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Stachys Babylonica (Lamiaceae), A New Endemic Species from Iraq and Related Studies for This Species

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Article Info	Abstract
Received 26/10/2017 Accepted 26/03/2018 Published 05/05/2019	<i>Stachys babylonica</i> (Lamiaceae). A new species from the mountainous, Kurdistan Iraq, is described and illustrated. Its distinguishing characters are discussed. It is distinguished from the closely related species <i>S. kotschy</i> by having elliptic-rhombic (vs. ovate or oval- elliptic) leaves, (30-35 x 10-16 mm) (vs. 25-47 x 14-21mm), lower leaves petioles longer $\pm$ 16mm (vs. C.7mm), the median leaves petiole $\pm$ 7mm (vs. subsessile – sessile), calyx is narrowly tubular appressed (vs. infundibular – campanulate $\pm$ spreading), bracteoles are well developed as long as or longer than calyx (vs. shorter than calyx or absent), teeth of calyx are narrowly lanceolate (vs. broadly lanceolate and spreading). This new species to science is represented only by two specimens: the holotype & the isotype #12125. Specimen #12125 has been mistakenly identified as <i>S. tomentosa</i> Rech. f. by Rechinger[1]. Rechinger used only morphological characters in his identification. To clear the ambiguity, Pollen grain study was done and the results of this study were tabulated in Hamodie's work[2]. Specimen #50059 mentioned by Al-Zubaedy[3] as collected by Ali Haloob in 2010 from Piera Magron Mt belongs to <i>S. kotschy</i> was also mistakenly identified as <i>S. babylonica</i>. The consideration of specimens belongs to <i>S. kotschy</i> Boiss. as <i>S. babylonica</i> Hamodie & Wilcock made errors on conclusions by Al-Zubaedy[3] on molecular & P.G and morphological studies and reconsideration on these issues are needed. All the indicators so far gathered, approve that plants of this new species were most likely vanished from Piera Magron Mt. in Sulaimaniya sometime after 1948. Keywords: <i>Stachys babylonica</i> Hamodie & Wilcock sp. nov, <i>S. kotschy</i> Boiss. الخلاصة <i>Stachys babylonica</i> نوع جديد مستوطن من المنطقة الجبلية في شمال العراق ينتمي الى العائلة الشفوية تم وصفه وتوضيحه ومناقشة صفاته المميزة حيث أمكن تمييزه عن النوع القريب <i>S. kotschy</i>. بامتلاك الأول (<i>Stachys babylonica</i>) أوراق رمحية – بيضوية (يقابله في النوع الثاني <i>S. kotschy</i> أوراق بيضاوية او شبه بيضاوية – إهليلجية)، طول النصل وعرضه في الأول 30 – 35 × 10 – 16 ملم (يقابله في الثاني 25 – 47 × 14 – 21 ملم)، سويقات الأوراق السفلى أطول $\pm$ 16 ملم (يقابلها في النوع الثاني على العموم 7 ملم)، سويقات الأوراق الوسطية $\pm$ 7 ملم (يقابلها في النوع الثاني جالسة - شبه جالسة)، الكاس انبوبي ضيق مضغوط (يقابلها في الثاني قمعي – جرسى $\pm$ متباعدة)، القنبيبات نامية بشكل جيد بطول او أطول من الكاس (يقابلها في الثاني اقصر من الكاس واقل عدد او لا توجد متباعدة)، اسنان الكاس مثلثة بقاعدة ضيقة (يقابلها في الثاني مثلثة بقاعدة عرض). هذا النوع الجديد للعلم تمثله عينتين فقط (holotype & isotype #12125). النموذج رقم 12125 قد صنف خطأ الى <i>S. tomentosa</i> من قبل Rechinger عام 1982 [1]. استعمل Rechinger الصفات المظهرية فقط في التشخيص. لإزالة الغموض قد تم دراسة حبوب اللقاح وقد ذكرت النتائج لهذه الدراسة في دراسة حمودي [2]. النموذج رقم 50059 الذي جمعه علي حالوب من جبل بيرة مكرون في عام 2010 وأشارت اليه في دراستها [3] Al-zubaedy يعود للنوع (<i>S. kotschy</i> Boiss) على انه (<i>Stachys babylonica</i> Hamodie & Wilcock) اثر على مصداقية استنتاجات الزبيدي لدراستها الجزيئية على DNA وعلى دراسة حبوب اللقاح والدراسات المظهرية و يستوجب إعادة النظر في هذه الدراسات. اثبتت كل المعطيات الى الآن ان نباتات هذا النوع الجديد على الاغلب قد اختفت في وقت ما بعد العام 1948 من منطقة جبل بيرة مكرون في السليمانية.

Introduction

Stachys L. is a genus of about 300 spp. In the mint family, *Lamiaceae*[4]. It is the third largest genus (113 spp.) in S.W. Asia after *Nepeta* (147 spp.) and *Salvia* (145 spp.)[5]. The distribution of spp. of *Stachys* in S.W. Asia is as follow: Afghanistan (5 spp.), Caucasia (26 spp.), Cyprus (1 sp.), Egypt (1 sp.), Iraq (20 spp.), Iran (38 spp.), Lebanon + Syria (15 spp.), Pakistan (2 spp.), Palestine (12 spp.) and Turkey (72 spp.). The genus center of speciation is in S.W. Asia and Balkan peninsula of Europe[6]. Turkey, E and S have the most active center of speciation. The genus is very scarce in Sahara Sindian[7]. Bhattacharjee[6] has shown in her isoflor map an absence of *Stachys* from Arabia, Syria and Libyan Desert. She attributed the desert conditions as an important factor behind this scarcity. *Stachys* has a secondary distribution in N. and S. America and South Africa, it is absent in Australia and Newzeland.

Zohary[8] had listed eleven spp. of *Stachys* in Iraq. *S. kotschy* Boiss. is among these spp. *S. lavandulifolia* Vahl. is mentioned as medicinal plant by Al-Rawi & Chakravarty in[9]. Al-Rawi[10] has also listed sixteen spp. of *Stachys* in Iraq and *S. kotschy* Boiss is among them as distributed in Amadia, Rawanduze and Sulaimaniya districts. The genus *Stachys* has not published yet in the series of volumes 1, 2, 3, 4, 8, 9 of The Flore of Iraq. The last volume that has been published recently is volume 5 part 1 & part 2 (Gzanfar & Edmenson)[11][12]. Two volumes of The Flora of Iraq #6 & #7 are to be published in a near future and the family *Lamiaceae* will be included in volume 7 (Mohamad Zein Al – Abideen , G.M, Ministry of Agriculture. pers. Comm). A taxonomic account of the genus *Stachys* by Hamodie[2] will be included in the family *Lamiaceae* (I.C. Hedge, Royal Botanic Garden, Edinburgh, pers. Comm.).

After examining the various floras and herbarium specimens of Iraq and adjacent countries especially Turkey[13] and Iran[1], it has been concluded that specimens #12125 have not been examined closely and carefully. Specimen #12125 was considered Holotype K! to the new species *Stachys babylonica* by the

author in 1988[2]. This new species is new to science and is endemic in Iraq. To be legitimate taxon, this new species has to be completely described & published in a well accredited journal, hence it is being published in this journal.

Some achievements in the taxonomy of the genus *Stachys* in Iraq have been achieved since the author's work on *Stachys* in 1988. Al-Musawi[14] studied the distribution of the genus in Iraq. He put a key to spp. of *Stachys* to distinguish them from each other. Hamodie in[15] has re-assesd the identification of specimens that have been collected by

Al- Musawi and housed in(BUH). Hamodie used vegetative and floral characters in his keys to separate closely related species apart. He grouped these spp. into six groups according to similarities in morphological characters. Al-Biaty & Al-Omer 2006 cited in[3] has done a study on the morphology of pollen grains of spp. of the genus *Stachys* which grow in Iraq by using compound microscopy.

After more than 25 years and since the study of Hamodie[2], Al-Zubaedy[3] has done a revised taxonomical study of the genus *Stachys L.* in Iraq. She has studied the morphological, the palaeonological, the mollecular and the ecological characters of spp. of *Stachys* in Iraq. She found a new subspecies of *Stachys*: *S. pubescens* Rech. f. subspecies *omranica* A. Al-Musawi & Z. Al-Zubady (Synonym of *S. annua* L.). Publications on new species that belongs to a different genus of Labiatae in Iraq is like: *Salvia ali-askaryi* S.A. Ahmed sp. nov.[16]. This new species is found in Kurdistan mountainous region in 2016. Ko *et al.*[17] also found a new species of different genus *Paraphlomis*, *Lamiaceae* from Korea.

Materials and Methodologies

Herbarium material from collections of B, BM, E, F, G, J, K, LE, MPU, SAV, W, WU, BAG and BUH are studied. Abbreviations used are those in Index Herbarium[18] Table 1. Specimens are studied with the aid of long-armed Nikon binocular (X8 – X80) with the zoom facility. Photographs of the isotype (BAG) #12125 and the specimen of *S. kotschy*

#53789 are taken in the year 2017 by using HerbScan, machine No. 283.

The Androecium parts, Gynoecium parts, as well as the Fruiting Calyx parts: fruiting calyx and nutlets are measured in 2017 and they are illustrated in Figures 5 and 6. A dissecting microscope KRUSS (A. KRUSS OPTONIC, GERMANY) is used for aid in dissecting. A flower is taken from a third verticillaster of the isotype 12125! (BAG) and has been soaked in water for 45 minutes. A fruiting calyx is used from a first verticillaster too, from a same flowering branch(inflorescens) and soaked in water for 45 minutes too. The camera of a mobile (Huwawie mate 8) is used for taken photos of Androecium, Gynoecium, Fruiting Calyx and Nutlets from the isotype of this new sp. 12125! This specimen was collected in 7/6/1948 and has used for the already mentioned characters.

Results and Discussion

S. babylonica Hamodie & Wilcock sp. nov

Suffrutescent perennial up to 30cm. Indumentum appressed, white - tomentose. Flowering stems numerous, ascending arcuate, simple, lower leaves long petiolate, ± 16 mm, the upper leaves shortly petiolate ± 7 mm. Lamina lanceolate - elliptic to rhombic 30 - 35 X 10 -16 mm., tomentose, entire, acute, base cuneate - attenuate . Floral leaves similar to the cauline, decreasing in size towards the top, lower rhombic, petioles 3 -6 mm., upper oblong-lanceolate, subsessile - sessile. Verticillasters 5 - 7, remote, the lower 3 -5 cm. apart. Flowers 6, pedicel 3 – 4 mm., calyx 7-13 mm., narrowly tubular, teeth linear, erect, close, almost 1/2 length of the tube. Bracteoles numerous, well-developed, linear, as long as or longer than calyx. Corolla 15 -17 mm., pink, tube sub-exserted. Androecium tetrandrous, didynomous, sub-exserted from corolla tube, stamens epipetalous 4-5mm long each, included within corolla, anthers bilobed pale yellow, its attachment with filament versatile, anthers dehiscence longitudinal extrose. Gynoecium of one pistal, ovary superior, four

lobed, style one gynobasic, 10 mm in length, divided in the apex into two stigmas, stigmas equal in length 0.50 – 0.70 mm. Fruiting calyx tubular 13 x 3 mm. Fruit schizocarp, four nutlets. Nutlet obovoid, trigonous 2 -3 x1.2 mm.

Type. (holo),. A. Rawi 12125 K!, isotype BAG!

HAB. Limestone of mountain - 1800m.

DISTRIB. Rare in the Forest zone of Iraq.

Found only in MSU: Pira Magrun (Pir Omar Gurdrun), mountainside, local name "Gia Borra", 1800m., A. Rawi 12125!

Endemic, N. Iraq.

Taxonomic notes on the new sp.

Stachys babylonica Hamodie & Wilcock sp. nov. Affinis *S. kotschyi* Boiss. It is distinguished from *S. kotschyi* Boiss. by having elliptic leaves, longer petioles of lower leaves (15mm.), the medium leaves petiole ± 7 mm.; the calyx is narrowly tubular appressed, bracteoles as long as or longer than calyx and the teeth of calyx are narrowly lanceolate. Leaves of *S. kotschyi* Boiss. are ovate – oval 25 - 47 x 14 – 21 mm, petioles of lower leaves C.7 mm., the median leaves subsessile - sessile, calyx infundibular-campanulate, $\pm$ spreading, bracteoles few, shorter than the calyx or absent, teeth broadly lanceolate, spreading, Figures 1, 2, 3, and 4. The new sp. *S. babylonica Hamodie & Wilcock sp. nov* was found in Iraq by the author when he was doing an account of the genus in 1988. The description of this new sp. was not completed at that time for the luck of specimens.

This new sp. is endemic in Iraq and was found only in Pier Omar Garden (Piera Magron Mountain in Sulaimaniya). Ali Al-Rawi found two specimens (#12125 in 1948) in high location in Piera Magron Mountain. These specimens were considered as holo and isotype by the author. So far, the author has not found any other specimen belongs to this new species. Whereas the closely related traditional species *S. kotschyi* Boiss has wider distribution in Erbil, Sulaimaniya and Mosul regions. This

fact has been discovered from labels of dry specimens collected from these regions, Table 1 and from recent investigations. Plants of *S. babylonica* can be easily overlooked because of its morphological characters similarities with those of *S. kotschyi*. Plants of *S. kotschyi* can also be mistaken as belong to the species *S. babylonica*. Al-Zubaidy[3] discovered a unique DNA profile by using PCR technique in a specimen collected from Piera Magron (appendix 1). Al-though she considered the specimen as belongs to *S. babylonica*. She found three different bands in this profile. But the specimens characters of this population (appendix 2) that have been studied by Al-Zubaidy do not correspond with the new species characters. Voucher specimens to her molecular study were not found and further survey and study are needed to elucidate the actual status of *S. babylonica* in this area and or another areas. Only one specimen #50059 collected by Ali Haloob from Piera Magron Mt. in 2010 and housed in BUH is identified wrongly by her as being *S. babylonica*. Plants of *S. babylonica* might have vanished from the area due to disturbances. *S. babylonica*'s closely related sp. *S. kotschyi* was found by Al-Salihy[19] in Piera Magron mountain along with three other spp. of *Stachys*. Like the case of *S. babylonica*, Al-Salihy explains in his study that two species of *Nepeta* and one species of *Phlomis* were mentioned by Boiss (1879) as they occur in Piera Magron mountain, but there were disappeared and were not found in 1983.

Table (1): Herbarium material of *Stachys* collected in Iraq from collection of different herbaria

Herbarium Code	Institution	Location	Species & Specimen No.
B	Botanischer Garten und Botanisches Museum Berlin-Dahlem, Zentraleinrichtung der Freien Universität Berlin	Germany, Berlin	<i>Stachys</i> L.
BAG	Ministry of Agriculture	Iraq, Baghdad	<i>Stachys</i> L. Including: <i>S. kotschyi</i> 11460! 16398! 3772! 3267! 8723! 46030! 45785! 26104! 53789! 46921! 46866! <i>S. babylonica</i> 12125! isotype
BM	The Natural History Museum	UK, England, London	<i>Stachys</i> L. Including: <i>S. kotschyi</i> 367! Type
BUH	University of Baghdad	Iraq, Baghdad	<i>Stachys</i> L. Including: <i>S. kotschyi</i> 50059! 45909! 40866! 45910! 4586! 0033240! 44734! 5130! 11628! 45908! 2!
E	Royal Botanic Garden Edinburgh	UK, Scotland, Edinburgh	<i>Stachys</i> L. Including: <i>S. tomentosa</i> Benth 40970!
F	Field Museum of Natural History	USA, Illinois, Chicago	<i>Stachys</i> L.
G	University of the Witwatersrand	South Africa, Gauteng Province, Johannesburg	<i>Stachys</i> L. Including <i>S. kotschyi</i> 367! type
K	Royal Botanic Garden	UK, England, Kew	<i>Stachys</i> L. Including: <i>S. kotschyi</i> W1 129! 11460! 46860! 8723! <i>S. babylonica</i> 12125! Holo
LE	V.L., Kamarov Botanical Institute	Russia, Saint Petersburg	<i>Stachys</i> L.
MPU	Université de Montpellier	France, Montpellier	<i>Stachys</i> L.
SAV	Slovak academy of science	Slovakia, Bratislava	<i>Stachys</i> L.
W	Naturhistorisches Museum Wien	Austria, Wien	<i>Stachys</i> L. Including: <i>S. kotschyi</i> 367! Type
WU	Universität Wien	Austria, Wien	<i>Stachys</i> L. Including: <i>S. kotschyi</i> 367! Type

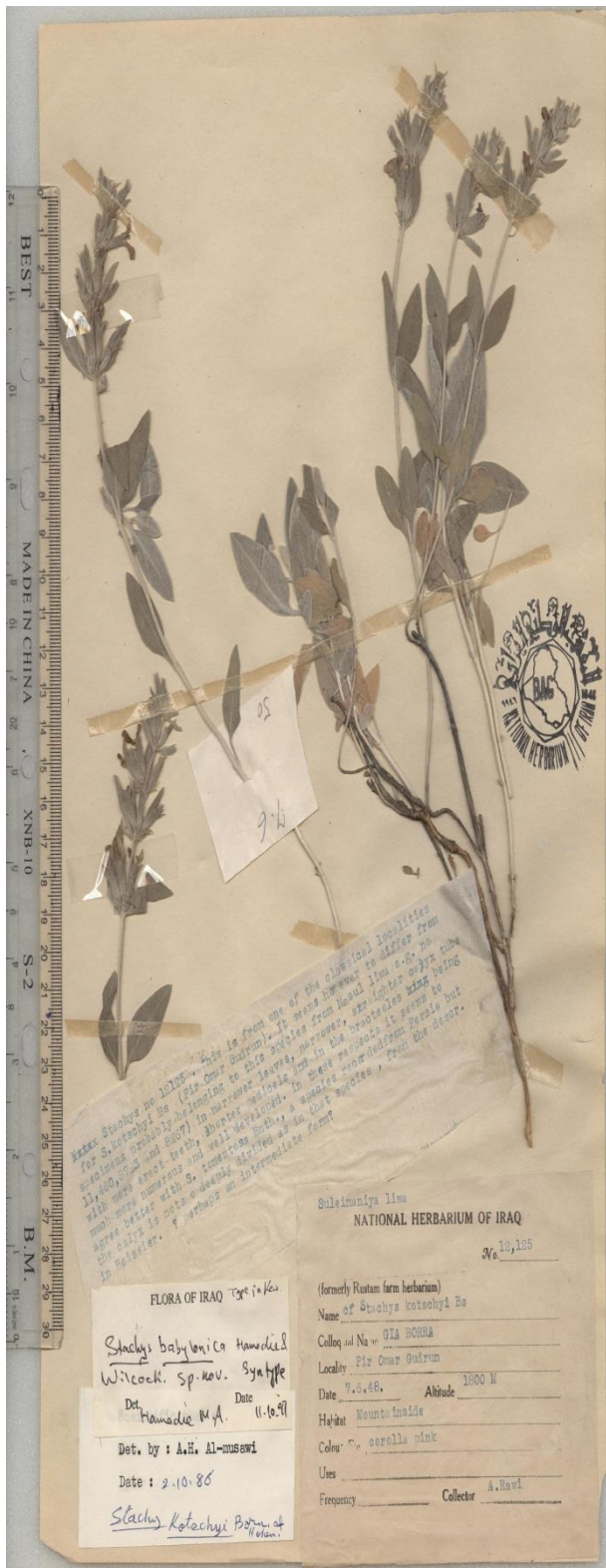


Figure 1: *Stachys babylonica* Hamodie & Wilcock sp. nov., isotype. Specimen # 12125(BAG)



Figure 2: Specimen of *S. kotschy* Boiss # 53789 (BAG).



Figure 3: Type Specimen of *S. babylonica* Hamodie & Wilcock, sp. nov. and specimen of *S. kotschyi* Boiss.#53789



Figure 4: Comparison of floral leaves calyces and bract of the related species *S. babylonica* Hamodie & Wilcock sp. nov. and *S. kotschyi* Boiss.#53789(BAG).

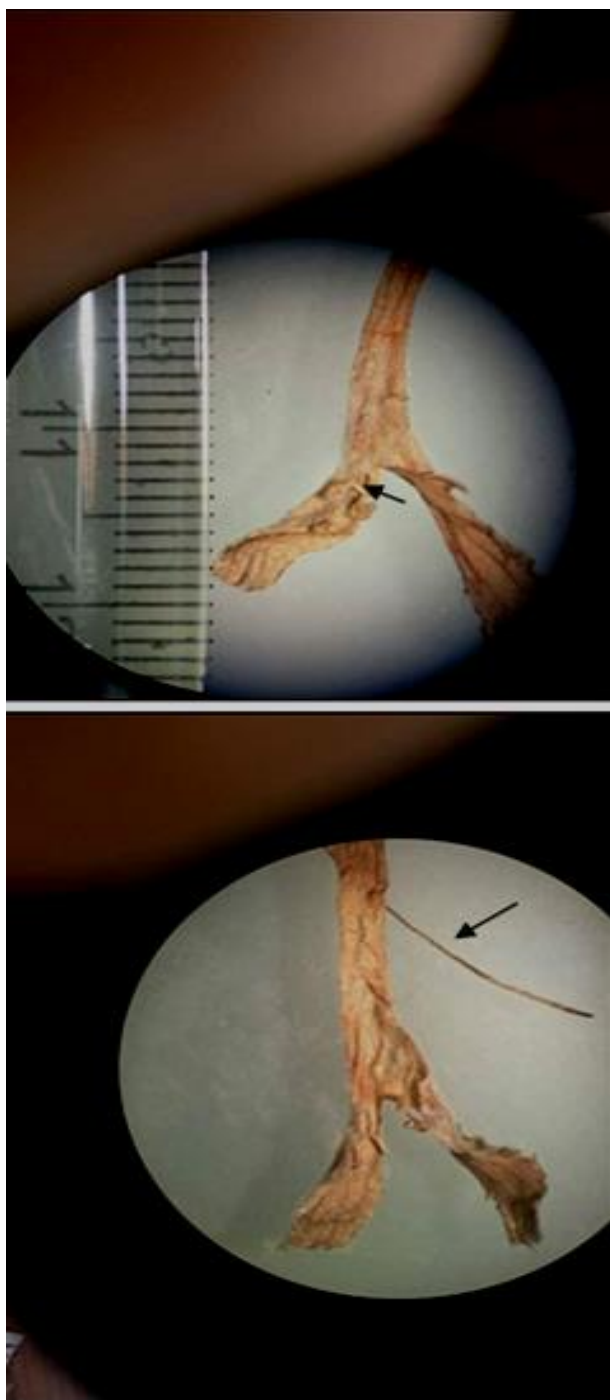


Figure 5: Androecium and the style and stigmas of the new species *S. babylonica* Hamodie & Wilcock sp. nov.



Figure 6: Style & Stigmas, Fruiting Calyx and Nutlets of the new sp. *S. babylonica* Hamodie & Wilcock sp. nov.

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Appendix 1: Population illustrated as *S. babylonica* in Al-Zubaidy thesis . (picture 38 page 77). Photo was taken by Ali Haloob in 2010.



Appendix 2: Population illustrated as *S. babylonica* in Al-Zubaidy thesis (picture 1 page 20). Photo was taken by Ali Haloob in 2010.

