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Key to the genera of the subtribe Rhopalosiphina, and a description of a species newly-recorded from China (Homoptera: Aphididae, Aphidinae)

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Abstract: A key is provided for the identification of ten genera of the world-wide subtribe Rhopalosiphina. One species, *Schizaphis hypersiphonata* Basu, (1969) 1970 was recorded for the first time in China. Studied specimens are deposited in the Zoological Museum, Institute of Zoology, Chinese Academy of Sciences (IOZ), Illinois Natural History Survey, University of Illinois, USA (INHS), Department of Agriculture, United States (USDA), and British Museum (BMNH).

Key words: Aphidinae; Rhopalosiphina; key; new record; China

The subtribe Rhopalosiphina belongs to the Aphidini, Aphidinae of Aphididae. Until 2001, there were 10 genera in this subtribe worldwide (Remaudière and Remaudière, 1997; Zhang and Zhang, 2001) but there was no practical key to the genera of this subtribe. The aim of this paper is to provide a means of distinguishing the genera. Authentic material of the type species of 9 genera was examined together with that of another genus, *Mordvilkoiella* Shaposhnikov, 1964, which is included in the key from its original descriptions. A list of checked species is shown in an appendix. Among the 10 genera studied, 6 genera are recognized from China in this subtribe (Tao, 1965; Zhang, 1983; Zhang and Zhang, 2001). In addition, one species, *Schizaphis hypersiphonata* Basu, (1969) 1970 from Guangxi Autonomous Region was first found from China and is described below.

Remaudières' taxonomic system (Remaudière and Remaudière, 1997) is adopted and the terminology of Heie (1986) is followed. Measurements are in millimeters (mm). Following abbreviations are used for the collections motioned:

IOZ: Institute of Zoology, Chinese Academy of Sciences, China;

INHS: Illinois Natural History Survey, University of Illinois, USA;

USDA: Department of Agriculture, USA;

BMNH: British Museum (Natural History), UK.

Rhopalosphina

This subtribe is distinguished from the Aphidina by the following characters: marginal tubercle on abdominal tergite Ⅶ placed above level of stigmal pore, or marginal tubercles absent; if absent, then processus terminalis longer than 2 times basal part of ultimate antennal segment.

The subtribe is represented by 10 genera worldwide, such as: *Asiphonaphis* Wilson and Davis, 1919, *Hallaphis* Doncaster, 1956, *Hyalopterus* Koch, 1854, *Hysteroneura* Davis, 1919, *Melanaphis* van der Goot, 1917, *Mordvilkoiella* Shaposhnikov, 1964, *Mutillaphis* Zhang and Zhang, 2001, *Pseudasiphonaphis* Robinson, 1965, *Rhopalosiphum* Koch, 1854, and *Schizaphis* Börner, 1931.

Key to genera of the subtribe Rhopalosiphina

1. Siphunculi absent; abdominal marginal tubercles bun-shaped, as long as basal width ..... ***Asiphonaphis***
   Siphunculi present, length various 2

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2. Siphunculi pore or truncate, length shorter than its basal width ····· 3
Siphunculi slightly longer to much longer, length same as to longer than its basal width ····· 5
3. Ultimate rostral segment 'rostrate' -shaped; marginal tubercles only on prothorax, cauda helmet-shaped ····· ***Mordvilkoiella***
Ultimate rostral segment normal; marginal tubercles on prothorax and abdominal segments Ⅰ – Ⅶ; cauda long conical ····· 4
4. First tarsal segment chaetotaxy: 2, 2, 2; marginal tubercles finger-shaped, length twice than basal width; antenna 6-segmented; antennal sockets weakly developed ····· ***Mutillaphis***
First tarsal segment chaetotaxy: 3, 3, 2 – 3; marginal tubercles small and round, almost as long as their basal width; antenna 5-segmented; antennal sockets extensively developed ····· ***Pseudasiphonaphis***
5. Basal and distal parts of siphunculi constricted, apex round, flange absent ····· ***Hyalopterus***
Basal part of siphunculi not constricted, apex with flange ··· 6
6. Basal part of siphunculi thick, tapered apicad; processus terminalis 6 – 8 times as long as base of the segment ··· ***Hysteroneura***
Siphunculi barrel-shaped, or distal half slightly swollen; processus terminalis less than 6 times of base of the segment ····· 7
7. Siphunculi distinctly constricted below flange, vase-shaped; fore wing median veins with two forks, the second fork near margin of fore wing ····· 8
Siphunculi barrel-shaped, distal part not vase-shaped; fore wing median veins with one or two forks, the second fork not near margin of fore wing if with two forks ····· 9
8. Hind wing with one oblique vein; cauda short, U-shaped; marginal abdominal tubercles absent ····· ***Hallaphis***
Hind wing with two oblique veins; cauda more or less conical, slightly constricted at middle; marginal abdominal tubercles on abdominal segments Ⅰ and Ⅶ ····· ***Rhopalosiphum***
9. Apical micro-sensoria of rostrum thick long and curved; dorsal appearance of thorax and abdomen more or less smooth; fore wing median vein with two forks; siphunculi normally shorter than cauda, some slightly longer ····· ***Melanaphis***
Apical micro-sensoria of rostrum normal; dorsal appearance of thorax and abdomen with reticulations; fore wing median vein with one fork; siphunculi normally distinctly longer than cauda ····· ***Schizaphis***

***Asiphonaphis* Wilson and Davis, 1919** (Fig. 1)

Distinguished from other Rhopalosiphina by the absence of siphunculi. And the male as well as the oviparous female is apterous. There are three species recognized in the world but none are found in China.

***Hallaphis* Doncaster, 1956** (Figs. 2, 3)

Characterized by 5-segmented antennae, the absence of marginal abdominal tubercles, rather short and thick siphunculi (Fig. 2), densely and finely spinulose, short and inconspicuous, U-shaped cauda (Fig. 3) and hind wing with one oblique vein. There are four known species worldwide, but none are found in China.

***Hyalopterus* Koch, 1854** (Fig. 4)

Distinguished from most other Rhopalosiphina by siphunculi (Fig. 4) which are very short, constricted at base, without flange and a small opening. The genus is represented by two species in the world, also distributed in China.

***Hysteroneura* Davis, 1919** (Fig. 5)

Hind wings with single cross-vein, processus terminalis much longer, about 6 – 8 times as long as the base of ultimate antennal segment, and "femur-shaped" siphunculi (Fig. 5) are distinctive. There is one known species in the world, also distributed in China.

***Melanaphis* van der Goot, 1917** (Figs. 6, 7)

Distinguished from *Schizaphis* by siphunculi (Fig. 6) usually shorter than cauda (Fig. 7), fore wing medial veins with two forks, and ante-siphuncular abdominal tergites with sclerotized patches or transverse bands. There are twenty four known species and subspecies, among them eleven species are found in China.

***Mordvilkoiella* Shaposhnikov, 1964**

Characterized by ultimate rostral segment 'rostrate' -like and helmet-shaped triangular cauda. Only one species is recognized in the world, not found in China.

***Mutillaphis* Zhang and Zhang, 2001** (Figs. 8, 9)

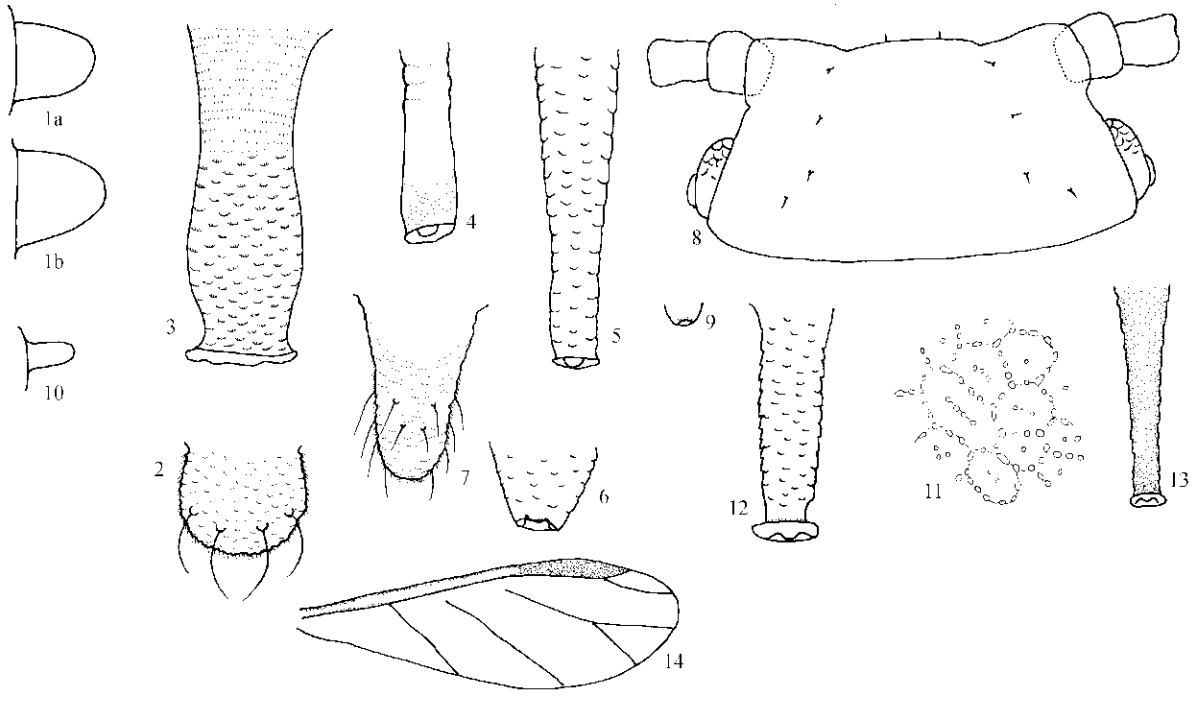
First tarsal segment chaetotaxy, abdominal marginal tubercles small and round, and developed antennal bucket are its diagnostic features. In this genus, only one species is known and it is only found in China according to the current materials.

***Pseudasiphonaphis* Robinson, 1965** (Fig. 10)

This genus is related to *Asiphonaphis*, but characterized by the presence of pore-like siphunculi (Fig. 10), abdominal marginal tubercles slender, about twice as long as basal width, as well as alate viviparous females fore wings second fork of medial veins very close to wing margin, or sometimes absent. Only type species is recognized in the world, not found in China.

***Rhopalosiphum* Koch, 1854** (Figs. 11, 12)

Distinguished from *Schizaphis* by siphunculi (Fig. 11) with a constriction just below the flange, much like the end of a home-made sausage, dorsum of apterous viviparous female with rows of fine spinules forming polygons (Fig. 12), each polygon enclosing a central group of spinules, and fore wing medial veins with two forks. There are seventeen known species worldwide, among them five species in China.



Figs. 1 – 14 Important characters of some species in Rhopalosiphina

1. *Asiphonaphis pruni* Wilson and Davis; 2, 3. *Hallaphis ilharcoi* van Harten; 4. *Hyalopterus pruni* (Geoffroy); 5. *Hysteroneura setariae* (Thomas); 6, 7. *Melanaphis siphonella* (Essig and Kuwana); 8, 9. *Mutillaphis prunisucta* Zhang and Zhang; 10. *Pseudasiphonaphis corni* (Tissot); 11. dorasl reticulations on *Rhopalosiphum nymphaeae* (Linnaeus); 12. *Rhopalosiphum rufiabdominale* (Sasaki); 13, 14. *Schizaphis graminum* (Rondani). a. marginal tubercle on abdominal tergite Ⅲ; b. marginal tubercle on abdominal tergite Ⅰ; 2. cauda; 3. siphunculus; 4. siphunculus; 5. siphunculus; 6. siphunculus; 7. cauda; 8. dorsal view of head; 9. siphunculus; 10. marginal tubercle on abdominal tergites Ⅰ, Ⅲ, Ⅶ; 11. dorsal reticulations; 12. siphunculus; 13. siphunculus; 14. fore wing

***Schizaphis* Börner, 1931** (Figs. 13, 14)

Distinguished from *Rhopalosiphum* by fore wing medial veins with one fork (Fig. 14), dorsal reticulations on body, and also the shape of siphunculi (Fig. 13). Forty two species and one subspecies are known in this genus, among them, six species recognized in China.

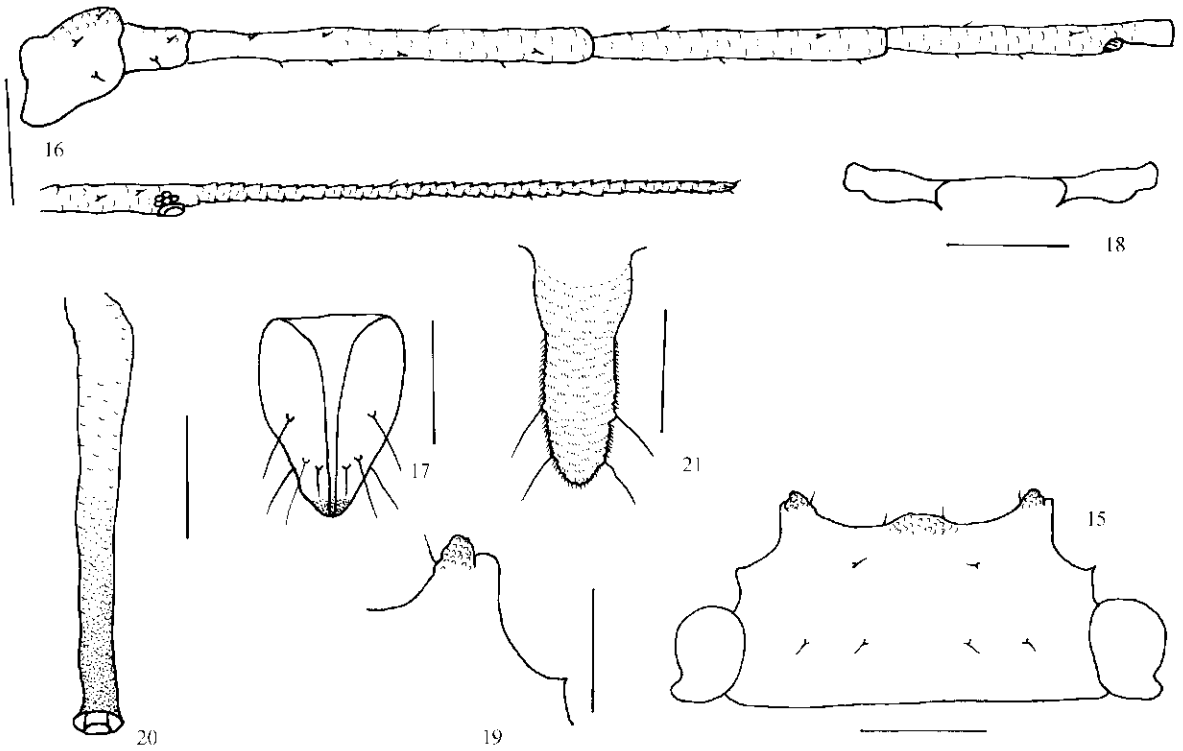
***Schizaphis hypersiphonata* Basu, (1969) 1970 New Record to China** (Figs. 15 – 21)

Schizaphis hypersiphonata Basu, (1969) 1970: 364; Eastop and Hille Ris Lambers, 1976: 387; Remaudière and Remaudière, 1997: 63.

Description: Apterous viviparous females: body length 1.636, width 0.815. Antenna (Fig. 16) 1.464, segments Ⅰ – Ⅵ: 0.082, 0.052, 0.320, 0.214, 0.222, 0.109 + 0.465. Ultimate rostral segment (Fig. 17) length 0.076, width 0.061. Hind femur 0.441, hind tibia 0.748, 2nd hind tarsal segment

0.100. Siphunculus (Fig. 20) length 0.362, 0.049 in basal diameter. Cauda length 0.189 (Fig. 21).

Body elliptical, pale yellow, antennae brown in life. In cleared specimens, apex of rostrum, distal half of siphunculi, basal 2/3 antennal segment Ⅲ, segments Ⅳ – Ⅵ, apex of hind femora, distal tibiae and tarsi dark brown; others pale. Spiracles elliptical and open, spiracular plates elliptical, sclerotized. Inner facets of antennal segments Ⅰ – Ⅱ punctured, antennal segments Ⅲ – Ⅵ, 2nd tarsal segments and siphunculi transversely imbricate. Mesosternal furca (Fig. 18) with connected arms, single arm 0.088, 1.7 times as long as antennal segment Ⅱ. Marginal tubercles small, present on prothorax and abdominal tergites Ⅰ and Ⅶ. Dorsal hairs of body short and pointed. Head with 1 pair of cephalic hairs, 1 pair of antennal tubercular hairs and 3 pairs of dorsal hairs. Pronutum with 1 pair of posterior spinal hairs, 1 pair of anterior pleural hairs and 1 pair of anterior marginal hairs. Body with a few dorsal hairs. A pair of marginal hairs and 2 – 3 pairs of spino-pleural hairs on abdominal tergites Ⅰ – Ⅶ. Two to three hairs on abdominal tergite Ⅷ. Length of cephalic hairs, marginal hairs on abdominal tergite Ⅰ, and spinal dorsal hairs on abdominal tergite Ⅷ 0.5, 0.7, 1.13 times as long as basal diameter of antennal segment Ⅲ, respectively. Median front developed, and with punctures; antennal tubercles distinctly developed, higher than median front; inner facet of antennal tubercle with a conical protuberance on which there are punctures (Figs. 15, 19). Antenna 6-segmented (Fig. 16), slender, without secondary rhinaria, length in proportion of segments Ⅰ – Ⅵ: 26, 16, 100, 67, 69, 34 + 145. Processus terminalis 4.23 times as long as base of antennal segment Ⅵ. Primary rhinaria small and round, ciliated. Rostrum reaching mid-coxae; ultimate rostral segment 1.25 times as long as its basal diameter, 0.76 times as long as 2nd hind tarsal segment, with 1 pair of accessory hairs and 3 pairs of primary hairs. Hind femur 1.38 times as long as antennal segment Ⅲ, hind tibia 0.45 times as long as body. Length of longest hairs on hind tibia 0.045, 1.23 times as long as mid-diameter of hind tibia. First



Figs. 15 – 21 Apterous viviparous female of *Schizaphis hypersiphonata* Basu, (1969) 1970

15. dorsal view of head; 16. antenna; 17. ultimate rostral segment; 18. mesosternal furca; 19. cone protuberance on inner facet of antennal tubercle (part); 20. siphunculus; 21. cauda. Scale bars: Figs. 15, 16, 18, 20, 21 = 0.1 mm; Figs. 17, 19 = 0.05 mm

tarsal segment chaetotaxy: 3, 3, 2. Siphunculus thin and long; constricted at base, "knee-shaped"; aperture at apex (Fig. 20); 7.39 times as long as its basal diameter, and 1.92 times as long as cauda in length. Cauda (Fig. 21) 1.1 times as long as its basal diameter, with 3 – 4 hairs. Anal plate with 18 – 22 hairs. Genital plate with 2 anterior hairs and 8 posterior hairs.

Materials examined: 6 apterous viviparous females, China: Guangxi, Fangcheng, 12 March, 1998 (QIAO Ge-Xia).

Biology: This species feeds on undersides of leaves of *Phragmites communis* Trin., Gramineae.

Distribution: China (Guangxi); India, Thailand, Philippines and Australia.

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Appendix: List of Checked Collections

Asiphonaphis pruni Wilson and Davis, 1919 (Type species) (INHS, USDA)

Hallaphis ilharcoi van Harten, (1971) 1972 (USDA)

Hyalopterus amygdali (Blanchard, 1840) (IOZ, INHS)

Hyalopterus pruni (Geoffroy, 1762) (Type species) (IOZ, INHS)

Hysteroneura setariae (Thomas, 1878) (Type species) (INHS, IOZ)

Melanaphis arundinaria (Takahashi, 1937) (IOZ)

Melanaphis bambusae (Fullaway, 1910) (Type species) (IOZ)

Melanaphis donacis (Passerini, 1862) (BMNH)

Melanaphis formosana (Takahashi, 1921) (IOZ)

Melanaphis graminisucta Zhang, 1992 (IOZ)

Melanaphis grossisiphonellus Zhang, Qiao and Zhang, 2001 (IOZ)

Melanaphis japonica (Takahashi, 1919) (IOZ)

Melanaphis koreana (Sorin, 1972) (BMNH)

Melanaphis montana (Sorin, 1970) (BMNH)

Melanaphis pyraria (Passerini, 1861) (IOZ)

Melanaphis pyrisucta Zhang and Qiao, 1999 (IOZ)

Melanaphis sacchari (Zehntner, 1897) (IOZ)

Melanaphis siphonella (Essig and Kuwana, 1918) (IOZ, BMNH)

Melanaphis zhanhuaensis Zhang, Qiao and Zhang, 2001 (IOZ)

Mutillaphis prunisucta Zhang and Zhang, 2001 (IOZ)

Pseudoasiphonaphis corni (Tissot, 1929) (Type species) (INHS)

Rhopalosiphum arundinariae (Tissot, 1933) (INHS)

Rhopalosiphum cerasifoliae (Fitch, 1855) (INHS)

Rhopalosiphum enigmae Hottes and Frison, 1931 (INHS, BMNH)

Rhopalosiphum insertum (Walker, 1849) (INHS, BMNH)

Rhopalosiphum maidis (Fitch, 1856) (IOZ)

Rhopalosiphum musae（Schouteden，1906）（INHS，BMNH）
Rhopalosiphum nigrum Richards，1960（BMNH）
Rhopalosiphum nymphaeae（Linnaeus，1761）（IOZ）
Rhopalosiphum padi（Linnaeus，1758）（IOZ）
Rhopalosiphum padiformis Richards，1962（BMNH）
Rhopalosiphum parvae Hottes and Frison，1931（INHS）
Rhopalosiphum rufiabdominale（Sasaki，1899）（IOZ）
Rhopalosiphum rufulum Richards，1960（INHS）
Schizaphis（Schizaphis）*chaenometicola* Zhang，1998（IOZ）
Schizaphis（Schizaphis）*graminum*（Rondani，（1847）1852）（Type species）（IOZ，INHS）
Schizaphis（Schizaphis）*hierochlophaga* Zhang and Chen，1998（IOZ）
Schizaphis（Schizaphis）*hypersiphonata* Basu，（1969）1970（IOZ）
Schizaphis（Schizaphis）*piricola*（Matsumura，1917）（IOZ）
Schizaphis（Schizaphis）*siniscirpi* Zhang，1983（IOZ）

缢管蚜亚族分属检索表及中国一新记录种记述

（同翅目：蚜科，蚜亚科）

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摘要：提供了世界蚜科 Aphididae 蚜亚科 Aphidinae 缢管蚜亚族 Rhopalosiphina 10 个属的检索表。记述一个中国新记录种——超管二叉蚜 *Schizaphis hypersiphonata* Basu，（1969）1970。研究标本保存在中国科学院动物研究所动物标本馆、伊利诺伊大学 Illinois Nature History Survey、美国农业部系统昆虫学实验室标本馆和英国自然历史博物馆。

关键词：蚜亚科；缢管蚜亚族；检索表；新记录；中国
中图分类号：Q969.376.2 **文献标识码**：A **文章标号**：0454-6296（2003）03-0345-06