Fauna, ecological properties, and zoogeographical composition of Mirinae (Hemiptera: Miridae) of the Hulunbuir region, Inner Mongolia of China

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The fauna, ecological properties, and zoogeographical composition of Mirinae of the Hulunbuir region of China were studied and summarized. A total of 65 species belonging to 2 tribes and 19 genera were recorded. Among them, *Charagochilus gyllenhalii* (Fallén, 1807), *Lygus poluensis* (Wagner, 1967) and *Phytocoris zhengi* Nonnaizab & Jorigtoo, 1992 are new records for the Hulunbuir region and the former species is the first record also for the entire Inner Mongolia. In the Hulunbuir region, the highest number of Mirinae species (31) was collected from the Ewenki Autonomous Banner during July within the elevations of 601–750 m. From the perspective of zoogeographical composition, the Mirinae species found in Hulunbuir belong to faunae attributed to the Palaearctic, Oriental, and Nearctic regions with the Palaearctic dominating.

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1. Introduction

Mirinae is the largest subfamily of Miridae (Hemiptera, Heteroptera), with seven tribes, 418 genera and more than 4,000 described species in the world (Schuh 1995, Schuh & Slater 1995, Cassis & Schuh 2012, Schuh 2013). Studies of different scopes have been performed by various researchers on the Mirinae fauna. The majority of these are faunistic and taxonomic studies. Many records of Mirinae are located relatively close to the Chinese borders or cover China, i.e. in the Soviet Far East, Siberia or the Palaearctic Region (Vinokurov 1979, Kerzhner 1988, Vinokurov & Kanyukova 1995, Kerzhner & Josifov 1999, Aukema *et al.* 2013). The most representative study performed on the Mirinae fauna in China is by Zheng *et al.* 2004. Up to now, 412 species and 80 genera of this subfamily have been recorded from China, belonging to Hyalopeplini Carvalho, 1952 (8 genera 13 species), Mecistoscelini Carvalho, 1959 (3 genera 3 species), Mirini Hahn, 1833 (60 genera 344 species), and Stenodemini China, 1943 (9 genera 52 species) (Zheng 1995, Qi *et al.* 2003, Zheng *et al.* 2004, Qi *et al.* 2008, Schwartz 2008, Konstantinov & Vinokurov 2011, Konstantinov *et al.* 2013, Vinokurov & Luo 2014). From Inner Mongolia of China, 17 genera and 90 species of Mirinae have been recorded (Bai 1999, Qi *et al.* 2003, Zheng *et al.* 2004).

Most Mirinae are herbivorous and some are known as serious crop pests (Shiba & Sugawara

Fig. 1. Map of research area, Hulunbuir region in North China (modified from https://en.wikipedia.org/wiki/Hulunbuir).

2005, Koczor *et al.* 2012, Liu *et al.* 2015, Zhang *et al.* 2015), for example *Adelphocoris lineolatus* (Goeze, 1778), *Apolygus lucorum* (Meyer-Dür, 1843), *Lygus pratensis* (Linnaeus, 1758) and *Trigonotylus caelestianum* (Kirkaldy, 1902).

The Hulunbuir region is located in the northeast of Inner Mongolia Autonomous Region, ranging from 47°05–53°20'N and 115°31–126°04'E, with an area of 253,000 km^2. It is a transitional zone between the forest meadows to the arid grassland of Northeast China. The Hulunbuir region is located inland with relatively high latitude, belonging to the temperate continental climate. The climate is characterized by long cold winter, dry windy spring, short cool summer, and autumn with early frost and plunging temperatures. It includes politically one district (Hailer), five cities (Erguna, Genhe, Manzhouli, Yakeshi, Zhalantun), three autonomous banners (Ewenki Autonomous Banner, Molidawa Daur Autonomous Banner, Oroqen Autonomous Banner) and four banners (Arun Banner, Chen Barag Banner, Xin Barag Left Banner, Xin Barag Right Banner) (Fig. 1). Its territory includes the well-known Erguna Wetland, Daxinganling Mountains, and Hulunbuir Prairie. The Erguna Wetland is the most intact wetland in China and it is also known as "the first wetland in Asia". Daxinganling Mountains run through the Hulunbuir region in a northeast-southwest direction. The western area of Daxinganling Mountains is mainly grassland while the eastern area is farmland. The Hulunbuir Prairie is one of the world's three prairies, with a total area of about 100,000 km^2, of which 80% is natural grassland (Editorial Committee of the Mongolia Encyclopedia 2012). The Hulunbuir region has varied terrains and landforms, rich in animal, plant, and mineral resources. In recent years, because of extensive development, farming, logging, ranching, mining, and tourism, this region has met with vegetation destruction, habitat fragmentation, biodiversity loss, and increased frequency of sandstorms. The Hulunbuir region is facing severe ecological degradation.

Speceis of Mirinae are usually well repre-

sented in grassland habitats (Zheng *et al.* 2004). There are no systematic studies of the Mirinae fauna of Hulunbuir region. The knowledge of the Mirinae species from this region is limited to very scattered and incomplete collections, lacking detailed and accurate locality information. The aim of this paper is to investigate the fauna and species composition, provide detailed distributional and ecological data (phenology, elevation, location) for the Mirinae of Hulunbuir region. We anticipate our project will provide supporting data for future research on biodiversity, biogeography, and ecology of this poorly known region.

2. Materials and methods

In this study, all data of the examined specimens was compiled from two sources:

1) From samplings between June and September of 2011–2015 in eight areas of Hulunbuir region (Chen Barag Banner, Ewenki Autonomous Banner, Xin Barag Left Banner, Xin Barag Right Banner, Genhe, Erguna, Manzhouli, Yakeshi).
2) From earlier label records of specimens and/or types deposited in the Entomology Museum of Nonnaizab Entomology Research Center, Inner Mongolia Normal University (EMIMNU); these involve eleven areas of Hulunbuir: Hailar, Oroqen and Zhalantun in addition to the eight above-mentioned areas.

For the first source above, five sampling sites were chosen from different habitats in our each collecting area. Mirinae specimens were collected by a five-plot sampling method (center and four corners of each sampling site), for a total of 40 sampling sites and 200 plots (a plot 50 m × 50 m). The samplings were performed in fine weather (at approximately 9:00 to 16:00 h), with one person per plot sweep netting for one hour. All sampling sites were collected one time per year, each equally and fully as far as possible. For each sampling site, the vegetation type, the GPS coordinates and the altitude was recorded. Collected insects were killed in poison bottles (ethyl acetate). Adults of Mirinae were pinned and deposited in the Inner Mongolia University for Nationalities (IMUN), Inner Mongolia, China. According to the literatures (Carvalho 1952, 1955, Vinokurov 1979, Kerzhner 1988, Schuh 1995, Vinokurov & Kanyukova 1995, Kerzhner & Josifov 1999, Schwartz & Eyles 1999, Demchenko 2003, Zheng *et al.* 2004, Aglyamzyanov 2005, Schwartz 2008, Aglyamzyanov 2009, Gapon 2014, Vinokurov & Luo 2014), all the specimens were examined using a Zeiss stemi 305 stereomicroscope (lab microscope-set, configuring 2.0 X front optics, max magnification 80 X).

3. Checklist of Mirinae species of Hulunbuir Region

3.1. *Adelphocoris fasciaticollis* Reuter, 1903
Material examined. **Ewenki Autonomous Banner**: Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 1♂, N. Bai leg. (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 4.VIII.1987, 1♂, N. Bai leg. (EMIMNU).

3.2. *Adelphocoris ferrugineus* Hsiao, 1962
Material examined. **Ewenki Autonomous Banner**: Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 2♂♂, N. Bai leg. (EMIMNU); **Hailar**, 49°12’33”N, 119°46’11”E, 609 m, 24.VII.1981, 2♀♀, N. Bai leg. (EMIMNU).

3.3. *Adelphocoris laeviusculus* Vinokurov, 1976
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 4.VIII.1985, 1♂, 1♀, Q. Liu leg. (EMIMNU).

3.4. *Adelphocoris lineolatus* (Goeze, 1778)
Material examined. **Chen Barag Banner**: Bayinhushu, 49°10’24”N, 119°12’48”E, 598 m, 23.VII.2012, 4♂♂, 9♀♀, Mehetuya leg. (IMUN), Ewenke County, 49°52’19”N, 120°23’49”E, 710 m, 24.VII.2014, 2♂♂, 7♀♀, K. Shi leg. (IMUN), Jinzhanghan, 49°30’16”N, 119°46’85”E, 651 m, 25.VII.2014, 12♂♂, 41♀♀, K. Shi leg. (IMUN), Wuzhuer County, 49°33’53”N, 118°30’20”E, 531 m, 25.VII.2012, 2♂♂, 11♀♀, Mehetuya leg. (IMUN); **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 13.VII.1988, 11♂♂, 20♀♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’

48”E, 613 m, 2.VIII.1981, 2♂♂ (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 9.VIII.1981, 1♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 29.VII.1980, 9♂♂, 20♀♀ (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 3.VII.1981, 1♂, 2♀♀, N. Bai leg. (EMIMNU).

3.5. *Adelphocoris melanocephalus* Reuter, 1903
Material examined. **Oroqen Autonomous Banner**, 50°34’54”N, 123°45’15”E, 425 m, 12.VIII.1981, 1♂, 2♀♀ (EMIMNU); **Zhalantun**, 48°01’54”N, 122°42’58”E, 310 m, 1.VIII.1978, 1♂, N. Bai leg. (EMIMNU).

3.6. *Adelphocoris nigritylus* Hsiao, 1962
Material examined. **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 13.VII.1988, 11♂♂, 20♀♀, N. Bai leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 3.VII.1981, 2♀♀, N. Bai leg. (EMIMNU).

3.7. *Adelphocoris obliquefasciatus* Lindberg, 1934
Material examined. **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 12.VIII.1981, 2♀♀ (EMIMNU); **Zhalantun**, 48°05’39”N, 122°44’38”E, 326 m, 29.VII.1982, 1♂, 3♀♀, N. Bai leg. (EMIMNU).

3.8. *Adelphocoris ponghvariensis* Josifov, 1978
Material examined. **Ewenki Autonomous Banner**: Xinihexi, 48°56’41”N, 119°46’30”E, 633 m, 11.VIII.2014, 1♂, K. Shi leg. (IMUN); **Xin Barag Right Banner**: Dongmiao, 48°45’04”N, 117°01’07”E, 545 m, 7.VIII.2014, 1♂, 1♀, K. Shi leg. (IMUN); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 9.VII.1981, 7♂♂, 11♀♀ (EMIMNU).

3.9. *Adelphocoris quadripunctatus* (Fabricius, 1794)
Material examined. **Chen Barag Banner**: Jinzhanghan, 49°30’16”N, 119°46’85”E, 651 m, 25.VII.2013, 1♂, 4♀♀, K. Shi leg. (IMUN); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 17.VII.1985, 7♂♂, 15♀♀, Q. Liu leg. (EMIMNU), Enhe, 50°49’19”N, 119°54’12”E, 658 m, 16.VII.2014, 1♂, 5♀♀, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Xinihexi, 48°56’41”N, 119°46’30”E, 633 m, 11.VIII.2014, 8♂♂, 68♀♀, K. Shi leg. (IMUN); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 25.VII.1981, 2♀♀ (EMIMNU); **Oroqen Autonomous Banner**, Alihe, 50°35’01”N, 123°43’07”E, 423 m, 28.VII.1980, 1♀ (EMIMNU); **Xin Barag Right Banner**: Buerdun, 49°05’92”N, 116°59’40”E, 633 m, 6.VIII.2014, 2♂♂, 1♀, K. Shi leg. (IMUN), Hulunlu, 49°20’28”N, 117°39’28”E, 595 m, 6.VIII.2015, 5♀♀, K. Shi leg. (IMUN).

3.10. *Adelphocoris reicheli* (Fieber, 1836)
Material examined. **Oroqen Autonomous Banner**, 50°35’24”N, 123°43’05”E, 425 m, 12.VIII.1981, 1♂, 2♀♀ (EMIMNU), Alihe, 50°35’01”N, 123°43’07”E, 423 m, 20.VII.1980, 1♀, 1♂ (EMIMNU).

3.11. *Adelphocoris rufescens* Hsiao, 1962
Material examined. **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 10.VII.1988, 1♀, N. Bai leg. (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 12.VIII.1981, 1♂, 1♀ (EMIMNU).

3.12. *Adelphocoris tenebrosus* (Reuter, 1875)
Material examined. **Erguna**: Enhe, 50°49’19”N, 119°54’12”E, 658 m, 2.VIII.2012, 2♂♂, 2♀♀, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 1♂ (EMIMNU); **Genhe**, 50°30’20”N, 121°01’49”E, 789 m, 26.VII.2012, 2♂♂, 5♀♀, Qilemoge leg. (IMUN), Mangui, 52°14’59”N, 122°16’35”E, 633 m, 27.VII.2012, 2♀♀, Mehetuya leg. (IMUN); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 12.VIII.1981, 1♂, 2♀♀ (EMIMNU).

3.13. *Adelphocoris triannulatus* (Stål, 1858)
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 2♂♂, Q. Liu leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 1.VII.1981, 2♂♂, 7♀♀ (EMIMNU).

3.14. *Apolygus lucorum* (Meyer-Dür, 1843)
Material examined. **Chen Barag Banner**: Hadatu, 49°38’03”N, 119°45’03”E, 668 m 28.VII.2011, 22♂♂, 34♀♀, K. Shi leg. (IMUN),

Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 22.VIII.2012, 24♂♂, 54♀♀, K. Shi leg. (IMUN); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 2♂♂, Q. Liu leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 633 m, 27.VII.2012, 21♂♂, 24♀♀, Qilemoge leg. (IMUN); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 806 m, 29.VII.2007, 11♂♂, 20♀♀, Y. Li leg. (EMIMNU); **Xin Barag Right Banner**: Wulannuoer, 48°18’36”N, 117°25’17”E, 554 m, 23.VII.2007, 2♀♀, X. Lv leg. (EMIMNU); **Zhalantun**: Yaergenchu, 47°44’43”N, 122°36’25”E, 336 m, 11.VII.1982, 3♂♂, 8♀♀, N. Bai leg. (EMIMNU).

3.15. *Apolygus nigronasutus* (Stål, 1858)
Material examined. **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 28.VII.1980, 1♂ (EMIMNU); **Zhalantun**, 48°05’39”N, 122°44’38”E, 326 m, 11.VII.1982, 1♂, N. Bai leg. (EMIMNU).

3.16. *Apolygus nigrovirens* (Kerzhner, 1988)
Material examined. **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 28.VII.1980, 1♀ (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 806 m, 29.VII.2007, 1♂, 2♀♀, Y. Li leg. (EMIMNU); **Xin Barag Right Banner**, 48°40’12”N, 116°48’58”E, 555 m, 14.VII.1982, 2♂♂, 4♀♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 11.VII.1999, 1♂, 2♀♀, H. Bai leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 12.VII.1981, 4♀♀ (EMIMNU), Yaergenchu, 47°44’43”N, 122°36’25”E, 336 m, 12.VII.1982, 2♂♂, N. Bai leg. (EMIMNU).

3.17. *Apolygus spinolae* (Meyer-Dür, 1841)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 1.VIII.1999, 1♂, 1♀, Y. Gao leg. (EMIMNU); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 1♂, 4♀♀ (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 714 m, 3.VIII.1985, 1♂, Q. Liu leg. (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 29.VII.1980, 1♂ (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 806 m, 28.VII.2007, 1♀, Y. Li leg. (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 18.VII.1999, 1♂, Z. Wu leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 9.VII.1981, 1♀ (EMIMNU).

3.18. *Capsodes gothicus* (Linnaeus, 1758)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 28.VII.1999, 4♂♂, 7♀♀, G. Tang leg. (EMIMNU); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 7♂♂, 13♀♀, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 3.VII.1980, 7♀♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 18.VII.1980, 8♀♀, N. Bai leg. (EMIMNU), Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 5♂♂, 4♀♀ (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 714 m, 10.VII.1990, 1♂ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°34’51”N, 123°43’17”E, 425 m, 11.VII.1988, 1♂ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 18.VII.1999, 17♂♂, 17♀♀, Z. Wu leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 13.VII.1981, 1♀ (EMIMNU), Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 13.VII.1981, 2♀♀ (EMIMNU).

3.19. *Capsus cinctus* (Kolenati, 1845)
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 1♀, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 22.VII.1980, 1♂ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 18.VII.1980, 2♂♂, 1♀ (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 3.VIII.1981, 1♀ (EMIMNU).

3.20. *Capsus pilifer* (Remane, 1950)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 28.VII.1999, 1♀, Y. Gao leg. (EMIMNU); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 30.VII.1985, 1♂, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1988, 1♂, N. Bai leg. (EMIMNU); **Genhe**, 50°46’44”N, 121°30’48”E, 715 m, 30.VII.1985, 1♀, Q. Liu leg. (EMIMNU).

3.21. *Capsus wagneri* (Remane, 1950)
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 15.VII.1985, 2♂♂, Q. Liu leg. (EMIMNU), Enhe, 50°49’19”N, 119°54’ 12”E, 658 m, 2.VIII.2012, 1♀, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 22.VII.1980, 1♂ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 12.VII.1980, 1♂ (EMIMNU); **Genhe**, 50°30’20”N, 121°01’ 49”E, 789 m, 26.VII.2012, 5♂♂, 4♀♀, Qilemoge leg. (IMUN); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 26.VII.1999, 1♂, H. Bai leg. (EMIMNU); **Zhalantun**: Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 12.VII.1981, 1♂ (EMIMNU).

3.22. *Charagochilus gyllenhalii* (Fallén, 1807)
Material examined. **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 809 m, 28.VII. 2007, 3♂♂, 4♀♀, H. Li leg. (IMUN).
Remark. New record for Inner Mongolia.

3.23. *Lygidea illota* (Stål, 1858)
Material examined. **Oroqen Autonomous Banner**: Alihe, 50°36’40”N, 123°44’05”E, 425 m, 12.V.1988, 1♂, 2♀♀, X. Li leg. (EMIMNU).

3.24. *Lygocoris pabulinus* (Linneaus, 1761)
Material examined. **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 2♂♂, 4♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’ 01”N, 123°43’07”E, 423 m, 16.VIII.1981, 2♂♂ (EMIMNU).

3.25. *Lygus gemellatus* (Herrich-Schaeffer, 1835)
Material examined. **Chen Barag Banner**: Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 12.VII.2011, 6♂♂, 10♀♀, Y. Li leg. (IMUN), Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 22.VIII.2012, 5♂♂, 20♀♀, K. Shi leg. (IMUN), Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 2.IX.2013, 7♂♂, 12♀♀, K. Shi leg. (IMUN), Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 18.IX.2014, 8♂♂, 18♀♀, K. Shi leg. (IMUN), Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 27.VII.2015, 6♂♂, 16♀♀, K. Shi leg. (IMUN); **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 12.VII.1988, 5♂♂, 7♀♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 22.VII.1980, 1♂, 1♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 12.VII.1980, 2♂♂, 3♀♀ (EMIMNU); **Genhe**: Mangui, 52°02’ 21”N, 122°02’56”E, 635 m, 17.VII.1983, 3♂♂, 4♀♀ (EMIMNU); **Hailar**, 49°14’13” N, 119°45’ 21”E, 617 m, 24.VII. 1981, 2♀♀ (EMIMNU); **Xin Barag Left Banner**: Chagang, 49°29’03”N, 117°54’28”E, 543 m, 6.VIII.2014, 1♂, 4♀♀, K. Shi leg. (IMUN), Chagang, 49°29’03”N, 117°54’ 28”E, 543 m, 24.VII.2015, 3♀♀, K. Shi leg. (IMUN), Handagai, 47°28’6”N, 119°26’27”E, 806 m, 28.VII.2012, 20♂♂, 22♀♀, Y. Li leg. (IMUN); **Zhalantun**, 48°01’41”N, 122°43’ 52”E, 318 m, 9.VII.1981, 1♂, 1♀ (EMIMNU).

3.26. *Lygus poluensis* (Wagner, 1967)
Material examined. **Erguna**: Enhe, 50°49’19”N, 119°54’12”E, 658 m, 16.VII.2014, 2♂♂, 8♀♀, K. Shi leg. (IMUN), Enhe, 50°49’19”N, 119°54’ 12”E, 658 m, 22.VII.2015, 1♂, 3♀♀, D. Xu leg. (IMUN); **Ewenki Autonomous Banner**: Xinihexi, 48°56’41”N, 119°46’30”E, 633 m, 11.VIII.2014, 2♂♂, 6♀♀, K. Shi leg. (IMUN); **Xin Barag Left Banner**: Chagang, 49°29’03”N, 117°54’28”E, 543 m, 6.VIII.2014, 1♂, K. Shi leg. (IMUN); **Xin Barag Right Banner**: Buerdun, 49°05’92”N, 116°59’40”E, 633 m, 6.VIII.2014, 1♀, K. Shi leg. (IMUN).
Remark. New record for Hulunbuir.

3.27. *Lygus pratensis* (Linnaeus, 1758)
Material examined. **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 5.VI.1980, 2♂♂, 3♀♀ (EMIMNU).

3.28. *Lygus punctatus* (Zetterstedt, 1840)
Material examined. **Erguna**, 50°18’25”N, 120°15’30”E, 570 m, 10.VII.1982, 1♂, 1♀, B. Qi leg. (EMIMNU).

3.29. *Lygus rugulipennis* Poppius, 1911
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 5.VIII.1985, 9♂♂, 19♀♀, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Xinihedong, 48°47’43”N, 119°49’ 05”E, 787 m, 11.VII.1980, 1♂, 6♀♀ (EMIMNU), Xinihexi, 48°56’41”N, 119°46’30”E,

633 m, 11.VIII.2014, 2♂♂, 8♀♀, K. Shi leg. (IMUN); **Hailar**, 49°14’13” N, 119°45’21”E, 617 m, 4.VIII.1981, 1♂ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’42”N, 123°44’10”E, 430 m, 11.VIII.1987, 2♂♂ (EMIMNU); **Xin Barag Left Banner**: Chagang, 49°29’03”N, 117°54’28”E, 543 m, 6.VIII.2014, 2♂♂, K. Shi leg. (IMUN), Handagai, 47°28’ 06”N, 119°26’27”E, 806 m, 29.VII.2012, 8♂♂, 13♀♀, Y. Li leg. (IMUN); **Zhalantun**, 48°01’ 41”N, 122°43’52”E, 318 m, 9.VII.1981, 2♂♂, 9♀♀, N. Bai leg. (EMIMNU).

3.30. *Lygus sibiricus* Aglyamzyanov, 1990
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 11♂♂, 13♀♀, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**, 49°08’48”N, 119°44’48”E, 613 m, 12.VII.1980, 2♀♀ (EMIMNU), Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 30.VII.1980, 6♂♂, 7♀♀ (EMIMNU), Xinihedong, 48°47’ 43”N, 119°49’05”E, 787 m, 12.VII.1980, 7♂♂, 24♀♀ (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 26.VII.1980, 6♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’05”N, 123°43’11”E, 426 m, 28.VII.1980, 4♀♀ (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 12.VII.1981, 3♂♂, 12♀♀, N. Bai leg. (EMIMNU), Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 13.VII.1982, 4♂♂, 9♀♀, N. Bai leg. (EMIMNU).

3.31. *Lygus wagneri* Remane, 1955
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 14.VII.1985, 2♂♂, 2♀♀, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 22.VII.1980, 1♀ (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 714 m, 4.VIII.1985, 2♀♀, Q. Liu leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 8.VII.1981, 2♂♂, 4♀♀, N. Bai leg. (EMIMNU).

3.32. *Neolygus chinensis*
(Lu & Yasunaga, 1994)
Material examined. **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 11.VII.1988, 2♂♂, N. Bai leg. (EMIMNU).

3.33. *Orthops forelii* Fieber, 1858
Material examined. **Zhalantun**: Sunjiagou, 47°52’05”N, 122°45’36”E, 287 m, 25.VII.1989, 1♂, 2♀♀ (EMIMNU).

3.34. *Orthops mutans* (Stål, 1858)
Material examined. **Manzhouli**, 49°35’40”N, 117°22’12”E, 648 m, 6.VIII.1981, 1♂, 2♀♀ (EMIMNU).

3.35. *Orthops scutellatus* Uhler, 1877
Material examined. **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 1♀ (EMIMNU), Xinihe, 48°47’ 43”N, 119°49’05”E, 787 m, 7.VII.1980, 2♂♂, 7♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Qiqiling, 50°35’01”N, 123°43’07”E, 423 m, 16.VIII.1981, 1♂ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’45”N, 121°03’45”E, 720 m, 10.VII. 1999, 2♂♂, Z. Wu leg. (EMIMNU).

3.36. *Phytocoris insignis Reuter*, 1876
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 1♂, 2♀♀, Q. Liu leg. (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 9.VIII.1981, 2♀♀ (EMIMNU).

3.37. *Phytocoris issykensis* Poppius, 1912
Material examined. **Oroqen Autonomous Banner**, 50°38’20”N, 123°40’15”E, 430 m, 9.VIII. 2007, 1♀, H. Li leg. (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’ 27”E, 809 m, 28.VII.2007, 2♂♂, 22♀♀, Wuen leg. (EMIMNU).

3.38. *Phytocoris nonnaizabi* Kerzhner & Schuh, 1995
Material examined. **Yakeshi**: Mianduhe, 49°05’ 45”N, 121°03’45”E, 720 m, 26.VII.1999, 2♂♂, H. Bai leg. (EMIMNU).

3.39. *Phytocoris nowickyi* Fieber, 1870
Material examined. **Hailar**, 49°14’13” N, 119° 45’21”E, 617 m, 2.VII.1981, 1♂ (EMIMNU); **Manzhouli**, 49°35’40”N, 117°22’12”E, 648 m, 1.IX.1989, 1♂, N. Bai leg. (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 12.VII.1981, 3♀♀ (EMIMNU).

3.40. *Phytocoris zhengi* Nonnaizab & Jorigtoo, 1992
Material examined. **Yakeshi**: Mianduhe, 49°05’45”N, 121°03’45”E, 720 m, 26.VII.1999, 1♂, 2♀♀, H. Bai leg. (EMIMNU).
Remark. New record for Hulunbuir.

3.41. *Polymerus brevicornis* (Reuter, 1879)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 8.VIII. 1999, 1♂, G. Tang leg. (EMIMNU), Ewenke County, 49°52’19”N, 120°23’49”E, 710 m, 24.VII.2014, 2♂♂, 7♀♀, K. Shi leg. (IMUN), Hadatu, 49°38’03”N, 119°45’03”E, 668 m, 30.VIII. 2013, 43♂♂, 51♀♀, K. Shi leg. (IMUN); **Erguna**, 50°14’29”N, 120°10’20”E, 576m, 22.VII.1997, 1♀ (EMIMNU); **Ewenki Autonomous Banner**: Mengenchulu, 48°46’52”N, 119°49’2”E, 647 m, 2.VIII.1981, 2♂♂, 3♀♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 13.VII.1980, 3♂♂, 7♀♀ (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 26.VII.1980, 1♀ (EMIMNU); **Xin Barag Left Banner**, 48°12’58”N, 118°15’45”E, 638 m, 1.VIII.2003, 2♀♀ (EMIMNU), Handagai, 47°28’06”N, 119°26’27”E, 809 m, 28.VII. 2007, 4♀♀, H. Li leg. (EMIMNU); **Xin Barag Right Banner**: Buerdun, 49°05’92”N, 116°59’40”E, 633 m, 6.VIII.2014, 2♂♂, K. Shi leg. (IMUN); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 18.VII.1999, 1♂, Z. Wu leg. (EMIMNU); **Zhalantun**: Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 12.VII.1981, 1♀, N. Bai leg. (EMIMNU).

3.42. *Polymerus carpathicus* (Horvath, 1882)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 1.VIII.1999, 1♂, Z. Wu leg. (EMIMNU); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 2♂♂, 3♂♂, Q. Liu leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 26.VII.1988, 1♀, N. Bai leg. (EMIMNU), Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 20.VII.1980, 2♂♂, 9♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 13.VIII.1981, 1♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 1.VIII.1998, 3♂♂, 7♀♀, Z. Wu leg. (EMIMNU); **Zhalantun**: Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 12.VII.1981, 1♀, N. Bai leg. (EMIMNU).

3.43. *Polymerus cognatus* (Fieber, 1858)
Material examined. **Chen Barag Banner**: Bayinhushu, 49°10’24”N, 119°12’48”E, 598 m, 23.VII.2012, 2♂♂, 5♀♀, Mehetuya leg. (IMUN), Ewenke County, 49°52’19”N, 120°23’49”E, 710 m, 6.VIII.2013, 2♂♂, 5♀♀, K. Shi leg. (IMUN), Ewenke County, 49°52’19”N, 120°23’49”E, 710 m, 24.VII.2014, 2♂♂, 4♀♀, K. Shi leg. (IMUN), Ewenke County, 49°52’19”N, 120°23’49”E, 710 m, 1.IX.2015, 2♀♀, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 21.VII.1980, 1♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 11.VII.1980, 2♂♂, 7♀♀, N. Bai leg. (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 9.VIII.1981, 2♀♀ (EMIMNU); **Manzhouli**, 49°35’40”N, 117°22’12”E, 648 m, 6.VIII.2011, 3♀♀, D. Xu leg. (IMUN), Zhalanuoer, 49°21’66”N, 117°39’68”E, 590 m, 22.VII.2014, 3♀♀, K. Shi leg. (IMUN); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 11.VIII.1981, 2♀♀ (EMIMNU); **Xin Barag Left Banner**: Chagang, 49°29’03”N, 117°54’28”E, 543 m, 6.VIII.2014, 4♂♂, 10♀♀, K. Shi leg. (IMUN), Ganzhuer, 48°21’17”N, 118°08’16”E, 576 m, 5.VII.1980, 5♀♀ (EMIMNU); **Xin Barag Right Banner**: 48°40’12”N, 116°48’58”E, 555 m, 17.VII.1999, 1♂, G. Tang leg. (EMIMNU), Buerdun, 49°05’92”N, 116°59’40”E, 633 m, 6.VIII.2015, 6♂♂, K. Shi leg. (IMUN), Hulun Lake., 49°22’30”N, 117°24’54”E, 650 m, 11.VII.2011, 1♀, Y. Li leg. (IMUN); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 15.VII.1981, 10♂♂, 23♀♀ (EMIMNU).

3.44. *Polymerus palustris* (Reuter, 1905)
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 13.VII.1985, 2♀♀, Q. Liu leg. (EMIMNU), Enhe, 50°49’19”N, 119°54’12”E, 658 m, 2.VIII.2012, 7♂♂, 24♀♀, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Menggenchulu, 48°46’52”N, 119°49’02”E, 647 m, 12.VII.1982, 1♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 11.VII.1980, 4♀♀, N. Bai leg. (EMIMNU); **Genhe**, 50°30’20”N, 121°18’54”E, 789 m, 26.VII.2012, 1♂,

1♀, Menghetuya leg. (IMUN); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 12.VIII.1981, 1♀ (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 809 m, 28.VII.2013, 1♂, 2♀♀, Y. Li leg. (IMUN); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 16.VII.2011, 1♂, 5♀♀, D. Xu leg. (IMUN).

3.45. *Polymerus pekinensis* Horváth, 1901
Material examined. **Ewenki Autonomous Banner**: Weinahe, 48°27’19”N, 121°34’23”E, 834 m, 5.VI.1980, 4♂♂, 5♀♀, N. Bai leg. (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 9.VIII.1981, 1♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 1.VIII.1998, 1♂, 1♀, Z. Wu leg. (EMIMNU).

3.46. *Polymerus unifasciatus* (Fabricius, 1794)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 3.VIII.1999, 2♂♂, Y. Gao leg. (EMIMNU); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 2♂♂, 4♀♀, Q. Liu leg. (EMIMNU), Enhe, 50°49’19”N, 119°54’12”E, 658 m, 16.VIII.2014, 1♂, K. Shi leg. (IMUN); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 26.VII.1988, 2♀♀, N. Bai leg. (EMIMNU), Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 22.VII.1980, 1♂, 3♀♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 11.VII.1980, 3♂♂, 13♀♀, N. Bai leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 3.VIII.1985, 1♀, Q. Liu leg. (EMIMNU); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 26.VII.1980, 1♀ (EMIMNU); **Xin Barag Left Banner**, 48°12’58”N, 118°15’45”E, 638 m, 4.VIII.2003, 2♀♀ (EMIMNU), Handagai, 47°28’6”N, 119°26’27”E, 809 m, 28.VII.2011, 4♀♀, D. Xu leg. (IMUN), Chagang, 49°29’03”N, 117°54’28”E, 543 m, 6.VIII.2014, 4♂♂, K. Shi leg. (IMUN); **Xin Barag Right Banner**: Hulun Lake, 49°22’30”N, 117°24’54”E, 650 m, 11.VII.1980, 1♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 16.VII.1999, 1♂, Z. Wu leg. (EMIMNU); **Zhalantun**: Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 13.VII.1981, 2♀♀, N. Bai leg. (EMIMNU).

3.47. *Actinocoris signatus* Reuter, 1878
Material examined. **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 10.VII.1988, 1♂, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 12.VII.1980, 1♂ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 11.VII.1980, 1♀, N. Bai leg. (EMIMNU).

3.48. *Leptopterna albescens* (Reuter, 1891)
Material examined. **Ewenki Autonomous Banner**: Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 11.VII.1980, 6♂♂, 20♀♀, N. Bai leg. (EMIMNU).

3.49. *Leptopterna kerzhneri* Vinokurov, 1982
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 2♂♂, 5♀♀, Q. Liu leg. (EMIMNU), Moerdaoga, 51°15’15”N, 120°46’43”E, 715 m, 27.VII.1985, 2♀♀, Q. Liu leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 5.VIII.1985, 1♂, 2♀♀, Q. Liu leg. (EMIMNU).

3.50. *Leptopterna xilingolana* Jorigtoo & Nonnaizab, 1993
Material examined. **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 12.VII.1980, 2♀♀, N. Bai leg. (EMIMNU).
Remark. Endemic to China.

3.51. *Myrmecoris gracilis* (Sahlberg, 1848)
Material examined. **Zhalantun**, 48°02’44”N, 122°42’56”E, 310 m, 6.VII.1982, 2♀♀, N. Bai leg. (EMIMNU).

3.52. *Notostira sibirica* Golub, 1978
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 4.VIII.1985, 1♂, 5♀♀, Q. Liu leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 3.VIII.1985, 2♀♀, Q. Liu leg. (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 15.VIII.1980, 1♀ (EMIMNU).

3.53. *Stenodema calcarata* (Fallén, 1807)
Material examined. **Ewenki Autonomous Banner**: Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 1♀ (EMIMNU); **Genhe**: Mangui, 52°14’59”N, 122°16’35”E, 633 m,

27.VII.2012, 2♀♀, Mehetuya leg. (IMUN); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 29.VII.1980, 1♂, 2♀♀ (EMIMNU).

3.54. *Stenodema holsata* (Fabricius, 1787)
Material examined. **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 26.VII.1988, 1♂, 5♀♀ (EMIMNU); **Genhe**: Mangui, 52°09’18”N, 122°13’05”E, 638 m, 28.VII.2012, 4♂♂, 5♀♀, Qilemoge leg. (IMUN).

3.55. *Stenodema mongolica*
Nonnaizab & Jorigtoo, 1994
Material examined. **Erguna**: Moerdaoga, 51°15’15”N, 120°46’43”E, 635 m, 26.VII.1985, 3♂♂, 6♀♀, Q. Liu leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 2.VIII.1985, 2♂♂, 2♀♀, Q. Liu leg. (EMIMNU).

3.56. *Stenodema parvula* Zheng, 1981
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 2.VIII.1999, 1♀, Y. Gao leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 26.VII.1993, 2♂♂, 4♀♀ (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 1♂, N. Bai leg. (EMIMNU); **Genhe**, 50°46’44”N, 121°30’48”E, 715 m, 27.VIII.1983, 3♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 28.VII.1980, 1♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 22.VII.1999, 1♂, H. Bai leg. (EMIMNU).

3.57. *Stenodema pilosa* (Jakovlev, 1889)
Material examined. **Chen Barag Banner**, 49°19’34”N, 119°24’58”E, 599 m, 2.VIII.1999, 1♂, 2♀♀, Y. Gao leg. (EMIMNU); **Genhe**, 50°46’44”N, 121°30’48”E, 715 m, 23.VIII.1983, 1♀ (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 22.VII.1999, 1♂, 1♀, H. Bai leg. (EMIMNU).

3.58. *Stenodema sibirica* Bergroth, 1914
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 4.VII.1985, 4♀♀, Q. Liu leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 4.VIII.1985, 2♂♂, 2♀♀, Q. Liu leg. (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 26.VII.1999, 1♂, Z.Wu leg. (EMIMNU).

3.59. *Stenodema trispinosa* Reuter, 1904
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 20.VII.1985, 3♂♂, 10♀♀, Q. Liu leg. (EMIMNU), Heishantou, 50°12’50”N, 119°34’14”E, 589 m, 13.VII.1988, 1♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Menggenchulu, 48°46’52”N, 119°49’02”E, 647 m, 2.VIII.1981, 1♀ (EMIMNU), Weinahe, 48°27’19”N, 120°34’23”E, 834 m, 25.VII.1988, 5♂♂, 8♀♀, N. Bai leg. (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 2♀♀, N. Bai leg. (EMIMNU); **Genhe**, 51°08’33”N, 121°11’31”E, 847 m, 27.VII.2012, 2♂♂, 2♀♀, Mehetuya leg. (IMUN), Mangui, 52°02’21”N, 122°02’56”E, 635 m, 3.VIII.1985, 1♂, 2♀♀, Q. Liu leg. (EMIMNU), Jiemen, 52°09’46”N, 122°17’14”E, 670 m, 27.VII.2012, 3♂♂, 7♀♀, Mehetuya leg. (IMUN); **Hailar**, 49°14’13”N, 119°45’21.81”E, 617 m, 24.VII.1981, 1♂ (EMIMNU); **Oroqen Autonomous Banner**, 50°38’20”N, 123°40’15”E, 430 m, 9.VIII.2007, 1♂, 1♀, H. Li leg. (EMIMNU), Xinihedong, 48°47’43”N, 119°49’05”E, 787 m, 23.VII.1988, 1♂, 2♀♀, N. Bai leg. (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’27”E, 809 m, 29.VII.2007, 2♂♂, 6♀♀, Wuen leg. (EMIMNU); **Xin Barag Right Banner**: Wulannuoer, 48°18’36”N, 117°25’17”E, 554 m, 22.VII.2007, 4♂♂, X. Lv leg. (EMIMNU); **Yakeshi**: Mianduhe, 49°05’35”N, 121°02’32”E, 714 m, 22.VII.1999, 3♂♂, 5♀♀, Z. Wu leg. (EMIMNU).

3.60. *Stenodema turanica* Reuter, 1904
Material examined. **Genhe**, 50°48’47”N, 121°33’45”E, 710 m, 30.VII.1985, 1♂, Q. Liu leg. (EMIMNU).

3.61. *Stenodema virens* (Linnaeus, 1767)
Material examined. **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 30.VII.1985, 1♂, Q. Liu leg. (EMIMNU), Moerdaoga, 51°15’15”N, 120°46’43”E, 715 m, 25.VII.1985, 1♂, Q. Liu leg. (EMIMNU); **Genhe**, 50°46’44”N, 121°30’

48”E, 715 m, 20.VII.1985, 1♀, Q. Liu leg. (EMIMNU).

3.62. *Teratocoris saundersi* Douglas & Scott, 1869
Material examined. **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 10.VII.1988, 1♂, N. Bai leg. (EMIMNU), Heishantou, 50°12’50”N, 119°34’14”E, 589 m, 13.VII.1988, 2♀♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 22.VII.1985, 1♂, 3♀♀, N. Bai leg. (EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 4.VIII.1985, 1♀, Q. Liu leg. (EMIMNU).

3.63. *Trigonotylus caelestialium* (Kirkaldy, 1902)
Material examined. **Chen Barag Banner**, 49° 19’34”N, 119°24’58”E, 590 m, 2.VIII.1999, 3♂♂, 10♀♀, G. Tang leg. (EMIMNU), Bayinhushu, 49°11’05”N, 119°12’04”E, 598 m, 23.VII.2012, 1♂, 6♀♀, Mehetuya leg. (IMUN), Wuzhuer County, 49°33’53”N, 118°30’20”E, 531 m, 25.VII.2012, 3♂♂, 19♀♀, Mehetuya leg. (IMUN), Ewenke County, 49°52’19”N, 120°23’ 49”E, 710 m, 1.IX.2014, 4♂♂, 20♀♀, K. Shi leg. (IMUN); **Erguna**, 50°16’19”N, 120°12’24”E, 582 m, 9.VII.1988, 2♂♂, 5♀♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 25.VIII.1988, 2♂♂, 7FF(EMIMNU); **Genhe**: Mangui, 52°02’21”N, 122°02’56”E, 635 m, 2.VIII.1985, 2♂♂, Q. Liu leg. (EMIMNU), Jiemen, 52°09’46”N, 122°17’14”E, 670 m, 27.VII.2012, 1♂, 11♀♀, Mehetuya leg. (IMUN); **Hailar**, 49°14’13”N, 119°45’21”E, 617 m, 29.VII.1981, 1♀ (EMIMNU); **Manzhouli**, 49°33’56”N, 117°21’50”E, 650 m, 25.VII.1986, 3♂♂, 9♀♀ (EMIMNU); **Oroqen Autonomous Banner**: Alihe, 50°35’01”N, 123°43’07”E, 423 m, 13.VIII.1981, 1♀ (EMIMNU); **Xin Barag Right Banner**: Hulun Lake, 49°22’30”N, 117° 24’54”E, 650 m, 30.VI.1980, 1♂ (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 9.VII.1981, 5♀♀ (EMIMNU).

3.64. *Trigonotylus cremeus* Golub, 1989
Material examined. **Manzhouli**, 49°33’56”N, 117°21’50”E, 650 m, 25.VII.1986, 2♂♂, N. Bai leg. (EMIMNU).

3.65. *Trigonotylus longitarsus* Golub, 1989
Material examined. **Chen Barag Banner**, 49° 19’34”N, 119°24’58”E, 599 m, 29.VII.1999, 1♂, 5♀♀, Y. Gao leg. (EMIMNU), Wangong, 49°11’ 14”N, 118°53’25”E, 605 m, 9.IX.1983, 1♀ (EMIMNU), Jinzhanghan, 49°19’34”N, 119°24’ 58”E, 599 m, 25.VII.2014, 18♂♂, 25♀♀, K. Shi leg. (IMUN), Ewenke County, 49°19’34”N, 119°24’58”E, 599 m, 24.VII.2014, 9♂♂, 13♀♀, K. Shi leg. (IMUN); **Erguna**, 50°14’29”N, 120°10’20”E, 576 m, 4.VII.1985, 10♂♂, 16♀♀, Q. Liu leg. (EMIMNU), Heishantou, 50°12’ 50”N, 119°34’14.99”E, 589 m, 13.VIII.1988, 23♂♂, 68♀♀, N. Bai leg. (EMIMNU); **Ewenki Autonomous Banner**: Nantun, 49°08’48”N, 119°44’48”E, 613 m, 25.VII.1988, 13♂♂, 77♀♀, N. Bai leg. (EMIMNU), Menggenchulu, 48°46’52”N, 119°49’02”E, 647 m, 2.VIII.1981, 1♂, 4♀♀ (EMIMNU), Xinihedong, 48°47’ 43”N, 119°49’05”E, 787 m, 23.VII.1988, 2♀♀, N. Bai leg. (EMIMNU); **Genhe**: Mangui, 52°02’ 21”N, 122°02’56”E, 635 m, 3.VIII.1985, 2♂♂, 3♀♀, Q. Liu leg. (EMIMNU); **Hailar**, 49°14’ 13”N, 119°45’21”E, 617 m, 7.VII.1988, 3♂♂, 5♀♀, N. Bai leg. (EMIMNU); **Manzhouli**, 49°35’40”N, 117°22’12”E, 648 m, 25.VII.1986, 1♀, N. Bai leg. (EMIMNU), Zhalainuoer, 49°19’ 34”N, 119°24’58”E, 599 m, 22.VII.2014, 8♂♂, 12♀♀, K. Shi leg. (IMUN); **Oroqen Autonomous Banner**, 50°38’20”N, 123°40’15”E, 430 m, 9.VII.2007, 2♂♂, 5♀♀, H. Li leg. (EMIMNU), Alihe, 50°35’11”N, 123°43’20”E, 433 m, 13.VIII.1987, 1♀ (EMIMNU); **Xin Barag Left Banner**: Handagai, 47°28’06”N, 119°26’ 27”E, 809 m, 29.VII.2007, 5♂♂, 22♀♀, H. Li leg. (EMIMNU); **Xin Barag Right Banner**: Hulun Lake, 49°22’30”N, 117°24’54”E, 650 m, 23.VII.2007, 4♂♂, 3♀♀, H. Li leg. (EMIMNU); **Zhalantun**, 48°01’41”N, 122°43’52”E, 318 m, 10.IX.1988, 1♀, N. Bai leg. (EMIMNU), Chaihe, 47°33’04”N, 121°17’32”E, 676 m, 6.VII.1982, 1♂, 2♀♀ (EMIMNU).

4. Systematic distribution of Mirinae of Hulunbuir Region

A total of 2 tribes, 19 genera and 65 species were examined from the Hulunbuir region in this study. Of the known Chinese Mirinae fauna, these

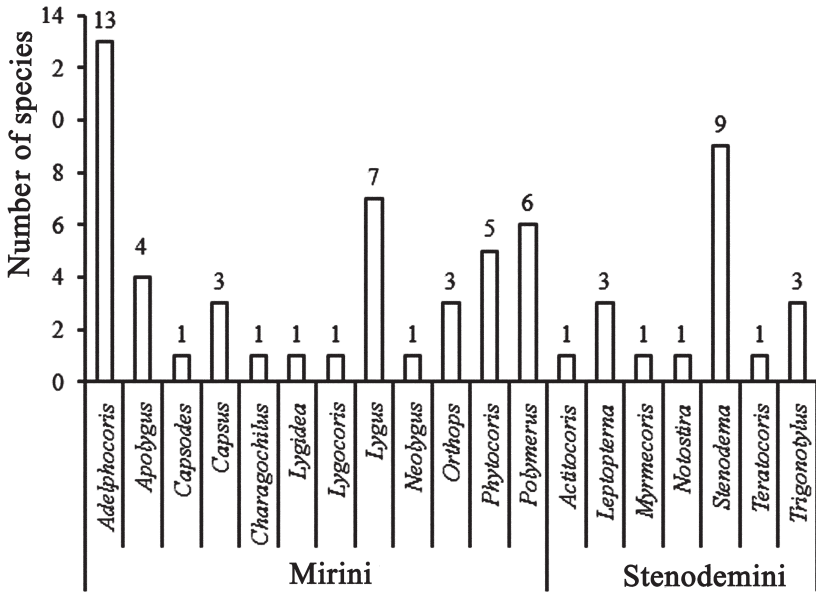

Fig. 2. Species numbers in different genera of two tribes of Mirinae in Hulunbuir region in North China.

represent 23.8% of the genera and 16.1% of the species. Overall, the tribe Mirini was represented by 12 genera and 46 species and Stenodemini by 7 genera and 19 species. The numbers of species per genus are given in Fig. 2. The genus with the highest number of species was *Adelphocoris* (13 spp.), followed by *Stenodema* (9 spp.), *Lygus* (7 spp.), *Polymerus* (6 spp.), *Phytocoris* (5 spp.), *Apolygus* (4 spp.), and *Capsus*, *Orthops*, *Leptopterna*, and *Trigonotylus* (3 spp. for each). *Capsodes*, *Charagochilus*, *Lygidea*, *Lygocoris*, *Neolygus*, *Actinocoris*, *Myrmecoris*, *Notostira*, and *Teratocoris* were represented by 1 species each.

5. Ecological properties of Mirinae of Hulunbuir Region

The highest number of species (58) was collected in July and the least (1) in May (Fig. 3). Our results indicate that the species with the longest activity period is *Trigonotylus caelestialium*, collected from June to September (Table 1).

In this study, we divided the whole altitudinal range (287–834 m) into six 150 m belts. The highest number of Mirinae species (47) was collected between 601–750 m while only one species was collected between 151–300 m (Fig. 4). There are 14 species with wide altitudinal belts (Table1): *Apolygus lucorum*, *A. nigrovirens*, *A.*

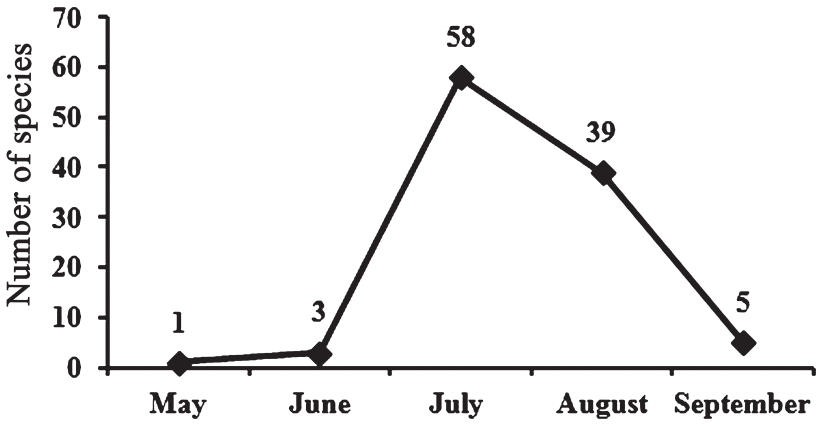

Fig. 3. Species numbers according to collecting months.

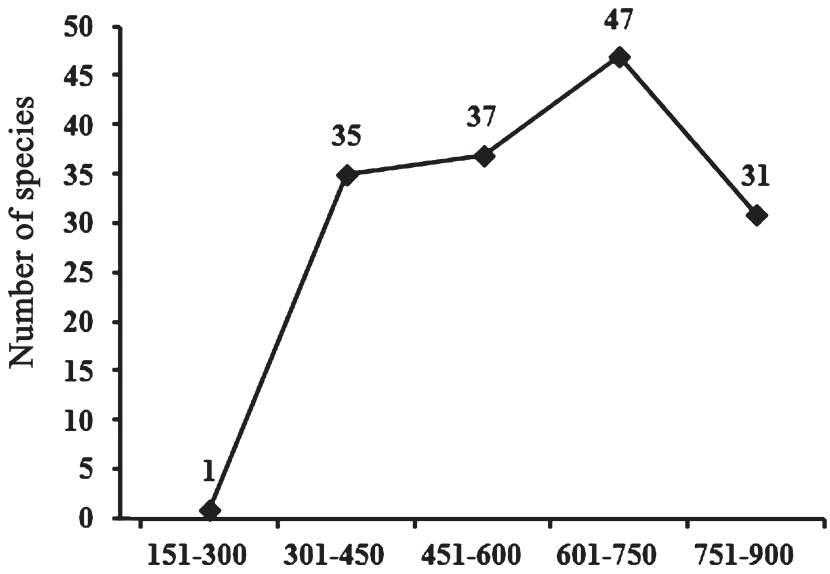

Fig. 4. Species numbers according to altitudinal belts (m).

spinolae, *Capsodes gothicus*, *Lygus gemellatus*, *L. rugulipennis*, *L. sibiricus*, *L. wagneri*, *Polymerus carpathicus*, *P. cognatus*, *P. palustris*, *Stenodema parvula*, *S. trispinosa*, and *Trigonotylus longitarsus*.

A summary of the Mirinae species collected from the studied areas of the Hulunbuir region is presented in Fig. 5. The highest number of species (35 species, Mirini with 25 species, Stenodemini with 10 species) was collected in the Ewenki Autonomous Banner (III in Fig. 5) and the least (6 species, Mirini with 3 species, Stenodemini with 3 species) in Manzhouli (VI in Fig. 5).

6. Zoogeographical composition of Mirinae of Hulunbuir Region

The Mirinae species from the Hulunbuir region are associated with the faunae of three zoogeographical regions, Palaearctic, Oriental and Nearctic region (based on Wallace's zoogeographic regions, Wallace 1876). Among of them, over 70% (46 species) are associated with the Palaearctic region. Other species are distributed across two or three regions (Fig. 6, Table 1).

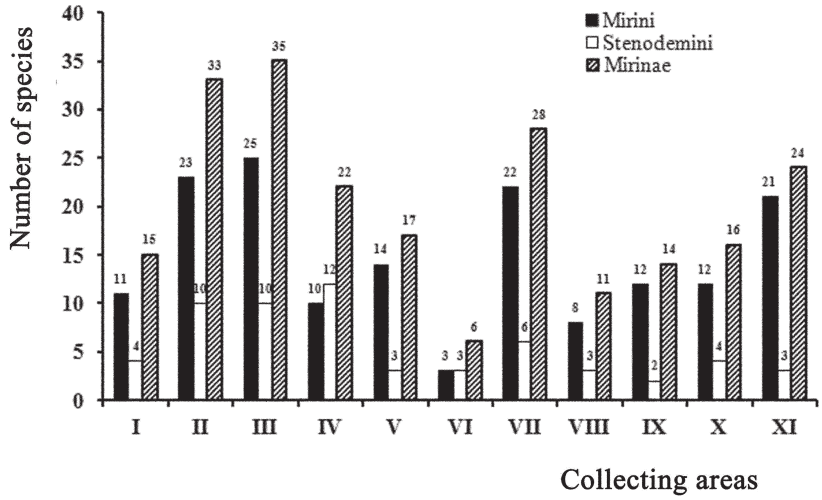

Fig. 5. Species numbers of two tribes and in total of the subfamily Mirinae in different collecting areas of Hulunbuir in North China (for the areas, see Table 1 and Fig. 1).

Table 1. Species, collecting areas, collecting months, altitudinal belts, zoogeographical regions and number of specimens of the examined species in Hulunbuir region. Species with two asterisks (*) is endemic to China, those with one asterisk are new to Hulunbuir region. Altitudinal belts (m): A. 151–300, B. 301–450, C. 451–600, D. 601–750, E. 751–900. Collecting areas (shown in Fig. 1): I. Chen Barag Banner, II. Erguna, III. Ewenki Autonomous Banner, IV. Genhe, V. Hailar, VI. Manzhouli, VII. Oroqen Autonomous Banner, VIII. Xin Barag Right Banner, IX. Xin Barag Left Banner, X. Yakeshi, XI. Zhalantun. PA. Palaearctic region, OR. Oriental region, NEA. Nearctic region.

Species	Area	Month	Altitude	Region	No.
Mirini					
Adelphocoris fasciaticollis	III, V	Jul, Aug	D, E	PA, OR	2
A. ferrugineus	III, V	Jul	D, E	PA	4
A. laeviusculus	II	Aug	C	PA	2
A. lineolatus	I–III, V, VII, XI	Jul, Aug	B–D	PA, OR	154
A. melanocephalus	VII, XI	Aug	B	PA	4
A. nigritylus	II, XI	Jul	B, C	PA, OR	33
A. obliquefasciatus	VII, XI	Jul, Aug	B	PA	6
A. ponghvariensis	III, VIII, XI	Jul, Aug	B–D	PA, OR	21
A. quadripunctatus	I–III, V, VII, VIII	Jul, Aug	B–D	PA	120
A. reicheli	VII	Jul, Aug	B	PA	5
A. rufescens	II, VII	Jul, Aug	B, C	PA, OR	3
A. tenebrosus	II–IV, VII	Jul, Aug	B, D, E	PA	17
A. triannulatus	II, XI	Jul	B, C	PA	11
Apolygus lucorum	I, II, IV, VIII, IX, XI	Jul, Aug	B–E	PA, OR, (NEA)[a]	225
A. nigronasutus	VII, XI	Jul	B	PA	2
A. nigrovirens	VII–XI	Jul	B–E	PA	19
A. spinolae	I, III, IV, VII, IX–XI	Jul, Aug	B–E	PA, OR	12
Capsodes gothicus	I–IV, VII, X, XI	Jul	B–E	PA	94
Capsus cinctus	II, III, V	Jul, Aug	C–E	PA, NEA	6
C. pilifer	I–IV	Jul	C–E	PA	4
C. wagneri	II–IV, X, XI	Jul, Aug	C–E	PA	16
**Charagochilus gyllenhalii*	IX	Jul	E	PA	7
Lygidea illota	VII	May	B	PA	3
Lygocoris pabulinus	III, VII	Jul, Aug	B, E	PA, OR, NEA	8
Lygus gemellatus	I–V, IX, XI	Jul–Sep	B–E	PA	188
**L. poluensis*	II, III, VIII, IX	Jul, Aug	C, D	PA	24
L. pratensis	III	Jun	E	PA	5
L. punctatus	II	Jul	C	PA, NEA	2
L. rugulipennis	II, III, V, VII, IX, XI	Jul, Aug	B–E	PA, NEA	82
L. sibiricus	II, III, V, VII, XI	Jul	B–E	PA	108
L. wagneri	II–IV, XI	Jul, Aug	B–E	PA	13
Neolygus chinensis	VII	Jul	B	PA	2
Orthops forelii	XI	Jul	A	PA	3
O. mutans	VI	Aug	D	PA	3
O. scutellatus	III, VII, X	Jul, Aug	B, D, E	PA, OR, NEA	13
Phytocoris insignis	II, V	Jul, Aug	C, D	PA	5
P. issykensis	VII, IX	Jul, Aug	B, E	PA	25
P. nonnaizabi	X	Jul	D	PA	2
P. nowickyi	V–VII	Jul, Sep	B, D	PA	5
**P. zhengi*	X	Jul	D	PA	3
Polymerus brevicornis	I–III, V, VIII–XI	Jul, Aug	C–E	PA	131
P. carpathicus	I–III, VII, X, XI	Jul, Aug	B–E	PA	30
P. cognatus	I, III, V–IX, XI	Jul–Sep	B–E	PA	102
P. palustris	II–IV, VII, IX, X	Jul, Aug	B–E	PA	50
P. pekinensis	III, V, X	Jun, Aug	D, E	PA, OR	12
P. unifasciatus	I–V, VIII–XI	Jul, Aug	C–E	PA, NEA	47
Stenodemini					
Actinocoris signatus	II, III	Jul	C–E	PA, NEA	3

Table 1, continued

Species	Area	Month	Altitude	Region	No.
Leptopterna albescens	III	Jul	E	PA	26
L. kerzhneri	II, IV	Jul, Aug	C, D	PA	12
***L. xilingolana*	III	Jul	D	PA	2
Myrmecoris gracilis	XI	Jul	B	PA	2
Notostira sibirica	II, IV, VII	Aug	B–D	PA	9
Stenodema calcarata	III, IV, VII	Jul	B, D, E	PA	6
S. holsata	III, IV	Jul	D	PA	15
S. mongolica	II, IV	Jul, Aug	D	PA	13
S. parvula	I, III, IV, VII, X	Jul, Aug	B–E	PA	13
S. pilosa	I, IV, X	Jul, Aug	C, D	PA	6
S. sibirica	II, IV, X	Jul, Aug	C, D	PA	9
S. trispinosa	II–V, VII–X	Jul, Aug	B–E	PA, NEA	73
S. turanica	IV	Jul	D	PA	1
S. virens	II, IV	Jul	C, D	PA, NEA	3
Teratocoris saundersi	II–IV	Jul, Aug	C, D	PA, NEA	8
Trigonotylus caelestialium	I–VIII, XI	Jun–Sep	B–D	PA, NEA, OR	116
T. cremeus	VI	Jul	D	PA	2
T. longitarsus	I–IX, XI	Jul–Sep	B–E	PA	366

a) Introduced.

7. Discussion and conclusions

So far, the Mirinae of Hulunbuir region has not been systematically studied, especially lacking knowledge about detailed fauna and species composition, ecological data, and accurate locality information. In the present, the first regional checklist of Mirinae of Hulunbuir, 65 species (2,321 specimens) were recorded. Compared with previous studies (Bai 1999, Qi *et al.* 2003, Zheng *et al.* 2004), most species are previously known and considered to be quite common having some broad distributional areas in Hulunbuir. The others (15 species) have relatively narrow distributional areas or are known only from single sites in this region.

The regular collections of Mirinae between 2011 and 2015 (though not very complete) not only added some new localities to known distributional data but also found *L. poluensis* as a new record for the Hulunbuir region. Similarly, earlier label records yielded two other new records (*C. gyllenhalii* and *P. zhengi*) for this region. *Leptopterna xilingolana* is an endemic species of China. The above situation suggests it is possible to find further new or rare species in Hulunbuir.

In addition to distributional data, we also give some information on the ecology of Mirinae species. First, the highest number of species was found in the Ewenki Autonomous Banner which represents the Hulunbuir Prairie. This suggests that Mirinae is adapted to grassland habitat. This

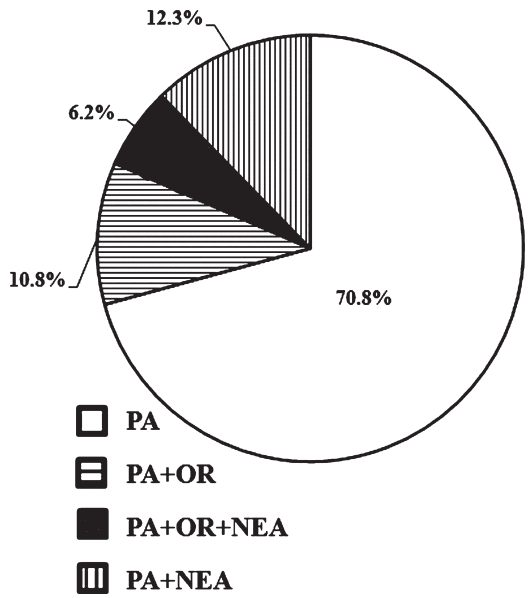

Fig. 6. Distributions of examined species in zoogeographical regions of the world (regions based on Wallace, 1876). PA: Palaearctic region, OR: Oriental region, NEA: Nearctic region.

is basically consistent with the previous conclusions (Zheng *et al.* 2004). Second, seasonal data suggest that the recorded species are active mainly in summer, especially July and August. However, a few species, like *L. gemellatus*, *P. nowickyi*, *P. cognatus*, *T. caelestialium* and *T. longitarsus*, were still active in early autumn (September). Third, palaearctic species dominated as expected due to the relatively high latitudinal location of Hulunbuir. In general, geographical location, geomorphology and vegetation are likely reasons for the observed distribution patterns of Mirinae.

The shortcoming of this study lies in the fact that there is no complete coverage of the whole territory of Hulunbuir region. However, our study reflects the basic fauna, species composition and ecological characteristics of Mirinae in this region, and can offer supporting data for future research. Considering that the area of Hulunbuir is vast, with complex and diverse habitats and vegetation types, as well as the fragility of its ecosystem, further research on Mirinae of this region is urgently needed.

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