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Research paper

Taxonomic Review of the Korean Tipulinae (Diptera: Tipulidae)

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Abstract

The family Tipulidae (Diptera) contains as many as 5,000 species in the world. Seventy species of the family belonging to 9 genera in 3 subfamilies are known in Korea including 63 species of Tipulinae. In this study, the Korean Tipulinae is reviewed using materials collected since the 1990s and the Alexander's type specimens preserved in the Smithsonian Institute, USA. As a result, 66 species including 3 new Korean records are recognized and their diagnoses, synonymy, materials examined, distributions, and taxonomic remarks are provided.

Key words: Tipulinae, Tipulidae, Diptera, taxonomy, Korea

Introduction

The crane flies (superfamily Tipuloidea) are one of the largest groups in Diptera, with 4 families (Cylindrotomidae, Limoniidae, Pediciidae, and Tipulidae), over 200 genera (326 subgenera), and approximately 15,000 described species. The adults are characterized by long slender legs, V-shaped structure on mesonotum, absence of ocelli, and wing venation with completely developed 2 anal veins (Alexander and Byers 1981, Gelhaus 2009). The larvae possess retractible hemicephalous head capsule.

The family Tipulidae, which contains approximately 5,000 species with 38 genera globally, is distinguished by generally large size, distinct nasus, and elongated terminal palpi segment. The Tipulinae is the largest subfamily and includes approximately 4,000 species in the world. The adult Tipulinae is distinguished from other subfamilies by simple cylindrical antennal flagellomeres without any branch and long but stout legs. Currently, 63 species of Tipulinae are known in Korea. Considering a high degree of the species diversity of crane flies, a large number of crane flies including Tipulinae species are supposed to be undiscovered in Korea.

Masaki (1933a, 1933b) reported three tipulid species, *Nephrotoma virgate*, *Nephrotoma makiella*, and *Leptotarsus* (*Longurio*) *pulverosus* from Korea. However, distribution of *Leptotarsus* (*Longurio*) *pulverosus* is doubtful because the locality was recorded as 'Corea (Shiko)', and 'Shiko' currently indicates Shikoku of Japan. There are no additional distribution reports on this species except in a checklist.

Alexander (1934, 1935, 1945, 1950) additionally reported 19 Tipulinae species from the Korean peninsula. Savchenko (1961, 1964) studied the genus *Tipula* fauna of USSR, and included 20 *Tipula* species from North Korea including Alexander's records. Kim (1971) in 'Distribution Atlas of the Insect of Korea' included 11 species of Korean Tipulinae without referring to previous studies. In the genus *Nephrotoma*, Tangelder (1984) studied Palaearctic species with 5 new records from Korea. Oosterbroek (1985) arranged Japanese *Nephrotoma* with Korean distributions of 14 species.

In the 'Palaearctic Catalogue of Diptera' (Oostebroke & Theowald 1992), 40 species of Korean Tipulinae were recorded consisting of 1 *Indotipula*, 18 *Nephrotoma*, 2 *Prionocera*, and 19 *Tipula* species. However, the 'Check List of Insects from Korea', published by ESK and KSAE (1994) and included 23 species of Korean Tipulinae, did not refer to previous catalogue of Oostebroke and Theowald (1992). Later, the 'Korean Checklist of Insects' (Paek *et al*. 2010, Jung *et al*. 2011) followed only the checklist of ESK and KSAE (1994). Recently, a comprehensive checklist of the Tipulinae covered all previous literatures was prepared by NIBR (2013) with 57 Tipulinae species including 1 *Indotipula*, 1 *Leptotarsus*, 21 *Nephrotoma*, 4 *Prionocera*, and 30 *Tipula* species. Baek and Bae (2016a, 2016b) additionally recorded 1 *Indotipula* and 5 *Tipula* species from South Korea.

As to the larvae, Yoon and Kim (1992) studied taxonomy of Korean Tipulidae larvae with identification of *Tipula latemarginata latemarginat* and *Ttipula nigrolamina*, but most of them were left unidentified. Kim and Lee (2002, 2003a, 2003b, 2004, 2005a, 2005b, 2006, 2007) intensively studied Korean species of larval Tipulidae including description, biology and life cycle of several Tipulinae species,

Tipula (*Yamatotipula*) *latemarginata*, *Tipula* (*Yamatotipula*) *nova*, *Tipula* (*Yamatotipula*) *aino*, *Tipula* (*Yamatotipula*) *patagiata*, and *Nephrotoma virgata*.

The purpose of this study is to comprehensively review the Korean species of Tipulinae using all available materials including Alexander's type specimens housed in the Smithsonian Institute (SI) in Washington D.C., USA.

Materials and methods

The Tipulinae materials mainly collected in South Korea since the 1990s were used for this study. Adult crane flies were collected by sweep nets, light traps, and Malaise traps. They are preserved in 100% ethanol and deposited in the Entomological Museum of Korea University (KU) in Seoul, Korea. Alexander's type specimens preserved in the Smithsonian Institute (SI) in Washington, D.C., USA were examined to verify previous records and identifications.

Male hypopygium was dissected using a fine needle under a dissecting microscope (Olympus SZ51, Japan), cleared in ca. 10% KOH, and preserved in vials filled with glycerol. Photographs were taken using stereomicroscope with an image analyzer (Carl Zeiss Stereo Discovery V12 and AxioCam ICc1, Germany).

Morphological terminology generally follows Alexander and Byers (1981) and Gelhaus (2009). Abbreviations used in this study are as follows: M (male), F (female); Russia: North European Territory (NET), Central European Territory (CET), South European Territory (SET), West Siberia (WS), East Siberia (ES), and Far East (FE).

Taxonomic accounts

Family Tipulidae Latreille, 1802 각다귀과
Subfamily Tipulinae Kirby and Spence, 1815 각다귀아과

Diagnosis. Color brown to black. Antennae commonly with 11 cylindrical flagellomeres, usually well developed verticils (except, *Prionocera*). Rostrum conspicuous with distinct nasus. Palpi 4-segmented, with elongated terminal segment. Wings usually well developed; subcostal vein (Sc) generally atrophied or incomplete; radius vein 1+2 (R1+2) usually preserved; cubitus A (CuA) slightly constricted at branching of Cubitus A1 (CuA1) and Cubitus A2 (CuA2). Legs long and stout.

Genus *Indotipula* Edwards, 1931 쪽각다귀속(신칭)

Tipula (*Indotipula*) Edwards, 1931: 81 [Type species: *Tipula walkeri* Brunetti, 1911].
Indotipula: Savchenko, 1983: 532.

Diagnosis (modified from Savchenko, 1983). Antenna with 12 segments. Wings with reduction of the anal angle, A2 vein almost parallel to anal margin, so cell A2 really narrow. Legs with reduction of spurs on foretibia, sometimes on midtibia also. Male hypopygium commonly with bilobed 9th tergite.

1. *Indotipula yamata yamata* (Alexander, 1914) 산쪽각다귀 (신칭)

Tipula yamata Alexander, 1914: 208 [holotype = ♂, holotype locality = Tokyo (Japan)].
Indotipula yamata yamata Savchenko, 1983.

Diagnosis. Male hypopygium: Ninth tergite with prominent chitinized 2 median lobe; each apex with numerous black spicules. Outer gonostylus long and broad; length as 2.3 times as long as width, caudal margin with short seta. Inner gonostylus simple with 1 lateral lobe on median part.
Materials examined. 1M, 1F, Jeju-do, Seogwipo-si, Saekdal-dong, Mt. Halla, 1100 goji. 16.v.2015, HM Baek [KU] 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.). 11.vi.2016 YJ Bae [KU].
Distribution. South Korea, Russia (Primorskiy Kray, Sakhalin, Kuril Is), Japan (Hokkaido, Honshu, Shikoku), Taiwan.

2. *Indotipula koreana* Baek and Bae, 2016 고려각다귀

Indotipula koreana Baek and Bae, 2016b: 165 [holotype = ♂, holotype locality = Changwon (South Korea)].

Diagnosis (from Baek and Bae 2016b). Male hypopygium: Ninth tergite with a wide median protuberance, its caudal margin with bundle of seta on tiny lateral notch. Ninth sternite flattened without lobes or notch, only small bundle of short seta on median margin. Outer gonostylus oval and flattend with small seta. Inner gonostylus quite complex with long and strong seta on wide part, a long and sharp beak, and median lobe with small chitinized teeth.
Materials examined. 2M, Gyeonsangbuk-do, Changwon-gun, Unmun-myeon, N35°38′42.8″, E128°58′34.4″, 14.v. 2016; HM Baek [KU].
Distribution. South Korea.

Genus *Leptotarsus* Guerin-Meneville, 1831 배각다귀속 (신칭)

Leptotarsus Guerin-Meneville, 1831 [Type species: *Leptotarsus macquartii* Guerin-Meneville, 1831].
Semnotes Westwood, 1876: 501 [Type species: *Leptotarsus* (*Leptotarsus*) *imperatorius* (Westwood, 1876)].

3. *Leptotarsus* (*Longurio*) *pulverosus* (Matsumura, 1916) 노랑배각다귀

Togotipula pulverosus Matsumura, 1916: 464 [holotype = ♂, holotype locality = Kyoto (Japan)].

Distribution. South Korea, Japan (Honshu, Shikoku, Kyushu).
Remarks. No accurate records of Korean distribution are available for this species except in the checklist.

Genus *Nephrotoma* Meigen, 1803 황나각다귀속
Nephrotoma Meigen, 1803: 262 [Type species: *Tipula dorsalis* Fabricius, 1781].
Pales Meigen, 1800 [Type species: *Tipula dorsalis* Fabricius, 1781].
Pachyrhina Macquart, 1834 [Type species: *Tipula crocata* Linnaeus, 1758].

Diagnosis. Antenna flagellomere with enlarged base with stout verticils. Wings usually less than 30 mm; Sc ending nearly opposite origin of Rs; basal section of Rs short, oblique; cell m, sessile or very short; CuA1 uniting with M for short distance before fork of M. Body coloration highly polished, often black and yellow.

4. *Nephrotoma bifusca* Alexander, 1920 쌍황나각다귀
Nephrotoma bifusca Alexander, 1920: 25 [Holotype = ♀, holotype locality = Kyoto (Japan)].

Diagnosis. Abdominal tergites yellowish with black stripes on lateral margin. Male hypopygium entirely black; ninth tergite with straight caudal margin expect U-shaped notch on median region; numerous black spicules on caudal margin. Outer gonostylus broad on basal region; slowly narrowed round margin. Inner gonostylus broad and flat with chitinized caudal margin; obtuse blade projected toward 9th tergite.
Materials examined. 1M, Gyeonsangbuk-do, Changwon-gun, Unmun-myeon, N35°38′42.8″, E128°58′34.4″, 14.v.2016, HM Baek [KU]; 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br,) 9.vi.2011, YJ Bae [KU].

5. *Nephrotoma chosensis* Alexander, 1935 조선황나각다귀 (신칭)
Nephrotoma chosensis Alexander, 1935: 233 [Holotype = ♂, Holotype locality = Mt. Geumgang (North Korea)].

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

6. *Nephrotoma cornicina cornicina* (Linnaeus, 1758) 황나각다귀
Tipula cornicina Linnaeus, 1758: 586.
Nephrotoma flavomaculata De Geer, 1776: 347 (as *Tipula*).
Nephrotoma iridicolor Schummel, 1833: 101 (as *Tipula*).
Nephrotoma nigrina: Savchenko, 1973: 36.
Nephrotoma petiolata Zetterstedt, 1838: 846 (as *Tipula*).
Nephrotoma sannio Meigen, 1838: 36 (as *Tipula*).

Diagnosis. Antennae flagellomere entirely black. Occipital mark black. Body yellowish. Male hypopygium dark brown. Eighth sternite with a straight appendage directed caudad at caudal margin. Outer gonostylus with obtuse caudal lobe on upper caudal margin; lower caudal margin acute and blackened.
Materials examined. 2M, 1F, Gyeonsangbuk-do, Cheongdo-gun, Maejeon-myeon, Bukji-ri San 63, Mt. Seoneui. N35°39′17.1″, E128°50′17.9″, 18.vi.2016; JW Lee (YNU) [KU]; 1F, Gyeongsangbuk-do, Bonghwa-gun, Bonghwa-eup, Jeokdeok-ri. 8.vi.2001, DS Kim [KU].
Distribution. South Korea, North Korea, Canada, Albania, Andorra, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Rep., Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Switzerland, Turkey, Ukraine, Georgia, Armenia, Azerbaijan, Turkey, Cyprus, Lebanon, Israel, Iran, Russia, Mongolia, Japan, China, India, Pakistan.

7. *Nephrotoma daisensis* Alexander, 1935 산황나각다귀
Nephrotoma daisensis Alexander, 1935: 236 [Holotype = ♀, holotype locality = Japan].

Diagnosis. Abdomen tergites yellowish with brown triangular mark on caudal margin. Male hypopygium dark brown; ninth tergite with shallow U-shaped notch on center of caudal margin; caudal margin pale brown with numerous dark brown spicules; two cylindrical lobes on latero-caudal margin. Outer gonostylus cylindrical with outwardly curved caudal margin. Inner gonostylus with chitinized beak projected to 9th tergite; six small sharp lobes on dorsal margin.
Materials examined. 1M, Jeollabuk-do, Jinan-gun, Jeongcheon-myeon, Mt. Unjang. 28.v.2011, YL Jeon [KU]; 1M Gyeongsangbuk-do, Yeongju-si, Punggi-eup, Samga-ri, Mt. Sobaek. 35°28′59.1″N 126°53′10.9″E 7.vii.2016, HM Baek [KU].
Distribution. South Korea, Russia: FE (Primorskiy Kray), Japan (Honshu, Shikoku).

8. *Nephrotoma difficilis* Tangelder, 1984 검정황나각다귀 (신칭)
Nephrotoma difficilis Tangelder, 1984: 53 [Holotype = ♂; Holotype locality = Chonsani (North Korea)].

Diagnosis. Male hypopygium: Ninth tegite with U-shape median notch on caudal margin; numerous spicules along the caudal margin; small lateral lobe. Outer gonostylus wide at base; acute extension at caudal margin. Inner gonostylus

simply curved to 9th tergite; acute lobe at base plate. Eight sternite with deeply concave caudal margin. Ninth sternite flattened and bifid.
Materials examined. Holotype, 1M, Chonsani, Paiktusan [=Baekdusan], North Corea [=Korea], 13.vii.1937, Yankovsky [SI].
Distribution. North Korea, Russia: WS (Tyva), ES (southern half), FE (Primorskiy Kray, Sakhalin), Japan (Hokkaido).

9. *Nephrotoma flammeola* Alexander, 1925 해동황나각다귀
Nephrotoma flammeola Alexander, 1925: 400 [Holotype=♂, holotype locality=Gifu (Japan)].

Diagnosis. Abdomen yellow; brown triangles along the median line of the tergites, extending from the 2nd tergite to 8th tergite. Male hypopygium brown. Ninth tergite with very shallow notch on caudal margin; caudal margin with numerous black spicules; two small black appendage on latero-ventral region on caudal margin. Outer gonostylus cylindrical with outer half very slender. Inner gonostylus relatively oval and flat with strong seta on outer basal margin; no other lobes or projection.
Materials examined. 1M, Gyeongsangbuk-do, Bonghwa-eup, Jeokdeok-ri. 12.ix.2002, DS Kim [KU]; 1M, Gyeongsangbuk-do, Bonghwa-eup, Bonghwa Women's Highschool. 15.vi.2001, DS Kim [KU].
Distribution. South Korea. Russia: FE (Primorskiy Kray, Kuril Is), Japan (Hokkaido, Honshu, Shikoku, Kyushu).

10. *Nephrotoma hirsuticauda* Alexander, 1924
동쪽황나각다귀
Nephrotoma hirsuticauda Alexander, 1924: 597 [Holotype=♂, holotype locality=Sapporo (Japan)].

Diagnosis (modified from Alexander 1924). Male hypopygium obliquely truncated, the ventral surface of the extensive 8th sternite with conspicuous long yellow seta, these decussate across a deep median incision; lobes of 9th sternite likewise with shorter but conspicuous yellow seta.
Distribution. North Korea, South Korea, Russia: ES (southern half), FE (Amur oblast, Primorskiy Kray, Sakhalin, Kuril Is), Mongolia, Japan (Hokkaido, Honshu), China (Heilongjiang, Inner Mongolia, Gansu, Ningxia).

11. *Nephrotoma koreana* Tangelder, 1984 고려황나각다귀 (신칭)
Nephrotoma koreana Tangelder, 1984: 57 [Holotype=♂, holotype locality=Ompo (North Korea)].

Diagnosis. Head with bicolored antennal flagellum and really narrow pale brown occipital triangle marking. Thorax with dark brown straight stripes; 2nd scutum with dull dark brown antero-lateral corners.
Materials examined. Holotype, 1M. Ompo, North Korea, 17.v.1937, Yankovsky [SI].
Distribution. North Korea, Russia: FE (Primorskiy Kray), China (Hebei, Heilongjiang, Ningxia).

12. *Nephrotoma lamellata sublamellata* Alexander, 1935
작은판황나각다귀(신칭)
Nephrotoma sublamellata Alexander, 1935: 231 [Holotype=♂, holotype locality=Shimizu (Japan)].

Diagnosis. Abdomen with three stripes on yellow tergites. Male hypopygium with strong lateral blade on 9th tergite. Outer gonostylus narrow. Inner gonostylus complex with apical sharp lobe.
Materials examined. Holotype, 1M. Shimizu, Japan, 27.vii.1922, Esaki [SI].
Distribution. North Korea, Russia: FE (Primorskiy Kray, Sakhalin (incl. Moneron), Kuril Is).

13. *Nephrotoma makiella* (Matsumura, 1916)
갈색무늬황나각다귀(신칭)
Pachyrhina makiella Matsumura, 1916: 466 [Holotype=♀, holotype locality=Taihoku (Japan)].

Distribution. Korea, China (Fujian), Taiwan.
Remarks. The only Korean record of this species is found in Masaki (1933a), where the locality 'Korea' only is indicated. There is no additional record or preserved specimen in Korea.

14. *Nephrotoma microcera* Alexander, 1921 멋황나각다귀
Nephrotoma microcera Alexander, 1921: 133 [Holotype=♂, holotype locality=Komada, Tokyo (Japan)].

Diagnosis. Male hypopygium yellow. Ninth tergite with very deep median notch. Outer gonostylus elongated with slender apex. Inner gonostylus curved toward 9th tergite with chitinized apex; long seta on caudal and basal margin.
Materials examined. Holotype, 1M. Komada, Tokio, Japan, 6.vi.1920, H. Machida [SI].
Distribution. South Korea, Japan (Hokkaido, Honshu).

15. *Nephrotoma neopratensis* Alexander, 1921
들황나각다귀(신칭)
Nephrotoma neopratensis Alexander, 1921: 132 [Holotype=♀, holotype locality=Maruyama, Sapporo (Japan)].

Diagnosis. Male hypopygium pale brown. Ninth tergite with bilobed median margin; numerous spines on each lobe. Outer gonostylus with small apical lobe. Inner gonostylus curved toward 9th tergite; small chitinized lobe on main plate; numerous long and short seta on caudal margin.
Materials examined. 2M, 1F, Gyeongsangbuk-do, Bong-

hwa-eup, Bonghwa Women's Highschool. 7.v.2002, DS Kim [KU]; 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 9.vi.2011, YJ Bae [KU].
Distribution. North Korea, South Korea, Japan (Hokkaido, Honshu, Shikoku).

16. *Nephrotoma parvirostra* Alexander, 1924
주둥이황나각다귀
Nephrotoma parvirostra Alexander, 1924: 600 [Holotype = ♂, holotype locality = Sapporo (Japan)].

Diagnosis. Male hypopygium orange. Ninth tergite with flat caudal margin with broad median notch; several spines on median lobes; narrow and long lobe on each lateral margin toward over caudal margin. Outer gonostylus flat with small apical lobe. Inner gonostylus broad with small chitinized apex toward 9th tergite; several small pointed lobes on dorsal margin.
Materials examined. 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 9.vi.2011, YJ Bae [KU].
Distribution. South Korea, North Korea, Russia: FE (south, incl. Sakhalin, Kuril Is), Mongolia, Japan (Hokkaido, Honshu, Kyushu), China (Beijing, Chongqing, Hebei, Heilongjiang, Hubei, Sichuan).

17. *Nephrotoma pullata* (Alexander, 1914) 큰황나각다귀
Pachyrhina pullata Alexander, 1914: 160 [Holotype = ♂, holotype locality = Tokyo (Japan)].
Nephrotoma hokkaidensis Alexander, 1925.
Nephrotoma mannheimsi Savchenko, 1966.

Diagnosis. Male hypopygium with narrow deep notch on caudal margin of 9th tergite; lobes on lateral margin with sharp point. Ninth sternite with gently concaved caudal margin. Inner gonostylus long and curved without any lobe; several spicules on apex.
Materials examined. Holotype. 1M, Tokyo, Japan, 5.v.1912 [SI]; 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 9.vi.2011, YJ Bae [KU].
Distribution. South Korea, North Korea, Russia: FE (Amur oblast, Primorskiy Kray), Japan (Hokkaido, Honshu, Shikoku, Kyushu), China (Heilongjiang).

18. *Nephrotoma relicta* (Savchenko, 1973) 빗황나각다귀 (신칭)
Pales parvirostra relicta Savchenko, 1973: 118.

Diagnosis. Male hypopygium orange. Ninth tergite with flat caudal margin with broad median notch; several spines on median lobes; narrow and long lobe on each lateral margin toward over caudal margin. Outer gonostylus broad with really narrow apical lobe. Inner gonostylus broad with quite small chitinized apex toward 9th tergite; several small pointed lobes on dorsal margin.
Materials examined. 2M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 9.v.2016, YJ Bae [KU].
Distribution. South Korea, North Korea, Finland (north), Russia: NET (southwest); ES (southwest), Mongolia, China (Heilongjiang, Sichuan, Hubei).

19. *Nephrotoma repanda* (Alexander, 1914) 발해황나각다귀

Pachyrhina repanda Alexander, 1914: 162 [Holotype = ♂, holotype locality = Tokyo (Japan)].
Nephrotoma grahamiana Alexander, 1941.

Diagnosis. Male hypopygium with concave median notch on 9th tergite; numerous spicules on median margin. Ninth sternite with pubescent medina caudal margin. Outer gonostylus broad. Inner gonostylus broad oval with chitinized round apex.
Materials examined. 1M, Gyeongsangbuk-do, Seongju-gun, Gacheon-myeon, Singye-ri, Mt. Gaya 27.v.2016, JW Lee [KU]; 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 9.vi.2011, YJ Bae [KU].
Distribution. North Korea, South Korea, Russia: FE (Primorskiy Kray, Kuril Is), Japan (Hokkaido, Honshu, Kyushu), China (Sichuan).

20. *Nephrotoma saghaliensis* Alexander, 1925
사할린황나각다귀
Nephrotoma saghaliensis Alexander, 1925: 447 [Holotype = ♂, holotype locality = Toyohara, Saghalien (Russia)].

Distribution. North Korea, Russia: FE (Amur oblast, Kamchatka, Sakhalin, Kuril Is), Japan (Hokkaido, Honshu).

21. *Nephrotoma scurra* (Meigen, 1818) 광대황나각다귀 (신칭)
Tipula scurra Meigen, 1818: 198.
Nephrotoma nodulosa: Brule, 1833 (as *Tipula*).
Nephrotoma stejnegeri: Alexander, 1918.

Distribution. North Korea, Austria, Belarus, Belgium, Bulgaria, Croatia, Czech Rep., Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy (north), Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Romania, Slovakia, Spain (north), Sweden, Switzerland, Ukraine; Russia: NET, CET, SET (west); Russia: WS, ES, FE; Kazakhstan (north, east), Mongolia, China (north).

22. *Nephrotoma sinensis* (Edwards, 1916) 대륙황나각다귀 (신칭)

Pachyrhina sinensis Edwards, 1916: 268 [Holotype = ♀, Type locality = North China].

Distribution. South Korea, North Korea, Russia: FE (Primorskiy Kray), China (Beijing, Henan, Jiangsu, Ningxia, Shaanxi, Sichuan), China (Guizhou, Yunnan and coastal provinces incl. Taiwan and Hainan).

23. *Nephrotoma spicula* Tangelder, 1984 가시황나각다귀 (신칭)

Nephrotoma spicula Tangelder, 1984: 48.

Distribution. North Korea, Russia: FE (Primorskiy Kray), China.

24. *Nephrotoma virgata* (Coquillett, 1898) 황각다귀

Pachyrhina virgata Coquillett, 1898: 306 [Type locality = Primoskiy Kray (Russia)].
Nephrotoma decrepita: Alexander, 1935.
Nephrotoma japonica: Esaki, 1950 (as *Limnophila*).

Diagnosis. Male hypopygium with flat 9th tergite; small V-shape notch on caudal margin; a pair of median lobe dull with numerous spicules; lateral margin with sharp lobe. Outer gonostylus cylindrical with much narrow apex. Inner gonostylus overally chitinized with hook-shape beak on basal margin.
Materials examined. 1M, 1F, Gyeongsangbuk-do, Bonghwa-gun, Bonghwa-eup, Jeokdeok-ri. 27.viii.2000, DS Kim [KU].
Distribution. South Korea, North Korea, Russia: FE (Amur oblast, Primorskiy Kray), Japan (Hokkaido, Honshu, Shikoku, Kyushu), China (Anhui, Hebei, Hubei, Sichuan, Zhejiang).

Genus *Prionocera* Loew, 1844 민더듬이각다귀속(신칭)

Prionocera Loew, 1844: 170 [Type species: *Prionocera pubescens* Loew, 1844].
Stygeropis Loew, 1863: 298 [Type species: *Prionocera pubescens* Loew, 1844].

Diagnosis. Antenna flagellomere with slightly produced outer end, no verticils on any flagellomere. Wings usually less than 30mm; Sc ending over branch of Rs; Rs long, usually exceeding basal section of CuA; cell m, long-petiolate; CuA, or crossvein m-cu meeting M beyond its fork. Body coloration usually opaque, pruinose.
Remarks. The genus *Prionocera* is recorded only in North Korea, but could be distributed in South Korea.

25. *Prionocera chosenicola* Alexander, 1945
조선민더듬이각다귀(신칭)

Prionocera chosenicola Alexander, 1945: 229 [Holotype = ♂, holotype locality = Puksu Pyaksan, Kankyo Nando (North Korea)].
Prionocera tjederi: Mannheims, 1952.
Prionocera pubescens, not Loew: Tjeder, 1948.
Prionocera subserricornis, not Zetterstedt: Lackschewitz, 1933.

Distribution. North Korea. Canada, USA (Alaska, NWT, Nunavut), Czech Rep., Estonia, Finland, Lithuania, Norway, Romania, Sweden; Russia: NET (north), WS (north), ES (north), FE (north), Mongolia.

26. *Prionocera pubescens* Loew, 1844 털보민더듬이각다귀 (신칭)

Prionocera pubescens Loew, 1844: 170.
Prionocera anderi: Tjeder, 1948.

Distribution. North Korea, Canada, USA (Alaska, Yukon, NWT, Alta and Man), Austria, Belarus, Belgium, Czech Rep., Denmark, Estonia, Finland, France (Yvelines, Auvergne), Germany, Great Britain, Latvia, Lithuania, Netherlands, Norway, Poland, Sweden, Switzerland, Ukraine; Russia: NET, CET, SET, WS, ES, FE, Kazakhstan (east).

27. *Prionocera serenicola* Alexander, 1945
설영민더듬이각다귀(신칭)

Prionocera serenicola Alexander, 1945: 230 [Holotype = ♂, holotype locality = Mt. Seren (North Korea)].

Distribution. North Korea, Mongolia.

28. *Prionocera subserricornis* (Zetterstedt, 1851)
집게민더듬이각다귀(신칭)

Tipula subserricornis Zetterstedt, 1851: 3970.
Prionocera proxima Lackschewitz, 1933.

Distribution. North Korea, Canada, USA (Alaska and NWT to Labr, south to Colo), Belarus, Belgium, Czech Rep., Denmark, Estonia, Finland, Germany, Great Britain, Latvia, Lithuania, Netherlands, Norway, Poland, Sweden, Ukraine (north); Russia: NET, CET, WS, ES, FE (in Russia widespread from the Baltic sea and Murmanskaya oblast throughout Siberia, incl. Altay, Kamchatka, Sakhalin and Kuril Is), Mongolia.

Genus *Tipula* Linnaeus, 1758 각다귀속

Tipula Linnaeus, 1758 [Type-species: *Tipula oleracea* Linnaeus, 1758].

Diagnosis. Antenna flagellomere elongated on basal part with several verticils. Wings usually more than 30 mm; Sc ending over branch of Rs; Rs long, usually exceeding basal section of CuA; cell m, long-petiolate; CuA, or crossvein m-cu meeting M beyond its fork. Body coloration usually

opaque, pruinose.

29. *Tipula* (*Acutipula*) *bicompressa* Alexander, 1950
뭉툭돌기각다귀(신칭)
Tipula bicompressa Alexander, 1950: 424 [Holotype = ♂, holotype locality = Puksu Pyaksan (North Korea)].

Distribution. North Korea, Russia: FE (Primorskiy Kray, Kuril Is).

30. *Tipula* (*Acutipula*) *bubo*, Alexander, 1918
좀잠자리각다귀
Tipula bubo Alexander, 1918: 69.
Tipula (*Acutipula*) *shibakawae* Matsumura, 1932.

Distribution. South Korea, Russia: FE (Primorskiy Kray, Sakhalin, Kuril Is), Japan (Hokkaido, Honshu).

31. *Tipula* (*Acutipula*) *tokionis* Alexander, 1920 동방각다귀
Tipula tokionis Alexander, 1920: 138 [Holotyoe = ♀, holotype locality = Tokyo (Japan)].

Diagnosis. Wing calypter with strong setae. Eighth sternite with a bundle of setae on lateral lobes. Male hypopygium with 9th tergite and sternite clearly separated with suture. Ninth tergite flat; median region produced into a simple lobe; apex obtuse and set with numerous black spicules. Outer gonostylus simple with widely round, small lobe at ventral margin. Inner gonostylus much complex with several lobes.
Materials examined. 2M, 1F, Gyeongsangbuk-do, Bonghwa-gun, Bonghwa-eup, Jeokdeok-ri. 17.viii.2001, DS Kim [KU]; 1M Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.) 21.v.2016, YJ Bae [KU]; 1M, Japan, Gifu; Kariya (Alexander's metatype no. 2188) [SI].

32. *Tipula* (*Arctotipula*) *centrodentata* Alexander, 1953
꼬리톱니각다귀(신칭)
Tipula centrodentata Alexander, 1953: 326.
Tipula (*Arctotipula*) *mediodentata* Alexander, 1950.

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

33. *Tipula* (*Arctotipula*) *laterodentata* Alexander, 1950
옆톱니각다귀(신칭)
Tipula laterodentata Alexander, 1950: 421.

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

34. *Tipula* (*Arctotipula*) *pudibunda* Savchenko, 1961
알락각다귀(신칭)
Tipula pudibunda Savchenko, 1961: 239.

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

35. *Tipula* (*Dendrotipula*) *isshikii* Alexnader, 1921
민꼬리각다귀
Tipula (*Dendrotipula*) *isshikii* Alexnader, 1921: 183 [Holotype = ♂, Holotype locality = Teshio (Japan)].

Diagnosis. Antennae long, usually reaching to thorax; flagellomere cylindrical without enlargement on basal part. Eighth sternite unarmed. Male hypopygium with 9th tergite caudal margin with broad U-shaped median notch; lateral lobes broadly rounded. Outer gonostylus broad. Inner gonostylus curved outwardly with small U-shaped median notch on caudal margin.
Materials examined. Holotype, Japan, Hokkaido, Teshio, 12.vii.1916, Isshiki T [SI]; 2M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.), 27.ix.2015, YJ Bae [KU].
Distribution. South Korea, Russia: FE (Kuril Is), Japan (Hokkaido).

36. *Tipula* (*Emodotipula*) *multibarbata* Alexander, 1935
좀각다귀(신칭)
Tipula multibarbata Alexander, 1935: 133.

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

37. *Tipula* (*Lindnerina*) *illinoinensis* Alexnader, 1915
일리노이각다귀(신칭)
Tipula illinoiensis Alexander, 1915: 128.
Tipula (*Lindnerina*) *versicolor* Loew, 1863.

Distribution. Korea, Canada, USA (Man to Ont, Que and NH, south to Minn, Ill, Tenn and NC), Russia: FE (Magadan oblast).
Remarks. There is no additional data on the distribution of this species except checklist.

38. *Tipula* (*Lunatipula*) *fulminis* Alexander, 1945
번개무늬각다귀(신칭)
Tipula fulminis Alexander, 1945: 239.

Distribution. North Korea, Russia: FE (Primorskiy Kray).

39. *Tipula* (*Lunatipula*) *manca* Alexander, 1924
몽당각다귀
?*Tipula* (*Lunatipula*) *terebrina* Alexander, 1920: 19.
Tipula (*Lunatipula*) *manca* Alexander, 1924: 457.
Tipula (*Lunatipula*) *plagiotoma* Alexander, 1924: 458.

Diagnosis. Male, Body length 14–16 mm, wings 17–20 mm.

Wing calypter with strong seta. Male hypopygium complex. Ninth tergite with bifid dorsal lobes on caudal margin. Outer gonostylus fairly small, pale, flattened. Inner gonostylus much complex with small claw shape outer basal lobe. Ventral margin of inner gonostylus with oval lobe. Eight sternite with very dense setal band.

Materials examined. 2 Male, Gyeongsangbuk-do, Bonghwa-gun, Jeokmok-ri. 24 May 2001, Kim DS [KU]; 1 Male, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.), 6 Jun. 2015, YJ Bae [KU]; 1 male, Japan, Gifu, Kariya (Alexander's metatype no. 2188) [SI].

Distribution. South Korea (New record), Japan, Russia.

Remarks. Morphological characters of Korean specimens well fit to those of original description by Alexander (1924).

40. *Tipula* (*Lunatipula*) *pendula* Alexander, 1924
흔들다리각다귀(신칭) (Fig. 1)

Tipula pendula Alexander, 1924: 469 [Holotype = ♂, holotype locality = Hokkaido (Japan)].

Diagnosis. Male hypopygium quite small; 9th tergite with 2 parallel lateral lobes and a narrow median notch. Gonocoxite with sharp round lobe on caudal margin; it cover some part of inner gonostylus. Outer gonostylus small. Inner gonostylus with 1 simple lobe and round outer basal lobe on upper caudal margin; lower caudal margin acute and blackened.

Materials examined. 2M, Gyeonsangbuk-do, Yeongju-si, Punggi-eup, Samga-ri, Mt. Sobaek. N35°28′59.1″, E126° 53′10.9″, 11.v.2016, HM Baek [KU].

Distribution. South Korea (New record), Russia: FE (Sakhalin, Kuril Is), Japan (Hokkaido, Shikoku).

Remarks. *Tipula* (*Lunatipula*) *pendula* is newly recorded from Korea.

41. *Tipula* (*Lunatipula*) *sublimitata atrodeclivis* Alexander, 1950 검은무늬각다귀(신칭)

Tipula sublimitata atrodeclivis Alexander, 1950: 425 [Holotype = ♂, holotype locality = Seren Mountain (North Korea)].

Distribution. North Korea.

Remarks. This species is endemic to North Korea.

42. *Tipula* (*Mediotipula*) *anatoliensis* Theowald, 1978
아나톨리아각다귀

Tipula (*Mediotipula*) *anatoliensis* Theowald, 1978: 424 [Holotype = ♂, holotype locality = Tukey].

Diagnosis. Antenna flagellomere with verticils only on basal enlargement. Wing calypter without strong setae. Male hypopygium with a pair of apical notch on median caudal margin. Outer gonostylus almost flat rectangular with length

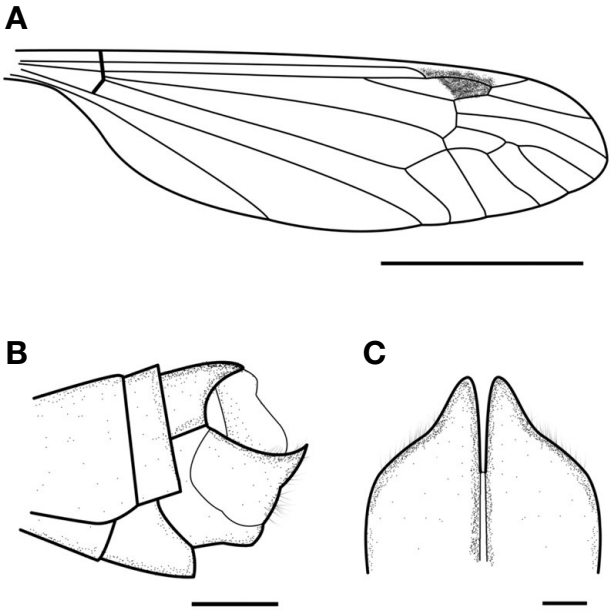

Figure 1. *Tipula* (*Lunatipula*) *pendula* (Alexander). A, Wing; B, Lateral view of male hypopygium; C, 9th tergite (scales: A, 5 mm; B, 1 mm; C, 0.2 mm).

3 times longer than wide. Inner gonostylus large with long lateral blade; beak curved anterior with bundle of small setae on mesal margin.

Materials examined. 1M. Gyeonggi-do, Gapyeong-gun, Baekdun Valley, 2.vi.2014, Jung SW [KU].

Distribution. South Korea, Turkey.

43. *Tipula* (*Nippotipula*) *coquilletti* Enderlein, 1912
잠자리각다귀

Tipula coquilletti Enderlein, 1912: 7.
Tipula (*Nippotipula*) *nubifera* Coquillett, 1898.

Distribution. South Korea, Russia: FE (Sakhalin, Kuril Is), Japan (Hokkaido, Honshu, Shikoku, Kyushu), Taiwan.

44. *Tipula* (*Nippotipula*) *sinica* Alexander, 1935
대륙잠자리각다귀

Tipula (*Nippotipula*) *sinica* Alexander, 1935: 92.

Diagnosis. Male hypopygium with uplifted 9th tergite. Outer gonostylus borad and strongly chitinized. Eighth sternithe with long median lobe.

Materials examined. 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Jeokmok-ri, Garim-gyo (Br.). 26.iv.2014, YJ Bae [KU].

Distribution. South Korea, China (Sichuan, Zhejiang).

45. *Tipula* (*Odonatisca*) *longicauda* Matsumura, 1906
배각다귀

Tipula longicauda Matsumura, 1906: 123.
Tipula (*Odonatisca*) *mystica*: Alexander, 1924.

Distribution. South Korea, Russia: FE (Magadan oblast, Primorskiy Kray, Sakhalin, Kuril Is), Mongolia, Japan (Hokkaido, Honshu, Shikoku, Kyushu).
Remarks. This species was treated as a subspecies of *T. nodicornis*. However, it was recently treated as a species because of sympatry.

46. *Tipula* (*Platytipula*) *ecaudata* Alexander, 1924
가는맵시각다귀(신칭)
Tipula (*Schummelia*) *ecaudata* Alexander, 1924: 474 [Holotype = ♂, holotype locality = Ozenuma lake (Japan)].
Tipula (*Platytipula*) *ecaudata* Savchenko, 1961: 75.

Diagnosis. Ninth tergite with numerous setae on dorsal plate; broad U-shaped caudal notch; its caudal margin chitinized. Outer gonostylus cylindrical with numerous setae. Inner gonostylus simple; flat with chitinized blade projected toward the notch of 9th tergite.
Materials examined. 1M, Jeollanam-do, Gurye-gun, Tojimyeon, Naeseo-ri, Mt. Jiri, Piagol Valley N35°16′18.4″, E127°34′17.2″, 3.vi.2016; HM Baek & S Podenas [KU].
Distribution. South Korea (New record), Russia: FE (Primorskiy Kray, Sakhalin, Kuril Is), Japan (Honshu, Shikoku, Kyushu).
Remarks. *Tipula* (*Platytipula*) *ecaudata* is newly recorded from Korea.

47. *Tipula* (*Platytipula*) *moiwana* (Matsumura, 1916)
산맵시각다귀
Platytipula moiwana Matsumura, 1916: 458.

Distribution. South Korea, Norway (Oslo), Russia: CET (Moskovskaya oblast, Tula oblast); FE (south, incl. Sakhalin, Kuril Is), Japan (Hokkaido, Honshu), China (northeast).
Remarks. No additional data on the Korean distribution are available for this species except in the checklist.

48. *Tipula* (*Platytipula*) *nipponensis* Alexander, 1914
섬각다귀
Tipula nipponensis Alexander, 1914: 236.

Distribution. South Korea, Russia: FE (Sakhalin), Japan (Hokkaido, Honshu, Shikoku).

49. *Tipula* (*Pterelachisus*) *flavocostalis* Alexander, 1921
노랑다리각다귀(신칭)
Tipula flavocostalis Alexander, 1921: 124 [Holotype = ♂, holotype locality = Tamagawa (Japan)].

Diagnosis. Male hypopygium with tridentate 9th tergite; lateral lobes strongly chitinized and longer median lobe. Inner gonostylus small with interior lobe curved into 9th tergite. Outer gonostylus short and stout. Eightth sternite with broad median lobe.
Materials examined. Holotype, Tamagawa, Saitama, Japan, 25.ix.1920, H Machida [SI].
Distribution. South Korea, Russia: FE (south, incl. Sakhalin, Kuril Is), Japan (Honshu, Shikoku, Kyushu).

50. *Tipula* (*Pterelachisus*) *phryne* Alexander, 1945
북녘각다귀(신칭)
Tipula phryne Alexander, 1945: 238 [Holotype = ♂, holotype locality = Ompo (North Korea)].

Diagnosis. Male hypopygium with broad U-shaped notch on 9th tergite; small median lobe on the notch. Inner gonostylus with broad basal blade and strongly chitinized apex. Outer gonostylus simple and basally broad.
Materials examined. Paratype, 1M, 1F, Ompo, North Korea, 2.vi.1937, Yangkovsky [SI].
Distribution. North Korea.
Remarks. This species is endemic to North Korea.

51. *Tipula* (*Pterelachisus*) *taikun* Alexander, 1921
줄각다귀
Tipula taikun Alexander, 1921: 125 [Holotype = ♂, holotype locality = Morioka (Japan)].

Diagnosis (Modified from Alexander, 1921). Male Hypopygium yellow. Ninth tergite with yellow seta; caudal margin with small median notch. Inner gonostylus complex with broad basal blade. Outer gonostylus broad.
Materials examined. Holotype, Koiwai Farm, near Morioka, Japan, 8.ix.1920. C Teranish [SI].
Distribution. South Korea, Russia: FE (Sakhalin, Kuril Is), Japan (Hokkaido, Honshu).
Remarks. Only slide specimen of the wing of holotype was preserved in SI.

52. *Tipula* (*Pterelachisus*) sp. 1

Materials examined. 1M, 1F, Gyeongsangbuk-do, Bonghwa-gun, Bonghwa-eup, Jeokdeok-ri. 4.vi.2001, DS Kim [KU].
Remarks. Male hypopygium of this species is similar to those of *Tipula* (*Pterelachisus*) *taikun* Alexnader, 1921, but shape of caudal margin of the 9th tergite and sternite is unique among congerers. We temporarily identify this specimen as separate species.

53. *Tipula* (*Savtshenkia*) *koreana* Alexander, 1934
한국각다귀
Tipula koreana Alexander, 1934: 33.

Distribution. North Korea, Russia: FE (Sakhalin), Japan (Shikoku).

54. *Tipula* (*Savtshenkia*) *persignata* Alexander, 1945 어리무늬각다귀(신칭)

Tipula persignata Alexander, 1945: 235.

Distribution. North Korea.
Remarks. This species is endemic to North Korea.

55. *Tipula* (*Savtshenkia*) *tofina* Alexander, 1945 나도각다귀(신칭)

Tipula persignata tofina Alexander, 1945: 236.

Distribution. North Korea, Sweden (Norrbotten), Russia: WS (Tyva), ES (Yakutiya), FE, Kazakhstan (east), Mongolia.
Remarks. This species was recently treated as a separate species because of sympatry.

56. *Tipula* (*Sinotipula*) *tsiosenica* Alexander, 1945 엉킨꼬리각다귀(신칭)

Tipula tsiosenica Alexander, 1945: 231.

Diagnosis. Male hypopygium with 9th tergite entirely separated with 9th sternite. Ninth tergite with medina lobe and narrow caudal margin. Inner gonostylus quite complex dorsally curved with twisted apex.
Materials examined. Paratype, 1M, Ompo, North Korea. 10.vi.1937, Yangkovsky [SI].
Distribution. North Korea.
Remarks. This species is endemic to North Korea.

57. *Tipula* (*Yamatotipula*) *aino* Alexander, 1914 아이노각다귀

Tipula aino Alexander, 1914: 209 [Holotype = ♂, holotype locality = Tokyo (Japan)].

Diagnosis. Abdomen with yellowish tergite; broad brown stripe on lateral side. Male hypopygium without clear suture between 9th tergite and sternite; 9th tergite with 2 round lobes on latero-caudal margin. Outer gonostylus large, oval, and flat. Inner gonostylus complex.
Materials examined. 2M, Jeju-do, Seogwipo-si, Saekdal-dong, Mt. Halla, 1100goji, 16.v.2015, HM Baek [KU]; 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Garim-gyo (Br.), 21.v.2016, YJ Bae [KU].
Distribution. South Korea, Russia: FE, Kazakhstan, Japan (Hokkaido, Honshu, Shikoku, Kyushu), China (Shanxi).

58. *Tipula* (*Yamatotipula*) *chonsaniana* Alexander, 1945 청산리각다귀(신칭)

Tipula chonsaniana Alexander, 1945: 234 [Holotype = ♂, holotype locality = Chonsani (Korea)].

Diagnosis. Central lobe of 9th tergite rounded, covered by numerous spicules. Lateral lobes apically rounded and slightly narrowed. Outer gonostylus with wide basal part, narrowed outwardly, tip rounded. Inner gonostylus sclerotized, bearing light hairs.
Materials examined. Holotype, Chonsani, altitude 3700 feet, 17.vii.1937, Yankovsky [SI].
Distribution. North Korea, Finland, Russia: WS (Altay, Tyva), FE (Primorskiy Kray); Mongolia.

59. *Tipula* (*Yamatotipula*) *freyana freyana* Lackschewitz, 1936 작은돌기각다귀(신칭)

Tipula freyana Lackschewitz, 1936: 292.
Tipula (*Yamatotipula*) *subpruinosa*, Mannheims, 1954.

Distribution. North Korea, Finland (central, north), Sweden (north); Russia: NET (Kareliya); Russia: ES (Taymyr); Mongolia.

60. *Tipula* (*Yamatotipula*) *hexacantha* Alexander, 1961 여섯돌기각다귀

Tipula (*Yamatotipula*) *hexacantha* Alexander, 1961: 415 [Holotype = ♂, Holotype locality = Urak (Pakistan)].

Diagnosis. Wing calypter without strong setae. Male hypopygium with 9th tergite and sternite fused to form a continuous ring. Ninth tergite with 2 small teeth on each edge of caudal margin and with 2 small teeth on median notch. Outer gonostylus simple flat and oval. Inner gonostylus complex with large outer basal lobe.
Materials examined. Holotype, Pakistan, Urak, 28.v.1954, Schmid [SI]; 2M. Gangwon-do, Samcheok-si, Miro-myeon, Hwalgi-ri. 30.viii.2011, SW Jung [KU].
Distribution. South Korea, Pakistan.

61. *Tipula* (*Yamatotipula*) *latemarginata latemarginata* Alexander, 1921 애아이노각다귀

Tipula latemarginata Alexander, 1921: 128 [Holotype = ♂, holotype locality = Sapporo (Japan)].
Tipula (*Yamatotipula*) *fumida*: Alexander, 1924 (synonymy not certain).
Tipula (*Yamatotipula*) *parvincisa*: Alexander, 1934.
Tipula (*Yamatotipula*) *trifida*: Alexander, 1921 (synonymy not certain).
Tipula KUb: Yoon & Kim, 1992.

Diagnosis. Male hypopygium 9th tergite and sternite fused into a ring, thus the suture not clear. Ninth tergite with short broad median lobe; caudal margin blackened; very small notch on median region. Outer gonostylus oval. Inner gonostylus with broad with relatively broad lobe; two long and round lobes on its outer margin.
Materials examined. 1M, Gyeongsangbuk-do, Bongh-

wa-gun, Bonghwa Women's Highschool, 2.vi.2001, DS Kim [KU].
Distribution. South Korea, Russia, Kazakhstan, Japan (Hokkaido), China (Beijing, Gansu, Hebei, Inner Mongolia, Ningxia, Shaanxi, Shanxi).

62. *Tipula* (*Yamatotipula*) *nigrolamina* Alexander, 1950
검정톱니각다귀(신칭)
Tipula nigrolamina Alexander, 1950: 418 [Holotype = ♂, holotype locality = Seren Mountains (North Korea)].
Tipula (*Yamatotipula*) *fendleri* Mannheims, 1963 (synonymy not certain).

Diagnosis. Male hypopygium with 9th tergite fused with 9th sternite. Ninth tergite with broad U-shape notch on caudal margin; numerous seta on flat, broad lobes. Outer gonostylus cylindrical. Inner gonostylus with broad basal part; dorsal margin straight with small chitinized apex; small lobe with several seta on basal inner margin.
Materials examined. Holotype, 1M, Seren Mountains, North Korea, 26.vi.1938, Yankovsky [SI].
Distribution. North Korea, Russia: WS (Altay), FE (Primorskiy Kray).

63. *Tipula* (*Yamatotipula*) *nova* Walker, 1848
애잠자리각다귀
Tipula (*Yamatotipula*) *nova* Walker, 1848: 71.
Tipula (*Yamatotipula*) *fumifasciata* Brunetti, 1911.
Tipula (*Yamatotipula*) *nohirae* Matsumura, 1916 (as *Yamatotipula*).

Diagnosis. Male hypopygium with 9th tergite fused with 9th sternite; obtuse notch on caudal margin with a small beak on each lobe; conspicuous a finger-shape dorsal lobe produced on caudal area. Outer gonostylus quite small and flat. Inner gonostylus with broadly waved basal margin.
Materials examined. 1M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Garim-gyo (Br.), 21.v.2016, YJ Bae [KU], 4M, Gyeonggi-do, Gapyeong-gun, Buk-myeon, Garim-gyo (Br.), 12.v.2015, YJ Bae [KU].
Distribution. South Korea, Japan (Hokkaido, Honshu, Shikoku, Kyushu), China, India (Assam), Taiwan.

64. *Tipula* (*Yamatotipula*) *ompoensis* Alexander, 1945
온포각다귀(신칭)
Tipula ompoensis Alexander, 1945: 233 [Holotype = ♂, holotype locality = Ompo (North Korea)].

Diagnosis. Male hypopygium dark brown. Ninth tergite with broad U-shape notch on caudal median margin; lateral margin produced flat and broad lobe with numerous spicules. Outer gonostylus flat, narrow. Inner gonostylus quite complex; outer basal lobe produced black spine; basal part with three strong beak.
Materials examined. Holotype, 1M, Ompo, altitude 200 feet, North Korea, 1.vi.1937, Yankovsky [SI].
Distribution. North Korea.
Remarks. This species is endemic to North Korea.

65. *Tipula* (*Yamatotipula*) *patagiata* Alexander, 1924
어리아이노각다귀
Tipula patagiata Alexander, 1924: 465 [Holotype = ♂, holotype locality = Mt. Moiwa, Ishikari-no-kuni (Japan)].

Diagnosis. Male hypopygium with 9th tergite fused with 9th sternite; caudal margin with broad and short median lobe and obtuse lateral lobes. Outer gonostylus broad and flat. Inner gonostylus with chitinized margin; numerous long setae along the margin.
Materials examined. 1M, Shikoku, Totidani-yanase, alt. 400 m, Japan, 2.v.1951, Issiki-Ito [SI].
Distribution. South Korea, Russia: FE (Khabarovskiy Kray), Japan.

66. *Tipula lanio* Alexander, 1945 갈래각다귀(신칭)
Tipula (*Oreomyza*) *lanio* Alexander, 1945: 237 [Holotype = ♂, holotype locality = Seren mountains (North Korea)].

Diagnosis. Male hypopygium with broad dull notch on 9th tergite; lateral lobe dull. Ninth sternite with an elongated lobe. Outer gonostylus long and narrow. Inner gonostylus flat without basal lobe; apical beak chitinized; lower beak short.
Materials examined. Paratype, 1M, Seren Mountains, altitude 3000 feet, 18.vi.1938, Yankovsky [SI].
Distribution. North Korea.
Remarks. This species is endemic to North Korea. Although this species may belong to the subgenus *Pterelachisus*, its subgeneric position is not decided.

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