, ca. 30 cm tall, single or a few branched from below, leafy along all length, densely villose with sparsely sessile glands, and densely glandular papillose above. Leaves herbaceous, broadly ovate to orbicular, 1.4-3.2 × 1.6-3.2 cm, all cauline leaves short to clearly petiolate, petioles 2-10 mm long and densely villose, cordate at base, crenate at margins, rounded at apex, villose with sessile glands and glandular papillose,

denser at beneath; lower floral leaves similar cauline leaves and longer than verticillasters. Verticillasters many flowered, lower verticillasters remote and cymes pedunculate, uppers approximate. Bracteoles linear, 2-3 mm long, shorter than calyx, densely villose and glandular papillae, partly purple. Flowers shortly pedicellate. Calyx tubular-campanulate, 5-6 mm long, mouth expanded, purplish at mouth and teeth, densely long villose with sessile glands and glandular papillose; teeth ± equal, c. 2 mm long, triangular-lanceolate to ovate-acuminate, 1-2.5 mm long, densely hairy with glandular papillose and ciliate; hairy in throat. Corolla violet? densely long hairy outside of lips. Nutlets unknown.

Distribution: An endemic species, known only from the type location in Iraq.

Habitat: It is understood from the type specimen label that it grows in the high mountains in the *Astragalus* zone, and on the slopes amongst small rocks; alt. 3880 m; fl. & fr. Late July to September.

Notes. There are no species that *Nepeta iraqensis* is close to in Iraq, Turkey, and Iran. In terms of calyx characteristics, it is closer to *N. elymaitica* and *N. menthoides*. It is distributed in the Qandil range region, which is the distribution area of these two species, and slightly above the heights where they are distributed. The species collected from 3880 m grows at the highest altitude among the *Nepeta* species in Iraq. It is quite different from these two species in its lack of pluri-furcate hairs.

11. *Nepeta betonicifolia* C.A.Mey. subsp. *strictifolia* (Pojark.) Menitsky, in Fl. Armen. 8: 47 (1987); Rawi in Dep. Agr. Tech. Bull 14: 152 (1964); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 177 (1982); Hedge in Fl. Turkey [P.H. Davis] 7: 277 (1982); Jamzad in Flora Iran 76: 522 (2012); Taifour & El-Oqlah in Pl. Jordan Annot. Checkl.: 103 (2017).

Synonyms: *Nepeta strictifolia* Pojark., in Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 15: 303 (1953); *N. speciosa* Boiss. & Noë in P.E.Boissier, Diagn. Pl. Orient., ser. 2, 4: 34 (1859); *Glechoma speciosa* (Boiss. & Noë) Kuntze, in Revis. Gen. Pl. 2: 519 (1891); *Nepeta buhsei* Pojark., in Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 15: 299 (1953).

Perennial herbs. Stems few to many, erect, unbranched, 25–55 cm tall, finely pilose with very short eglandular hairs, glandular papillose above. Leaves erect, ± adpressed to stem, especially uppers, oblong to ovate-lanceolate, 1.5–3.5 × 0.5–2.2 cm, brightish green, truncate or subcordate at base, serrate at margins, obtuse to acute at apex, sessile or subsessile, with a sparse indumentum of very short hairs on both surfaces, and sparsely to densely sessile glands at beneath. Inflorescence a ± condensed oblong ‘spike’, usually one or two lowermost verticillaster remote. Bracteoles linear to subulate, 4–10 mm long, shorter than or as long as calyx, violet. Pedicel to 1 mm long. Calyx narrowly tubular, 8–10 mm long, dark violet, shortly eglandular-pilose, tomentellous, sometimes long pilose with glandular papillae and sessile glands, straight or almost so, mouth slightly oblique; teeth subequal, narrowly triangular-acuminate, 1.5–3.5 mm long; hairy in throat. Corolla violet or violet-blue, 13–17 mm long, tube narrowly expanded above, ± straight or curved, puberulous on the outside; median lobe of lower lip concave, crenate, bearded. Stamens 4, included in corolla. Style exerted from corolla. Nutlets broadly oblong, trigonous, 2–3 × 1–1.2 mm, tuberculate. **Distribution:** East of Turkey, Caucasus, Iran, and North Iraq. It is distributed in the Northern and Northeastern parts of Iraq.

Examined specimens: Iraq. MAM: Mossul, Matina, Rawi 8849-B (BAG, K); MSU: In montibus calcareis Avroman et Schahu, *Haussknechtii* s.n. (K); MRO: Arbil:

M. Rayat, *Thesiger* 1054 (BM); Gali Warta, NW & N of Rania, Rawi, Nuri & Kass 28796 (K).

Habitat: Limestone slopes, *Quercus* forests, alpine meadows, fallow fields; alt. 1100–3100 m; fl. & fr. May to August.

Notes. Among the typical characteristics of the species are ± adpressed leaves to the stem and the congested spike-like inflorescence. These characters distinguish it from *Nepeta haussknechtii* in Iraq.

12. *Nepeta haussknechtii* Bornm., in Bull. Herb. Boissier 7: 249 (1899); Rawi in Dep. Agr. Tech. Bull 14: 152 (1964); Feinbrun-Dothan in Fl. Palaest. 3: 149 (1978); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 184 (1982); Jamzad in Flora Iran 76: 505 (2012). —Lectotype (designated here by Dirmenci): Iraq, Riwandous (ad fines Persicos) in alpibus Sakri-Sakran, 2200 m, 23.06.1893, *Bornmüller* 1686 (G00424356); isolectotypes (B100277249, B100277250, E00319651, G00424355, G00424357, HBG518441-photo! JE00018457-photo! JE00018458-photo! K000910891, LE00016672, W1895-0001705).

Synonym: *Nepeta racemosa* Lam. subsp. *haussknechtii* (Bornm.) A.L. Budantzev, in Bot. Zhurn. (Moscow & Leningrad) 77(1): 121 (1992). **syn. nov.**

Perennial herbs. Stems 25–55 cm tall, ascending to erect, a few to many stemmed from the base, branched or not, finely pilose to villous with eglandular hairs or white lanate with sessile glands and glandular papillose above, Leaves spreading to ±erecto-patent, ovate to ovate-elliptic, or oblong to oblong-lanceolate, 1.5–4 × 0.5–2.5 cm, truncate to ± cordate at base, crenate to serrate, obtuse at apex, green to greyish-green, finely to densely pilose and with few to numerous sessile glands, sometimes glandular papillose; lower leaves shortly petiolate; uppers sessile; lower floral leaves longer than verticillasters. Verticillasters ± few to many flowered, distant, or approximate above. Bracteoles linear-lanceolate, 2–4 mm long, clearly shorter than calyx tube. Calyx tubular, 6–9 mm long, at least at mouth and teeth darkish violet, densely pilose-villous to tomentose with sessile glands and glandular papillose, or lanate; slightly curved and oblique; teeth subequal, triangular, acuminate, 1.5–2.5 mm long; hairy in throat. Corolla violet to violet-blue, 10–18 mm long; tube slender, slightly exerted from calyx, abruptly widening above; lower lip median lobe concave, crenate, bearded. Stamens 4, well-developed or sterile. Style slightly to clearly exerted from corolla. Nutlets oblong, trigonous, 2–2.2 × 0.8–1.2 mm, tuberculate.

Distribution: Transcaucasus, East of Turkey, Northern Iraq to Iran. It is distributed in Northern/Northeastern Iraq mountains between 1300–3000 m altitudes.

Examined specimens: Iraq. MRO: Riwandous (ad fines Persicos) in regione alpina montis Helgurd, *Bornmüller* 1685 (*Syntype*: B100277251, JE 00018459-photo!); Erbil, Montes Qandil ad confines Persiae, in decl. orient. Supra Pushtashan, *Rechinger* 11076 (G, W). Qandil range, *Serhang & Rawi* 26724 (BAG, K); Erbil, mons Helgurd ad confines Persiae, in valle supra pagum Nowanda, *Rechinger* 11354 (G, K, W). N.E. slopes of Algird Dag, *Gillet* 9530 (BAG, K); Helgurd range, *Rawi* 24916 (BAG); Chia-i-Mandali, *Guest* 2740 (BAG, K); Kawriech, E. side of Kanoukla mountain, *Kass & Nuri* 27675 (BAG, K); Gali Warta, c. 30 km NW of Rania, *Quercus* forest, *Nuri, Kass & Rawi* 28746 (K).

Habitat: Rocky igneous, limestone and shady slopes, banks, meadows, near streams; alt. 1300–2600 m; fl. & fr. May to August.

Notes. *Nepeta haussknechtii* was described by Bornmüller (1899) from Bornmüller's 1685 and 1686 specimens. In *Flora Iranica* (1982:184), Bornmüller 1686 was selected as lectotype and it was stated that lectotypes were stored in G and W herbaria. Later, Budantszev (1992: 122) mentioned G herbarium for lectotypes. During this study three specimens, *Bornmüller* 1686 were identified at G. All three of these examples are described as "Typus". In this case, and the specimens with barcode G00424356 was selected as Lectotype. The other specimens barcoded in the herbaria were chosen as isolectotypes: B100277249, B100277250, E00319651, G00424355 and G00424357, HBG518441-photo! JE00018457-photo! JE00018458-photo! K000910891, LE00016672, W1895-0001705.

Nepeta haussknechtii differs from *Nepeta betonicifolia*, which is the closest relative among the species distributed in Iraq, in that it has spreading leaves and clearly distant verticillasters. Budantsev (1993) evaluated it as a subspecies of *Nepeta racemosa* Lam. However, *N. racemosa* differs from other species in this group in its smaller and discoloured leaves. Therefore, it was concluded that it would be more appropriate for *N. haussknechtii* to remain a valid species.

Nepeta racemosa, *N. haussknechtii*, *N. crassifolia* Boiss. & Buhse, *N. stenantha* Kotschy & Boiss. ex Boiss., *N. transcaucasica* Grossh., etc. with several intermediates form a species complex where several species have been described. It would be beneficial to review the species defined in this group from Caucasus to northern Iraq which is not within the scope of this revision

13. *Nepeta humilis* Benth., in A.P.de Candolle, *Prodr.* 12: 382 (1848). *Rawi* in *Dep. Agr. Tech. Bull* 14: 152 (1964); *Rechinger* in *Fl. Iranica* [K.H. *Rechinger*] 150: 207 (1982); *Duman* in *Fl. Turkey* [Guner et. al] 11(supl. 2): 207 (2000); *Jamzad* in *Flora Iran* 76: 556 (2012). —Lectotype (designated here by Dirmenci): Iran, in Persia, 1837, *Aucher* 1743 (G00424358 isolectotypes

G00741110, K000910873, K000910876, P00743249-photo! P00743250-photo!)

Synonyms: *Glechoma humilis* (Benth.) Kuntze, in *Revis. Gen. Pl.* 2: 518 (1891); *Nepeta kurdica* Hausskn. & Bornm., in *Bull. Herb. Boissier* 7: 251 (1899).

Annual. Stem erect, branched or unbranched, (5-)10–45 cm tall, glandular-papillose and puberulous. Leaves rotundate to triangular, 10–25 × 10–25 mm, lower leaves petiolate to 1.5 cm long, cordate to truncate at base, crenate-dentate at margins, rarely subentire, obtuse at apex, minutely puberulent and glandular papillose, sometimes glabrous above. Inflorescence paniculate; verticillasters many-flowered, lowers remote and cymes long-pedunculate, uppers approximate. Bracteoles lanceolate to subulate, 4–10 mm long, equal or slightly shorter than calyx, densely ciliate or canescent, with densely glandular papillae. Calyx tubular, 6–9.5 mm long, tube slightly curved, with a deep cleft to 1/2, mouth oblique, densely glandular papillae with simple hairs; teeth straight, 1–3 mm long, oblong to triangular-lanceolate, acuminate, shorter than tube, sometimes long ciliate; sparsely hairy in throat. Corolla violet, 11–14 mm long, short-puberulous. tube ± straight, exerted beyond calyx teeth; middle lobe constricted from base transversely dilated, crenate-incised, bearded. Stamens 4, upper ones slightly protruding or included in upper lip. Style including in corolla. Nutlets oblong-trigonus, 1.8–2 × 1–1.2 mm, black, smooth.

Distribution: Southeast of Turkey, North Iraq to Iran. It has a wide distribution between 800 and 3200 m altitudes in Northern and Northeastern Iraq.

Examined specimens: Iraq. MAM: Mossul, Gara Dag, *Rawi* 9272 (BAG, K); Mosul, ad confines Turciae prov. Hakkari, in ditone pagi Sharanish, in montibus cal. A Zakho septentrionem versus, in saxosis cacuminis Zawia, *Rechinger* 10964 (G, K); Galli Zawita, NE of Zakho, near Turkish border, *Rawi* 23574 (BAG, K); Mosul, ad confines Truciae prov. Hakkari, inter Dohuk et Amadiya, in quercetis saxosis supra Sirsank, calc., *Rechinger* 11694 (G); MSU: Sulaymaniyah, montes Avroman ad confines Persiae, in ditone pagi Tawilla, in saxosis calc. *Rechinger* 10338-a (G); Suleymaniyah, monte Avroman, ad confines Persiae, in ditone pagi Tawilla, *Rechinger* 12414 (G); in montibus calcareis Avroman et Schahu, *Haussknecht* s.n. (BM, K, W); Suleymaniya, Jebal Avroman, spur north of Biyara, on scree, *Gillet* 11795 (BAG, K); Hawraman mountain, *Rawi* 29525 (K); Avroman mountain, N. of Halabje (on Persian border), *Rawi* 22051 (BAG, K); Sulaymaniyah, in ditone pagi Panjwin, in glareosis serpenticis jugi Malakawa, *Rechinger* 10423 (G); Suleymaniyah, Qara Dag, *Makki* 449 (W); Suleymaniya, Gulashina, Pir Omar Gudrum, *Rawi* 12113 (BAG, K); Pir Omar Gudrun, *Haussknecht*

s.n.! 12 km east of Chemchemal, *Gillett & Rawi* 11617 (BAG, K); Jarmo, *Halbaek* 1291 (K) & 1825 (K); Mela Kowa, Suleymaniya-Penjwin highway, *Rawi* 24447 (BAG, K); Dara, on the road between Halabja and Tawaila, *Rawi* 21991 (BAG, K); MRO: Rawandiz, *Bornmuller* 1687 (K); Hawawra Blinda mountain (NE of Haji Omran), *Kass & Nuri* 27839 (BAG, K); Riwandous, *Bornmuller* 1688 (K); Riwandous (ad fines Persiae), *Bornmuller* 1689 (*type of N. kurdica*) (K, W); Rowandiz gorge, *Field & Lazar* 851 (K); Erbil, mons Helgurd ad confines Persia, in valle supra pagum Nowanda, ca. *Rechinger* 11333! (G). Erbil, Algird Dag, *Guest* 2921 (K); Between Rawanduz and Agoyan village, *Kass & Nuri* 27283 (BAG, K); Erbil, montes Qandil ad confines Persiae, in faucibus supra Pushtashan, *Rechinger* 11227 (G); Erbil: montes Qandil ad confines Persiae, Pushtashan, in glareosis (Tonschiefer), *Rechinger* 11737 (G); Qandil range, Baisar village, *Rawi & Serhang* 24166 (K); Erbil, montes Qandil ad confines Persiae, supra lacum Goam-e Kirmosoran, calc., *Rechinger* 11138 (G); Lower slope of Qandil range, *Rawi & Serhang* 24696 (K); Pustashan, 15 km NE of Rania, lower slope of Qandil range, *Rawi & Serhang* 24193 (BAG, K); Serin mountain, on road to Qandil, *Rawi* 23987 (BAG); in steppa ad colles aridos prope pagum Der Harir inter Erbil (Arbela) et Rewanduz, *Nábělek* 1624 (SAV-photo); FKI: Kirkuk, conglomerate rock in narrow gorge in Tuni Baba Amara hils 10 km south of Durbendiken, 09.04.1964, *Barkley & Haddad* 7440 (K) & 7443 (K, W); Near Pewaz, *Poore* 599 (K).

Habitat: Wet places, slopes and eroded slopes; alt. 800–3200 m.; fl. & fr. June to August.

Notes. *Nepeta humilis* was described by Bentham (1848) based on *Aucher-Eloy* 1743 and *Aucher-Eloy* 2851 specimens. Rechinger in *Flora Iranica* (1982: 207) selected *Aucher-Eloy* 1743 as lectotype at G. Two specimens were found in the G herbarium as *Aucher-Eloy* 1743 [G00424358 and G00741110 (in G-BOISS)]. Only “Typus” is written on the sheet numbered G00424358. In the other specimen (G00741110), there is no indication that it is a type specimen. As a result, the specimen with barcode number G00424358 in G herbarium is selected as Lectotype. The other specimens of *Aucher-Eloy* 1743 in other herbaria (G00741110, K000910873, K000910876, P00743249-photo! P00743250-photo!) were selected as isolectotypes.

14. *Nepeta petraea* Benth., in *Prodr.* 12: 394 (1848); Rechinger in *Fl. Iranica* [K.H. Rechinger] 150: 193 (1982); Jamzad in *Flora Iran* 76: 525 (2012).

Lectotype (designated here by Dirmenci): Iran, in Persia lapidosis, 1837, *Aucher-Eloy* 1747 (G00424393! isolectotypes G00741059 (G-BOISS), K000910866, K000910868, MPU017440-photo! P00743275-photo! P00743276-photo!).

Synonym: *Glechoma petraea* (Benth.) Kuntze, in *Revis. Gen. Pl.* 2: 518 (1891).

Annual. Stems 15–40–(60) cm tall, erect, branched base to inflorescence, laxly crispitate villose with densely glandular papillae. All leaves white-lanate with glandular papillae; lower leaves ovate, 10–25 × 10–20 mm, petiolate to 1 cm, truncate to cuneate at base, obtuse to rotundate at apex; upper leaves narrowly lanceolate, petiole gradually shorter to sessile, attenuate at base, crenate to obtusely dentate at margin, acute at apex. Inflorescence finely long pedunculate cymes, capitulate, 3–7 flowered. Pedicel 3–10 mm long. Bracteoles lanceolate to linear-lanceolate, 4–7 mm long, shorter than calyx, obtuse at apex, white lanate-ciliate. Calyx tubular, 4.5–6 mm long, mouth straight, cleft indistinct, sparsely scabridulous to white-lanate, with minutely glandular papillae and sessile glands; teeth erect, subequal, 1.5–2.5 mm long, lanceolate, acute, ciliate or not; glabrous in throat, but hairy between the teeth. Corolla white to pale lilac, 7–10 mm long, pubescent, tube exerted from calyx; lower lips deflexed, median lobe flabellate-dilatate, concave, crenate-incised, bearded. Stamens and style included in corolla. Nutlet ovoid-oblong, 1.5 × 1 mm, dark brown, glabrous, areola narrowly transverse.

Distribution: Iraq and Iran. It is distributed in the mountains of northern and northeastern Iraq.

Examined specimens: Iraq. MSU: in montibus calcareis Avroman et Schahu, *Haussknecht* 780 (BM, K, W); Tawela, *Rawi* 21940 (K); Suleymaniya, Pira Magrun (Pir Omar Magrun), *Haussknecht* s.n. (K); MRO: Arbil: Rost, *Haley* 187 (BM).

Habitat: Stony hillsides, open herbaceous vegetations; alt. 1200–2500 m; fl. & fr. June to July.

Notes. It is distinguished from *N. humilis* in its bracteole's apex obtuse, calyx and tube short, mouth straight, cleft indistinctly.

Bentham (1848) described *Nepeta petraea* based on *Aucher-Eloy* 1747 and *Aucher-Eloy* 2876 specimens, which were included in its protologue collected from Iran. Rechinger in *Flora Iranica* (1982: 193), selected *Aucher-Eloy* 1747 as lectotype and stated that the specimens were stored in G-DC and G-BOISS. Two specimens *Aucher-Eloy* 1747 (G00424393 and G00741059) are present at G, which are designated as synlectotypes. Here, the specimen with barcoded G00424393 in G-DC was selected as Lectotype.

15. *Nepeta iraqo-iranica* Haloob, Bordbar & Qader, in *Pyhtotaxa* 550(2): 196 (2022).

Type: Iraq, NE, 38 km from NE Sulaimaniya, N Basneh village, near Rushikani, Shahrabazhar (Chuwarta), 1575 m, 24.05.2021, *Omar* 60380 (holotype: BAG, isotype: BAG)

Annual. Stem erect, 30–60 cm long, simple or branched from the lower half, with dense puberulent-

crispate and sparsely glandular papillose hairs. Leaves bright green, covered with dense pubescent or \pm villose and sparsely glandular papillose hairs, more dense in lower face, lower leaves petiolate, petiole 10–35 mm long, broadly triangular-ovate, 25–35 \times 20–30 mm, cordate-subcordate at base, crenate at margins, rounded at apex, sometimes mucronulate, middle leaves petiole 5–10 mm long, ovate, 11–18 \times 8–15 mm, crenate-dentate at margins, subcordate-subtruncate at base, obtuse at apex, upper leaves sessile, lanceolate, 10–15 \times 3–8 mm, cuneate at base, apiculate-mucronate at apex. Verticillasters congested into terminal elongated spike, 30–60 mm long, 10–15 mm wide, flowers many, pedicel 1–2 mm long. Bracts broadly lanceolate, 11–13 \times 2–4 mm, sessile, green, purplish in the upper half, apex rostrate, adaxial surface glabrous, abaxial surface with villose-crispate and sparsely glandular papillose hairs. Calyx straight, tubular, 8–9 mm long, oblique at throat, tube 5–6 mm long, green, glabrous inside, covered with villose-crispate and sparsely glandular papillose hairs outside; upper teeth lanceolate, 2.0–2.5 mm long; lower teeth narrowly lanceolate 2.5–3.0 mm long, teeth purple, margins ciliate. Corolla lavender, 13–14 mm long, exerted from the calyx, tube 7–9 mm long; upper lip 2 \times 2 mm; lateral lobes of lower lip 1 mm long, middle lobe 4–5 mm long, margins crenate; corolla villose outside, glabrous inside, internally with a dense tuft of short hairs at throat, upper lip covered with white pilose hairs inside. Stamens 4, posterior pair longer than anterior; filaments glabrous, free part 3.0–3.5 mm; anthers dark lilac, glabrous. Style shortly 2-branched, branches unequal. Nutlets oblong; ca. 1.7 \times 0.8 mm, brown, surface glabrous, areole 0.3–0.4 mm, lobes oblique.

Distribution. Iraq. West Iran to Northeast Iraq.

Examined specimens: Iraq. MSU: NE, 38 km from NE Sulaimaniya, N Basneh village, near Rushikani, Shahrabazhar (Chuwarta), 1790 m, *Haloob, et al.* 60236 (BAG).

Habitat: colluvial soils of hillslopes: alt. 1575–1790 m; fl. & fr. May to July.

Notes. *Nepeta iraqo-iranica* is also similar to *N. wettsteinii* distributed in Gilan and Azerbaijan Province of Iran. But it differs mainly in plant height, size of the lower leaf blade, inflorescence shape, length of bract, upper teeth shape of the calyx, indumentum of bract and calyx.

Nepeta iraqo-iranica also similar morphologically to *N. humilis* and *N. petraea*, the two other sympatric annual species, from the West of Iran and Northeast of Iraq. It can be readily distinguished from them by the difference in the shape of the lower leaf blade, inflorescence shape, shape and length of bract, length of calyx, and corolla.

16. *Nepeta macrosiphon* Boiss., in *Diagn. Pl. Orient.* 7: 51 (1846); Rechinger in *Fl. Iranica* [K.H. Rechinger]

150: 153(1982); Hedge in *Fl. Turkey* [P.H. Davis] 7: 284 (1982); Jamzad in *Flora Iran* 76: 553 (2012).

Synonyms: *Glechoma macrosiphon* (Boiss.) Kuntze, in *Revis. Gen. Pl.* 2: 518 (1891); *Nepeta glandulosa* Blakelock, in *Kew Bull.* 4: 542 (1949 publ. 1950).

Perennial herbs. Stems 20–60 cm tall, a few to many stemmed from a woody rootstock, erect or ascending, glabrescent to canescent, glandular-papillose or not. Leaves ovate to triangular, 1–4 \times 1–3(–4) cm, cordate at base, coarsely crenate, obtuse at apex, sparsely to densely pilose or canescent, glandular papillose or not; lower leaves clearly petiolate to 20 mm long, upper subsessile to sessile. Inflorescence lax, cymes all pedunculate, loosely flowered. Bracteoles elliptic to linear, 2–4 mm long, much shorter than calyx. Calyx tubular, 8–12 mm long, clearly bilabiate with a deep cleft on the lower lip; tube long and usually partially or completely deep purple, somewhat curved, mouth oblique, veins prominent, \pm sparsely pilose to scabridulous, glandular or not; teeth 1–2.5 mm long; upper teeth oblong-triangular; lower teeth lanceolate-triangular, lower lip deeply cleft; sparsely hairy inside of the tube up to $\frac{1}{2}$. Corolla violet-blue, 20–26(–30) mm long, tube curved or not, narrow, long exerted from calyx teeth, tube subglabrous to puberulous, pilose at lips; upper lip c. 2 mm long; lower lip 3–4 mm long, median lobe concave, crenate, bearded. Stamens 4, included in corolla. Style unequally bilobed, included in corolla. Nutlets oblong, \pm trigonous, c. 2.5–2.8 \times 1–1.2 mm, \pm smooth.

Distribution: East and Southeast of Turkey, Northern Iraq and Western Iran. Distributed in the high altitudes of the northern Iraq mountains; on rocky slopes and screes.

Examined specimens: Iraq. MRO: Erbil, mons Helgurd ad confines Persiae, in valle supra pagum Nowanda, *Rechinger* 11343 (BUH, G, K, W); Helgurd range, E of Berma sand lake, serpentine rocks, *Serhang & Rawi* 24774! (BAG-photo); Arbil, Algurd Dagh, *Guest* 3067! (syntype of *N. glandulosa*) (BAG); Algurd Dagh, *Guest* 3069 (BAG, K) (syntype of *N. glandulosa*); N.E slopes of Arl Gird Dagh, *Gillett* 9586 (BAG, K); *Ibid.*, *Gillet* 9588 (BAG, K); Erbil, Algurd Dagh, among rocks, *Gillet* 12365 (BAG, K); Ser Kurawa, *Gillet* 9755 (BAG); Ser-i Khazni, *Haley* 253 (BM, BUH); MSU: in montibus calcaresi Avroman et Schahu, *Hausknecht* s.n. (BM, K, W).

Habitat: Rocky slopes and screes; alt.: 2000–3600 m; fl. & fr. July to September.

Notes. *Nepeta macrosiphon* differs from other species distributed in northern Iraq mountains with its lax inflorescence and long corolla (up to 30 mm long).

17. *Nepeta lamiifolia* Willd., in *Enum. Pl.*: 602 (1809); Poyarkova in *Fl. U.S.S.R* [Shishkin & Yuzepchuk] 20: 272 (1976); Hedge in *Fl. Turkey* [P.H. Davis] 7: 282 (1982) (Figure 5).



Figure 5. *Nepeta lamiifolia* (K001222563).

Synonyms: *Glechoma lamiifolia* (Willd.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891), nom. illeg.; *Nepeta iodantha* Nábelek, in Spisy Prír. Fak. Masarykovy Univ. 70: 53 (1926).

Perennial with \pm woody rhizome. Stems ascending, 10–22 cm tall, scabridulous to pilose, with or without glandular papillae or sessile glands. Leaves ovate-triangular to broadly triangular, 1–2 \times 1–2.2 cm, cordate to \pm truncate at base, obtuse at apex, coarsely crenate-dentate, \pm puberulous to pilose with glandular papillae and sessile glands; lower leaves petiolate to 1.3 cm long; uppers subsessile. Inflorescence verticillate, verticillasters usually congested at apex, sometimes lowermost verticillaster remote, flowers congested. Bracteoles elliptic to linear-lanceolate, 4–6 \times 0.3–1 mm, usually shorter than tube. Calyx tubular, 6–7 mm long, straight or somewhat curved, expanded above, clearly bilabiate with a deep cleft on lower lip; usually partially or completely deep purple, mouth oblique, pilose with

glandular papillose. Corolla pale lavender-blue, 12–16 mm long, expanded at mouth; tube somewhat curved, exerted from calyx, tube subglabrous to puberulous or sparsely long hairy; upper lip 2–3 mm long; lower lip 5–6 mm long, median lobe concave, crenate, bearded. Stamens 4, included in corolla. Style included in corolla or slightly protruding. Nutlets ovate, trigonous, 2–2.6 \times 1.2–1.4 mm, \pm smooth.

Distribution: Northern Iraq, East and Southeast Turkey to South Transcaucasus. In the high mountain areas of northern Iraq, is usually adapted to volcanic soils and igneous scree habitats.

Examined specimens: Iraq. MRO: Qandil range, NE of Rania, brownish-black rocky land, *Serhang & Rawi* 26786 (K); Ibid., *Serhang & A.Rawi* 26810 (K); Qandil range, *Rawi* 24515 (BAG, K); Perrish mountain, *Serhang & Rawi* 24523(K).

Habitat: Igneous screes, usually volcanic soils; alt.: 2900–3340 m; fl. & fr. July to August.

Notes. *Nepeta lamiifolia* has not been recorded for Iraq by Rechinger nor Rawi (Rechinger, 1982; Rawi, 1964). In the Flora of Turkey, according to Hedge (1982:282) its distribution in northern Iraq was doubtful. *Nepeta lamiifolia* is Armenian in origin, described by Willdenow (B-W-10742-010!, type in B-Willd.). It is distributed along the Southern Caucasus and the high mountain belt in Northeast Turkey to the northern mountains of northern Iraq. It is a species with a short capitate inflorescence, often densely pilose, it is found on volcanic soils in Iraq. Although it is accepted as closely related to *Nepeta brevifolia* C.A.Mey. by some authors (Bentham, 1848; Ladebour, 1847-49; Boissier, 1879; Pojorkova, 1953 and Hedge, 1982) accepted it as a distinct species. It differs from *N. brevifolia* (C.A.Meyer 166!, type in LE) in its capitate inflorescence with dense indumentum. A large number of specimens consistent with the type specimen of *N. lamiifolia* were collected in the Caucasus, Turkey, and Iraq.

It differs from *N. macrosiphon* in Iraq, to which it is also closely related, by its shorter calyx and corolla and its capitate inflorescence

18. *Nepeta trautvetteri* Boiss. & Buhse, in Nouv. Mém. Soc. Imp. Naturalistes Moscou 12: 175 (1860); Rawi in Dep. Agr. Tech. Bull 14: 153 (1964).

Synonym: *Glechoma trautvetteri* (Boiss. & Buhse) Kuntze, in Revis. Gen. Pl. 2: 519 (1891).

Perennial herbs. Stems 40–85 cm tall, mostly branching from base and leafy in lower part, axillary branches long, with few pairs of cymes, densely covered with coarse subsetaceous white spreading hairs with glandular papillose. Leaves broadly ovate to suborbicular-ovate, 1–3.5 × 1–3 cm, deeply cordate at base, crenate at margins, rounded or obtuse at apex; lower cauline leaves petiolate to 1.5 cm long, uppers short petiolate to subsessile, sparsely to densely hirsute with few to many sessile glands; floral leaves small, sessile, oblong-ovate to narrowly elliptic, entire or lower with few teeth. Inflorescence broad, loose panicle, dichotomously branched; cymes remote, the axes of the first order to 3 cm long or more, sometimes repeatedly dichotomous or bostryciform. Bracteoles 2–4 mm long, elliptic to linear. Calyx tubular, 7–9 mm long, violet, densely covered with whitish or yellowish sessile glands and sparse spreading 3-jointed simple hairs with glandular papillose, frontally incised to the middle; teeth with scarious margins, upper teeth 1–2 mm long, oblong-ovate, mucronate; lower teeth 1.5–2.5 mm long, lanceolate to narrowly lanceolate, acuminate; tube hairy inside. Corolla lavender-blue, 13–17 mm long, tube slender and curved, exerted from calyx, tube and lips short hairy and glandular papillose outside; middle lobe of lower lip concave and crenate, bearded. Stamens and style included in corolla.

Nutlets ellipsoid, 1.5–2.1 × 1–1.2 mm, brown, minutely tuberculate.

Distribution: Transcaucasus, northeast of Turkey to Northern Iraq. It is known only from around Amadia.

Examined specimens: Iraq. MAM. Mountains of SE of Serva, *Jillet* 9696 (BAG, K); Amadia, *Guest* 3770 (K); Sulaf, *Haines* 2067 (K).

Habitat: Dry stony ground, on rocks, eroded slopes, alt. 1000–2000 m; fl. & fr. June to August.

Notes. The most important characters of *Nepeta trautvetteri*: inflorescence broad, loose panicle and dichotomously branched; cymes remote from each other, sometimes repeatedly dichotomous or bostryciform, the axis of the first order to 3 cm long or more.

19. *Nepeta iodantha* Nábělek, in Spisy Prír. Fak. Masarykovy Univ. 70: 53 (1926) (Figure 6 & 7).

Perennial herbs, many stemmed from base, and usually few branched from lower part, ascending to erect, 30–45(–80) cm tall, base densely foliate, puberulent to hirsute with glandular papillose. Leaves cordate-ovate to suborbicular, 1.5–3 × 1.5–3 cm, petiolate to 2 cm long, cordate at base, crenate at margins, obtuse at apex, tomentose with sessile glands; upper cauline leaves short petiolate to sessile, ovate-cordate to oblong; floral leaves small. Inflorescence 3–5-flowered, 1 or 2 lower cymes clearly pedunculate, peduncle 1–1.5 cm long, upper cymes short pedunculated or sessile, panicle contracted; all verticillasters distant. Bracteoles linear to subulate, 2–4 mm long, green or violet, hirsute, ciliate. Calyx 6–8 mm long, tube slightly incurved, partly or completely purple, mouth oblique, densely strigose-hirsute with glandular papillae; teeth unequal, 1.5–2 mm long, triangular to triangular-lanceolate, acute-acuminate; hairy in throat. Corolla violet-purple, 14–20 mm long, hirsute with glandular papillose, tube slightly incurved; median lobe of lower lip concave, crenate, bearded. Stamens 4, included in or slightly exerted. Style slightly exerted. Nutlet oblong, 2.5–3 × 1–1.2 mm, brown, smooth.

Distribution: Southeast Turkey and Northern Iraq. It grows on serpentine bedrock-based soils between 1000–2100 m in northern Iraq.

Examined specimens: Iraq. MRO: Pushtashan, 15 km E of Ranin, lower slope of Qandil range, *Rawi & Serhang*, 24203 (BAG, K); Sula Khal, black-brownish rocks, *Serhang & Rawi* 24679 (BAG, K); Kanirush, Qerna valley, N of Pushtashan, near streams, *Rawi & Serhang* 26648 (BAG, K).

Habitat: Black-brownish rocks, serpentine rocks; alt. 1060–2100; fl. & fr. August to September.

Notes. *Nepeta iodantha* originates from Turkey and was first described by Nábělek (1926). It is distinguished from *N. macrosiphon* and *N. trautvetteri*, to which it is



Figure 6. *Nepeta iodantha* (K001297579).

closely related in its more tightly arranged verticillasters and shorter pedunculated cymes.

Nepeta iodantha var. *parviflora* (Ludlow-Hewitt & Guest 2726!-2727!, in K and BAG), described by Blakelock (1949), adapted to higher altitudes than *Nepeta iodantha*, and is generally more related with *Nepeta lamiifolia*. However, it differs from it in that its verticillasters are remote from each other.

Species doubtfully recorded for Iraq

Nepeta wettsteinii Heinr. Braun, in Verh. K. K. Zool.-Bot. Ges. Wien 39: 226 (1889); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 212 (1982); Jamzad in Flora Iran 76: 498 (2012).

Type: [Iran] Zendjanab, in glareosis, 1. viii 1884, Knapp s.n. (holotype: WU-photo! isotypes B-photo (fragments)! JE-photo! W!)

Annual. Stems 20–40 cm tall, erect, simple or branched, branches erect-patent, purple, densely pubescent along

the angles, whole plant short crisped, adpressed canescent. Leaves orbicular-ovate, 15–25 mm long; basal leaves petiolate to 10 mm long, subcordate at base, obsolete crenate at margins, obtuse at apex; lower cauline leaves short petiolate; upper leaves sessile to subsessile, ovate-triangular, acute at apex; floral leaves lanceolate; all leaves both sides densely adpressed white-pubescent, suffused with purple. Verticillasters 3–5, sessile, many-flowered, lower verticillasters remote, uppers spicate, ± capitate. Flowers subsessile. Bracteoles linear to narrowly lanceolate, long subulate-attenuate, 6–8 mm long, ½ of calyx, purpurascens, glandular-papillae, crispilusciliate at margins. Calyx tubular, 7–10 mm long, rectus, mouth oblique, purple-suffused, glandular-papillae; teeth subulate-attenuate, upper teeth 1.5–2 mm long, lanceolate, lower teeth very short. Corolla purple, ±15 mm long, tube narrow, long exerted from calyx. Nutlet triangular-ovate, c. 1.8 × 1.2 mm, dark brown, glabrous.



Figure 7. *Nepeta iodantha* (photo: Ali Haloob).

Distribution: N. Iraq? to Iran

Notes. The existence of *Nepeta wettsteinii* in Iraq is doubtful. *Nepeta kurdica* which is known from Iraq was given by Rechinger (1982:212) as a synonym for *Nepeta wettsteinii*. Thus, specimens belonging to *Nepeta kurdica* were recorded as *Nepeta wettsteinii* there. As a result of comparing the type specimens of *Nepeta wettsteinii*, *N. humilis*, and *N. kurdica*, it was concluded that *Nepeta kurdica* should be a synonym of *Nepeta humilis*. All specimens identified as *Nepeta wettsteinii* in Flora Iranica were examined and it was concluded that they all belonged to *Nepeta humilis*. For this reason, just in case *Nepeta wettsteinii* may be found in northern Iraq, its description in Flora Iranica is also given briefly above.

Nepeta teucriifolia Willd., in Enum. Pl.: 602 (1809).

Synonyms: *Glechoma teucriifolia* (Willd.) Kuntze, in Revis. Gen. Pl. 2: 519 (1891); *Nepeta fissa* C.A.Mey., in Verz. Pfl. Casp. Meer.: 33 (1831); Rechinger in Fl. Iranica [K.H. Rechinger] 150: 152(1982); Hedge in Fl. Turkey [P.H. Davis] 7: 283 (1982); Jamzad in Flora Iran 76: 547 (2012); *N. glabra* Benth., in Labiat. Gen. Spec.: 483 (1834); *N. laxa* Benth., in Labiat. Gen. Spec.: 483 (1834); *Melissa teucriifolia* Willd. ex Ledeb., in Fl. Ross. 3: 379 (1849); *Nepeta rarifolia* K.Koch, in Linnaea 21: 676 (1849); *N. virgata* K.Koch, in Linnaea 21: 676 (1849); *N. calvertii* Boiss., in Diagn. Pl. Orient., ser. 2, 4: 25 (1859); *Glechoma calvertii* (Boiss.) Kuntze, in Revis. Gen. Pl. 2: 518 (1891); *Nepeta galatica* Bornm., in Bull. Herb. Boissier 7: 241 (1899).

Perennial herbs. Stems few to many stemmed from the base, ascending to erect, 20–80 cm, glabrous to densely, and shortly puberulous. Leaves usually ovate-triangular, oblong-ovoid, rarely rhomboid or reniform, 12–30 × 15–45 mm, base truncate or cordate, rarely cuneate, crenate to coarsely dentate, slightly to densely puberulous; petiole 7–48 mm. Inflorescence usually lax, at least lower cymes pedunculate, flowers congested or loose. Bracteoles narrowly lanceolate-elliptic to elliptic-oblong, 1.5–2 mm, much shorter than calyx. Calyx tubular, ±straight, (5–)6–8(–10) mm long, mouth oblique, ± pubescent to scabridulous, glandular or not, often purple; teeth acuminate or blunt, ovate-oblong to triangular, much shorter than tube; upper lip tridentate, teeth 1–1.5 mm long, ovate-lanceolate, lower lip deeply cleft, teeth c. 1.5 mm long, lanceolate-acuminate. Corolla blue or lilac to purple, 10–21 mm long, exserted from calyx teeth; upper lip 2–2.5 mm long; lower lip c. 3 × 5–6 mm long, bearded inside with purple dots. Nutlets elliptic to oblong, ±trigynous, c. 1.2–1.7 × 0.7–1 mm, smooth.

Distribution: East and Southeast of Turkey, Iran, and North Iraq?

Notes. Specimens representing *Nepeta teucriifolia* (formerly *N. fissa* in Flora of Turkey, p. 283 and Flora Iranica, p. 152) are characterized by the inflorescence being lax and dichotomously branched. Flowering branches usually end with two flowers in *N. teucriifolia*. However, in some specimens, flowering branches can

carry up to 8 flowers horizontally or bostryciform and these features are seen in *Nepeta trautvetteri* (Buhse 756-photo!, in P). Specimens with these inflorescence characteristics collected from Northern Iraq were evaluated as *N. trautvetteri*. However, it is known that *N. teucriifolia* is also distributed in regions very close to the Iraq-Turkey border, therefore, it is highly probable that *N. teucriifolia* can also be found in northern Iraq.

4. Conclusion

In this study, an identification key and descriptions of all species of the genus *Nepeta* in Iraq were given. In addition, a new species, *Nepeta iraqensis*, and four new records taxa, *Nepeta congesta* subsp. *cryptantha*, *N. stricta*, *N. Lamiiifolia*, and *N. iodantha* were recorded here for the first time in Iraq. Lectotypes for six taxa were selected with taxonomic comments about the complex species. In addition, two taxa were given as new synonyms.

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