

New records for the genus *Grammacephalus* Haupt (Hemiptera: Auchenorrhyncha: Cicadellidae)

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Abstract. *Grammacephalus rahmani* Singh Pruthi, 1930 is recorded for the first time from the United Arab Emirates and Mali, *G. raunoi* Viraktamath, 1981 – from the United Arab Emirates, and *G. indicus* Viraktamath et Ananta Murthy, 1999 – from Afghanistan. Photos of these species are provided, and male genitalia of *G. rahmani* and female 7th sternite of *G. indicus* are illustrated. Distribution and composition of the genus *Grammacephalus* Haupt is discussed.

Keywords. Deltocephalinae, Scaphoideini, morphology, new record, distribution, Middle East, Western Africa.

During my study of the leafhopper genus *Grammacephalus* Haupt, 1929 (Deltocephalinae, Scaphoideini) new records are registered for *G. rahmani* Singh Pruthi, 1930 from the United Arab Emirates and Mali, for *G. raunoi* Viraktamath, 1981 from the United Arab Emirates, and for *G. indicus* Viraktamath & Ananta Murthy, 1999 from Afghanistan.

According to the recently published revision of the genus *Grammacephalus* by Shah *et al.* (2019) it comprises 13 species distributed from India via Middle East to Africa including Cape Verde. However, Dlabola's (1980) record of *G. pugio* (Noualhier, 1895) (listed as *G. turneri* (Evans, 1947) a junior synonym of *G. pugio* according to Dlabola (1960)) from Saudi Arabia (Wadi Tihamma) was missed from this revision. According to my data the genus is also present in the United Arab Emirates, Mali, and Afghanistan. These new records are listed below.

MATERIAL AND METHODS

The study based on the specimens deposited in the collection of the Zoological Institute of the

Russian Academy of Sciences, Saint Petersburg (Russia), collected between 1966 and 2010.

The photographs of the specimens were taken using the microscope Leica MZ9.5 and a Leica DFC 490 camera. Images were produced using Helicon Focus V. 6.7.1 and Adobe Photoshop software. The drawings were prepared using the same microscope with camera lucida attached.

RESULTS AND DISCUSSION

Grammacephalus indicus Viraktamath & Anantha Murthy, 1999

(Figures 1, 2, 12, 17)

Grammacephalus indicus Viraktamath et Anantha Murthy, 1999: 42, figs 14–21.

Material examined. Afghanistan: 2♂, 1♀, Nangarkhar Province, Djalalabad, Kabul River, 22.VII.1966, E.S. Sugonyaev leg.

Remarks. The species was described from New Delhi in India (Viraktamath & Anantha Murthy 1999) and later recorded from Sindh and Punjab Provinces in Pakistan (Khatri & Webb 2010; Naveed & Zhang 2018).



Figures 1–4. *Grammacephalus* spp. 1 = *G. indicus*, male (Afghanistan), dorsal view; 2 = same, lateral view; 3 = *G. raunoi*, female (UAE), dorsal view; 4 = same, lateral view. Male – 4.5 mm. Female – 5.0 mm.

Male genitalia of the specimen from Afghanistan were examined and compared with the drawings by Viraktamath & Anantha Murthy (1999, figs 14–21) and Khatri & Webb (2010, figs 20, 21) and the photos by Naveed & Zhang (2018, fig. 1) with no significant differences discovered. From the other hand the hind margin of female 7th sternite illustrated by Khatri & Webb (2010, fig. 20c) is widely concave while the female from Djalalabad has it sharply notched medially (Fig. 12), wherein Viraktamath & Anantha Murthy (1999: 42) noticed in the original description of *G. indicus* that 7th sternite of this species has V-shaped excavation on its hind margin which is in accordance to the condition of the specimen from Afghanistan examined by the author (Fig. 12), confirmed also by the photo of female paratype of *G. indicus* kindly sent for my study by Dr. Chandrashekharaswamy A. Viraktamath (Bangalore, India). Thus Khatri & Webb (2010) apparently figured female 7th sternite of another species, different from *G. indicus*, erroneously reproduced again by Shah et al (2019, fig. 5D).

***Grammacephalus raunoi* Viraktamath, 1981**

(Figures 3, 4, 16)

Grammacephalus raunoi Viraktamath, 1981: 9, figs 30–36.

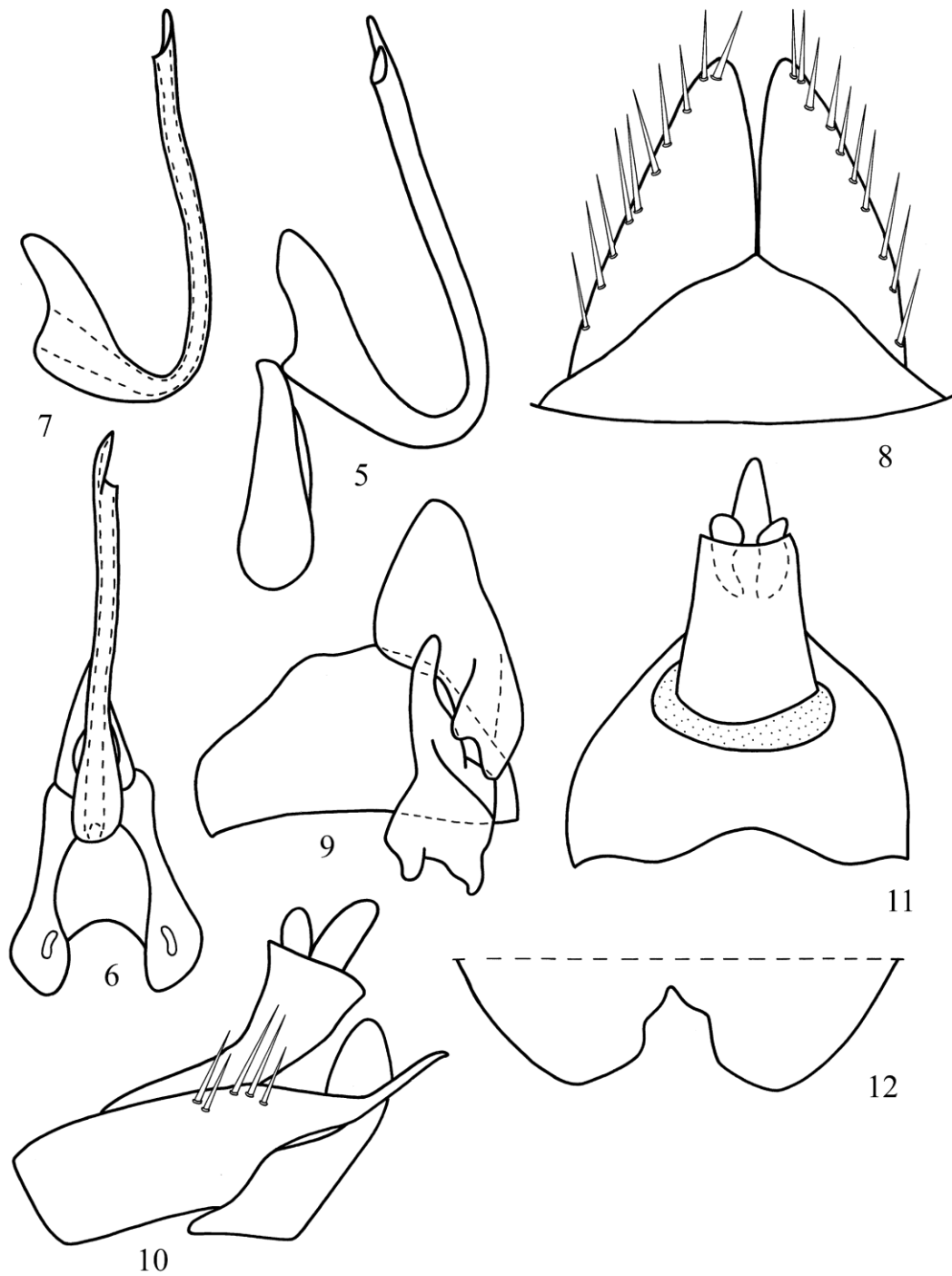
Material examined. United Arab Emirates: 1♂, 2♀, Sharjah, Sharjah Desert Park, N 25°16.859' E 55°41.422', 17.IV.2010, at light, V.M. Gnezdilov leg.

Note. The species was described from Delhi in India (Viraktamath 1981) and later recorded from Punjab (Mianwali) in Pakistan (Naveed & Zhang 2018). In UAE the species was collected in sand desert near to park house at light during the evening from 20.00 to 20.30.

***Grammacephalus rahmani* (Singh Pruthi, 1930)**

(Figures 5–11, 13–15)

Platymetopius rahmani Singh Pruthi, 1930: 33, figs 45, 46.



Figures 5–12. *Grammacephalus* spp. 5–11 = *G. rahmani*. 12 = *G. indicus* (Afghanistan). 5 = aedeagus and connective, lateral view (specimen from Mali); 6 = same, dorsal view; 7 = aedeagus, lateral view (here and following numbers – specimens from UAE); 8 = valve and subgenital plates, ventral view; 9 = valve, style, and subgenital plate, dorsal view; 10 = male pygofer, subgenital plate, and anal tube, lateral view; 11 = male pygofer and anal tube, dorsal view; 12 = female 7th sternite, ventral view.

Material examined. United Arab Emirates: 5♂, Sharjah, Sharjah Desert Park, N 25°16.859' E 55°41.422', 13.IV.2010, V.M. Gnezdilov leg. Mali: 1♂, Kita, 20.XII.1969, Orlovskaya leg.

Remarks. The species was described from Lyallpur (currently Faisalabad) in Punjab of Pakistan where it was collected at light (Singh Pruthi 1930). Later it was recorded from Sindh Province in Pakistan (Mahmood 1979, after Khatri & Webb 2010) and from India (Delhi, Gujarat, Jammu and Kashmir, Karnataka, Punjab) (Viraktamath 1981). In UAE the species was collected in sand desert during the day sweeping *Prosopis cineraria* (L.) Druce (Fabaceae).

Male genitalia of the species were illustrated by Singh Pruthi (1930, fig. 46) and later by Viraktamath (1981, figs. 2–8) based on the specimens from the Indian subcontinent. Viraktamath (1981: 8) suggested that *G. rahmani* could be conspecific with *G. turneri* (Evans, 1947), however, the latter is distinguished by sinuate aedeagal shaft and robust processes of pygofer. From the other hand Dlabola (1960: 17) and following him Shah *et al.* (2019: 81) treated *G. turneri* (Evans) as junior synonym of *G. pugio* (Noualhier) and separated it in the key by aedeagal shaft curved subapically in lateral view.

The specimens from UAE and Mali figured here (Figs 5–11) have aedeagal shaft slightly sinuate in dorsal view, but straight subapically in lateral view, and pygofer with slender processes. My examination of the photo of pygofer process and the aedeagus of *Platymetopius pugio* holotype described from Akbès (Alep) in Northern Syria (Puton & Noualhier 1895), deposited in the Museum national d' Histoire naturelle (Paris, France) and kindly sent for study by Dr. A. Soulier-Perkins, showed their identity with Linnavuori's figures (Linnavuori 1978, figs. 12f, 13a) reproduced by Shah *et al.* (2019). Apparently, for solving the question on possible synonymy of the mentioned names it will be necessary to examine the type specimen of *G. turneri* and compare it with *G. pugio* and *G. rahmani*. Currently, I am identifying the material from UAE and Mali as *G.*

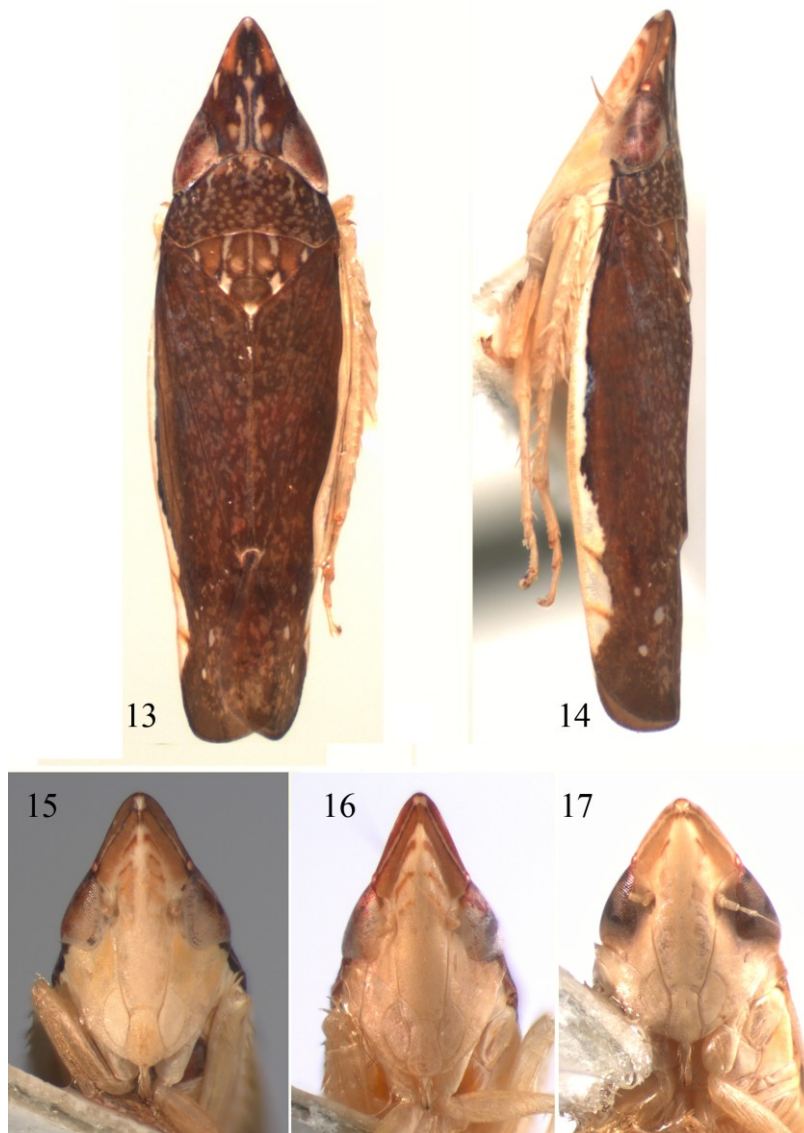
rahmani insofar as this species is well defined and illustrated.

CONCLUSIONS

Grammacephalus rahmani together with *G. raunoi* are first records of the tribe Scaphoideini Oman, 1943 from the United Arab Emirates as herein the subfamily Deltocephalinae Dallas was known from UAE only after few species of the tribes Chiasmini Distant, Eupelicini Sahlberg, and Macrostelini Kirkaldy (Wilson & Turner 2010, Gnezdilov 2019).

Linnavuori (1978: 476) assumed that the genus *Grammacephalus* radiated from Africa to the Oriental region "...along the mountain ranges bordering the Red Sea...". However, according to current data within 13 described species of the genus 8–9 species are known from the Oriental region (7 – from Indian subcontinent, one – from southern China, and one unidentified species – from the Philippines (Webb & Godoy 1993)), 7 species – from Africa and Arabian Peninsula, and 3 species – from Iran. Probably *Grammacephalus* species have no particular host-plant specialization as different species are recorded from several plant families including Fabaceae, Rhamnaceae, and Sapindaceae (Viraktamath 1981; Dai *et al.* 2006, current data). Insofar as the species of *Grammacephalus* may easily fly for long distance we can not confidently locate the centre of diversification of this genus. Apparently, some species currently known as local endemics would be found later in other regions as it is demonstrated here for *G. rahmani* and *G. raunoi*.

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Figures 13–17. *Grammacephalus* spp. 13–15 = *G. rahmani*, male – 4.5 mm (UAE). 16 = *G. raunoi*, female (UAE). 17 = *G. indicus*, male (Afghanistan). 13 = dorsal view; 14 = lateral view; 15–17 = face.

REFERENCES

- DAI, WU, ZHANG, Y.L., VIRAKTAMATH, C.A. & WEBB, M.D. (2006): Two new Asian Scaphytopiini leafhoppers (Hemiptera: Cicadellidae: Deltocephalinae) with description of a new genus. *Zootaxa*, 1309: 37–44. doi: 10.11646/zootaxa.1309.1.3
- DLABOLA, J. (1960): Iranische Zikaden (Homoptera: Auchenorrhyncha) (Ergebnisse der Entomologischen Reisen Willi Richter, Stuttgart, in Iran 1954 und 1956 – Nr. 31). *Stuttgarter Beiträge zur Naturkunde aus dem Staatlichen Museum für Naturkunde in Stuttgart*, 41: 1–24.
- DLABOLA, J. (1980): Homoptera: Auchenorrhyncha (Part 2). *Insects of Saudi Arabia*, 2: 74–94.
- GNEZDILOV, V.M. (2019): Leafhoppers of the subtribe Paradoriina Evans (Hemiptera, Auchenorrhyncha: Cicadellidae) in the United Arab Emirates. *Zoosystematica Rossica*, 28(1): 155–162. doi: 10.31610/zsr/2019.28.1.155

- KHATRI, I. & WEBB, M.D. (2010): The Deltocephalinae leafhoppers of Pakistan (Hemiptera, Cicadellidae). *Zootaxa*, 2365: 1–47. doi: 10.11646/zootaxa.2365.1.1
- LINNAVUORI, R. (1978): Revision of the Ethiopian Cicadellidae (Homoptera) Parabolopinae and Deltocephalinae: Scaphytopiini and Goniagnathini. *Revue de Zoologie Africaine*, 92(2): 457–500.
- MAHMOOD, S.H. (1979): *A revision of the leafhoppers (Cicadellidae: Homoptera) of Pakistan and adjoining countries of the Oriental region*. Final Technical Report PK-ARS-15 from June 24, 1974 to August 31, 1979, University of Karachi, 103 pp.
- NAVEED, H. & ZHANG, Y.L. (2018): Taxonomy of the leafhopper genus *Grammacephalus* (Hemiptera: Cicadellidae: Deltocephalinae) from Pakistan with description of a newly recorded species. *Journal of Entomology and Zoology Studies*, 6(2): 1816–1818.
- PUTON, A. & NOUALHIER, M. (1895): Supplément a la liste des Hémiptères d'Akbès. *Revue d'Entomologie*, 14: 170–177.
- SHAH, B., NAVEED, H. & DUAN, Y. (2019): Taxonomic review of the leafhopper genus *Grammacephalus* Haupt (Hemiptera: Cicadellidae: Deltocephalinae: Scaphoideini) with description of a new species from Pakistan. *Zootaxa*, 4688(1): 71–85. doi: 10.11646/zootaxa.4688.1.3
- SINGH PRUTHI, H. (1930): Studies on Indian Jassidae (Homoptera). Part I. Introductory and description of some new genera and species. *Memoirs of the Indian Museum*, 11: 1–68.
- VIRAKTAMATH, C.A. (1981): Indian species of *Grammacephalus* (Homoptera: Cicadellidae). *Colemania*, 1(1): 7–12.
- VIRAKTAMATH, C.A. & ANANTHA MURTHY, H.V. (1999): A revision of the leafhopper tribe Scaphytopiini (Insecta, Hemiptera, Cicadellidae, Deltocephalinae) from India and Nepal. *Senckenbergiana biologica*, 79(1): 39–55.
- WEBB, M.D. & GODOY, C. (1993): Review of the leafhopper tribe Scaphytopiini (Homoptera: Cicadellidae: Deltocephalinae) with a key to genera. *Journal of Natural History*, 27: 423–427. doi: 10.1080/00222939300770181
- WILSON, M.R. & TURNER, J. (2010): Order Hemiptera. Key to families of Auchenorrhyncha from the Arabian Peninsula. *Arthropod fauna of the UAE*, 3: 113–125.