

**THE GENUS *GAEANA* Amyot & Serville, 1843 (HEMIPTERA: CICADIDAE)
FROM VIETNAM WITH KEY TO SPECIES**

PHAM HONG THAI, TA HUY THINH

Institute of Ecology and Biological Resources

JENG-TZE YANG

National Chung Hsing University, Taiwan

INTRODUCTION

The species of the genus *Gaeana* Amyot & Serville occur in the Oriental region, and 16 species are presently known in this genus.

Distant (1888) described a new species from Vietnam, *Gaeana delinenda*, which was subsequently transferred to the genus *Balinta*). Distant (1913a) described 8 new species, including two species from Vietnam: *Gaeana annamensis* Distant, 1913 and *Gaeana sultana* Distant, 1913. Distant (1913b) described one more new vietnamese species: *Gaeana vitalisi* Distant, 1913. Distant (1917a) recorded 4 species: *Gaeana vitalisi* Distant, 1913; *Gaeana maculata* Drury, 1773; *Gaeana sultana* Distant, 1913 and *Gaeana paviei* Noualhier, 1896 (the latter transferred by Metcalf (1963a) to the genus *Tosena* Amyot and Audinet-Serville, 1843). Jacobi (1902) described one species from Vietnam: *Gaeana electa* Jacobi, 1902 (transferred by Boulard (2005d) to the genus *Becquartina* Kato, 1940). Lee, 2008 recorded six species for the fauna of Vietnam: *Gaeana vitalisi* Distant, 1913; *Gaeana maculata* Drury, 1773; *Gaeana annamensis* Distant, 1913; *Gaeana sultana* Distant, 1913; *Gaeana laosensis* Distant, 1917 and *Gaeana vestita* Distant, 1905. Pham & Yang, 2009 recorded two more species: *Gaeana cheni* Chou et Yao, 1985 and *Gaeana hainanensis* Chou et Yao, 1985.

MATERIALS AND METHOD

Specimens were collected by netting and light trapping. Previously collected specimens were included in our evaluations. Specimens are deposited at the Department of Insect Systematics of the Institute of Ecology and Biological Resources, Hanoi; in the Netherlands Centre of Biodiversity, Leiden and at the Royal Belgian Institute of Natural Sciences (Brussels).

The tribal classification of this study follows on that of Moulds (2005). Genus and species names, as well as synonymies, follow the catalogues of Metcalf (1963), and Lee (2008).

Examined specimens are listed by provinces (given in bold). The following acronyms are used for the collections::

IEBR - Institute of Ecology and Biological Resources, Hanoi, Vietnam

NCB - Netherlands Centre of Biodiversity, Leiden, The Netherlands

RBINS - Royal Belgian Institute of Natural Sciences, Brussels, Belgium

Taxonomy

Family Cicadidae

Subfamily Cicadinae

Tribe Gaeaniini

Genus *Gaeana* Amyot & Serville, 1843

Gaeana Amyot & Serville, 1843, Hist., Hem: 463.

Type species: *Cicada maculata* Drury, 1773, Illustr. Nat. Hist. 2: 68.

Distribution. Oriental region.

Key to the species of *Gaeana*

- 1(2) Apical half of fore wings white with veins black; margin of hind wing opalescent or white, extending beyond 1/2 length of wing.....3
- 2(1) Apical half of fore wings black, with veins opalescent.....5
- 3(4) Base of hind wings with ochraceous or sanguineous points, apex of hind wings with 5 opalescent points; abdominal segments with 4 pairs of stramineous points; lateral view basal lobe of uncus not emarginated.....*G. cheni*
- 4(3) Basal hind wing with opalescent punctate, apical hind wing with 5 cinereous-opalescent punctate, the second and fourth a little small; abdominal segments without punctate; lateral view basal lobe of uncus emarginated.....*G. hainanensis*
- 5(6) Hind wings black.....7
- 6(5) Hind wings greyish brown, apical area fuscous, enclosing a greenish brown spot before apex, and with a strong greyish-brown indentation near anal area; black submarginal line.....*G. sultana*
- 7(8) Hind wings black with basal half irregularly greenish white, and a subapical spot of the same color.....9
- 8(7) Hind wings with a broad transverse subbasal patch, followed by two contiguous spots near costal margin, ochraceous, sometimes greyish, and with a submarginal series of greyish-brown spots in apical cells.....*G. maculata*
- 9(10) Operculum small, not passing the first abdominal segment, lateral margins nearly straight, apical margins rounded*G. annamensis*
- 10(9) Operculum not quite reaching base of abdomen, strongly concavely sinuate internally, slightly sinuate externally, apex transversely convex*G. vitalisi*

***Gaeana cheni* Chou & Yao, 1985**

Gaeana cheni Chou & Yao, 1985: 129; Pham & Yang, 2009: 6

Material examined. **Quang Tri:** 5 males, 3 females, Huc Nghi, Dakrong, 250-350m, 6.v.2005, coll. Pham Hong Thai; **Thua Thien Hue:** 1 female, Bach Ma NP, 1300m, 24.iii.2001, Hoang Vu Tru; 1 male, Aroang, Aluoi, 600-700m, 4.v.2005, coll. Pham Hong Thai (IEBR).

Distribution. Vietnam (Quang Tri, Thua Thien Hue), China (Chou *et al.*, 1997).

***Gaeana hainanensis* Chou & Yao, 1985**

Gaeana hainanensis Chou & Yao, 1985: 128 ; Pham & Yang, 2009: 6.

Material examined. **Quang Tri:** 2 males, 2 females, Dakrong NR, 200-400m, 2.vi.2004, coll. Tran Thieu Du (IEBR); **Thua Thien Hue:** 4 males, Vietnam (Thua Thien Hue prov) 40km W of Hue: camp at Khe Ca Loc stream, Phong Dien nature reserve, 60m, 16°31'15"N, 107°12'45"E, 22 Mar-7Apr 2001, at light, J. van Tol cs (NCB)

Distribution. Vietnam (Quang Tri, Thua Thien Hue), China (Chou *et al.*, 1997)

***Gaeana vitalisi* Distant, 1913**

Gaeana vitalisi Distant, 1913b: 287 [Type location: Indo-China]; Distant, 1914: 29; Distant, 1917a: 101; Metcalf, 1963b: 601; Lee, 2008: 6; Pham & Yang, 2009: 13.

Material examined. No specimen was available.

Distribution. Vietnam.

***Gaeana maculata* (Drury, 1773)**

Cicada maculata Drury, 1773: 68 [Type location: China].

Gaeana maculata: Jacobi, 1905: 432; Distant, 1906a: 145; Distant, 1917a: 101; Schmidt, 1932: 130; Wu, 1935: 19; Metcalf, 1963b: 596; Lee, 2008: 6; Pham & Yang, 2009: 13.

Material examined. 3 males, 5 females, Tonkin, Bavi, 16.iv.1936, Le Moulton (NCB); 1 male, Tonkin, Than-moi, Juni-Juli, 1905, H. Fruhstorfer (NCB); 1 female, Tonkin (NCB); **Thanh Hoa:** 5 males, 8 females, Pu Luong NR, 650m, 14.iv.2002; 1 female, Thành Sơn, Ba Thuoc, 600-700m, Cic0168, 9.iv.2002, **Vinh Phuc:** 3 males, 2 females: Me Linh, 250m, 23.iv.2001; 1 female, Me Linh, 100-200m, Cic0029, 26.v.2001; 1 male, 1 female, Me Linh, 100-200m, Cic0700, Cic0701, 1.v.2004; 3 females, Me Linh, 100-200m, Cic0672, Cic0673, Cic0795, 7-9.vi.2005 (IEBR); **Lang Son:** 1 female, 18.v.1964 (DZM); **Bac Kan:** 1 female, Tonkin, Backan, R.I.Sc.N.B. I.G.18.293, 1907, Ex Museo R.Oberthur (RBINS); **Ninh Binh:** 1 female, Dang, VQG Cuc Phuong, 19 v 2005, Luong Van Hao (IEBR); 4 females, Cuc Phuong NP, v.2006; 2 males, Cuc Phuong NP, Cic1091, Cic1092, 24.v.2005; **Phu Tho:** 2 females, Xuan Son NP, Cic0683, Cic0683, 7.v.2005 (IEBR); **Lao Cai:** 1 male, Chapo, prov. De Lao-Kay, Tonkin, Le Moulton (NCB)

Distribution. Vietnam (Lao Cai, Yen Bai, Bac Kan, Hoa Binh, Ha Noi, Quang Ninh, Vinh Phuc, Lang Son, and Thanh Hoa), China, India, Myanmar, Japan, Sri-Lanka.

***Gaeana annamensis* Distant, 1913**

Gaeana annamensis Distant, 1913c: 562 [Type location: Frontier of Laos, East Annam]; Distant, 1914: 29; Distant, 1917a: 101; Moulton, 1923: 149; Metcalf, 1963b: 592; Lee, 2008: 7; Pham & Yang, 2009: 13.

Material examined. Thua Thien Hue: 2 males, Bach Ma NP, 1300m, 24.iii.2001, Hoang Vu Tru (IEBR).

Distribution. Vietnam (Thua Thien Hue), Laos, Campuchia.

***Gaeana sultana* Distant, 1913**

Gaeana sultana Distant, 1913c: 562 [Type location: frontier of Laos, East Annam]; Distant, 1917a: 101; Metcalf, 1963b: 601; Lee, 2008: 7; Pham & Yang, 2009: 13.

Material examined. No specimen was available.

Distribution. S. Vietnam, Laos.

Species removed from the Vietnamese cicada fauna

Metcalf (1963) published a catalogue of the cicadas of the world, in which 100 species are recorded from Tonkin, Annam, Cochinchina and Indochina. However, Metcalf was mistaken in believing Indochina was Vietnam only.

Gaeana laosensis Distant, 1917 and *Gaeana vestita* Distant, 1905 are removed from the fauna of Vietnam because Metcalf (1963b) erroneously interpreted Indochina. Distant (1917b) only recorded it from Laos. Lee (2008) and Pham & Yang (2009) repeated Metcalf's error.

Acknowledgments: The first author would like to thank the scholarship for PhD dissertation that issued by the program of the National Chung Hsing University, Taiwan. We thank Mr Jerome Constant

(Royal Belgian Institute of Natural Sciences) for his critical reading and valuable comments in improving the contents of the paper. We also thank Dr. Yves Samyn and Dr. Patrick Grootaert (Royal Belgian Institute of Natural Sciences) for grant support to the first author; the grant was issued by the capacity building Programme of the Belgian Global Taxonomic Initiative National Focal Point and runs with financial support from the Belgian Directorate-General for Development Cooperation. This study would not have been possible without the help of Dr. Jan van Tol, MSc. Yvonne van Nierop, Dr. C. van Achterberg, and Mr. R. de Vries, (Netherlands Centre of Biodiversity) who kindly allowed access to the NCB collection, and the support from the Netherlands Centre of Biodiversity. The present study was partially supported by National Foundation for Science and Technology Development (NAFOSTED-106.12.15.09), Vietnam.

REFERENCES

1. **Chou I., Z. Lei , L. Li , X. Lu , W.Yao**, 1997: The Cicadidae of China (Homoptera: Cicadoidea). *Ilustrataj Insectfaunoj*, 2. Tianze Eldoneio, Hong Kong, 380 pp., 16 pls.
2. **Duffels J.P., P.A Van der Laan**, 1985: *Series Entomologica*, 34. Dr. W. Junk Publishers, Dordrecht, xiv+414 pp.
3. **Jacobi A.**, 1905: *Zool. Jahrb. Abt. System., Okl. Geog. U. Biol. Tiere* 21: 425-446, p1. 21.
4. **Lee Y.J.**, 2008: *Zootaxa*, 1787, 1-27.
5. **Metcalf Z.P.**, 1963: North Carolina State College, Raleigh, pp. 587–919.
6. **Moulds M.S.**, 2005: *Records of the Australian Museum*, 57, 375-446.
7. **Pham H. T., J. T.Yang**, 2009: *Zootaxa* 2249, 1-19.

GIỐNG VE SÀU *GAEANA* Amyot & Serville, 1843 (HEMIPTERA: CICADIDAE) Ở VIỆT NAM VÀ KHOÁ ĐỊNH LOẠI ĐẾN LOÀI

PHẠM HỒNG THÁI, TẠ HUY THỊNH, JENG-TZE YANG

TÓM TẮT

Giống ve sấu *Gaeana* Amyot & Serville có 6 loài được ghi nhận ở được Việt Nam: *Gaeana cheni* Chou & Yao, 1985; *G. hainanensis* Chou & Yao, 1985; *G. vitalisi* Distant, 1913; *G. maculata* (Drury, 1773); *G. annamensis* Distant, 1913 và *G. sultana* Distant, 1913, trong đó loài *Gaeana vitalisi* Distant, 1913 mới chỉ biết đến ở Việt Nam. Hai loài *Gaeana laosensis* Distant, 1917 và *Gaeana vestita* Distant, 1905 không có trong khu vực sấu Việt Nam. Khoá định loại đến loài cùng với những thông tin về mẫu vật nghiên cứu được trình bày trong bài báo này.