

Checklist of the Korean Stoneflies (Plecoptera) with Six Newly Recorded Species

Jeong Mi Hwang^{1,*}, David Murányi²

¹Korean Entomological Institute, Korea University, Seoul 02841, Korea

²Department of Zoology, Hungarian Natural History Museum, Budapest H-1088, Hungary

ABSTRACT

A revised checklist of the Korean Plecoptera is updated here, with 10 families, 36 genera, and 95 species are reported. *Pictetiella asiatica* Zwick & Levanidova, *Claassenia radiata* (Klapálek), *Xanthoneuria unimaculata* (Zhiltzova) and *Sweltsa* sp. Ko (temporary name) are known only from the Democratic People's Republic of Korea. *Nemoura sahlbergi* Morton, *Perlomyia kiritshenkoi* Zhiltzova, and *Neoperla adamantea* Murányi & Li are reported for the Republic of Korea in this study. *Nemoura ussuriensis* Zhiltzova, *Capnia sidimiensis* Zhiltzova, *Eucapnopsis quattuorsegmentata* Okamoto, *Yoraperla uenoi* (Kohno), *Isoperla kozlovi* Zhiltzova, and *Kamimuria lyubaretzi* Teslenko are new from the Korean peninsula. Materials, bibliographic data, diagnoses for newly recorded species, and their distributions are provided.

Keywords: Plecoptera, stoneflies, new record, diagnoses, Korea

INTRODUCTION

Plecoptera is a small order of hemimetabolous insects, commonly called stoneflies, with approximately 3,500 species in the world (Fochetti and Tierno de Figueroa, 2008). A total of 82 species in the Plecoptera were catalogued by Kim et al. (1998), Ham (2009), and Hwang and Murányi (2015) were reported in the Korean peninsula and 10 species of them were reported only for the Democratic People's Republic of Korea. This Plecoptera checklist incorporates subsequent taxonomic studies of Korean Plecoptera (Hwang and Murányi, 2015; Hwang et al., 2016; Murányi et al., 2016; Murányi and Hwang, 2017). In this paper, 10 families, 36 genera, and 95 species of the Korean Plecoptera are catalogued including six new recorded species, *Nemoura ussuriensis* Zhiltzova, *Capnia sidimiensis* Zhiltzova, *Eucapnopsis quattuorsegmentata* Okamoto, *Yoraperla uenoi* (Kohno), *Isoperla kozlovi* Zhiltzova, and *Kamimuria lyubaretzi* Teslenko.

MATERIALS AND METHODS

The specimens were collected mainly by Malaise traps and

only a few specimens were collected by sweeping net. All specimens are stored in 80% ethanol. Materials are deposited in the Entomological Museum of Korea University (KU), Seoul and in the National Institute of Biological Resources (NIBR), Incheon, Korea. The abbreviations and symbols used in the taxonomic account are as follows: ♂, male adult; ♀, female adult; CB, Chungcheongbuk-do; CN, Chungcheongnam-do; GB, Gyeongsangbuk-do; GG, Gyeonggi-do; GW, Gangwon-do; JN, Jeollanam-do; Mt., mountain.

SYSTEMATIC ACCOUNTS

Order Plecoptera Burmeister, 1839

Family Scopuridae Uéno, 1935

Genus *Scopura* Uéno, 1929

1. *Scopura gaya* Jin & Bae, 2005

Scopura gaya Jin & Bae, 2005a: 23.

2. *Scopura jiri* Jin & Bae, 2005

Scopura jiri Jin & Bae, 2005b: 89.

3. *Scopura laminata* Uchida & Maruyama, 1987

Scopura laminata Uchida and Maruyama, 1987: 707.

© This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

*To whom correspondence should be addressed

Tel: 82-2-3290-4260, Fax: 82-2-3290-3623

E-mail: msmay74@korea.ac.kr

4. *Scopura scorea* Jin & Bae, 2005
Scopura scorea Jin & Bae, 2005a: 30.

Family Taeniopterygidae Klapálek, 1905
 1*Genus *Strophopteryx* Frison, 1929

5. *Strophopteryx nohirae* (Okamoto), 1922
Rhabdiopteryx nohirae Okamoto, 1922: 14.

Genus *Taenionema* Banks, 1905

6. *Taenionema japonicum* (Matsumura), 1904
Nemoura japonica Matsumura, 1904: 157.

Family Nemouridae Billberg, 1820
 Genus *Amphinemura* Ris, 1902

7. *Amphinemura baei* Ham & Lee, 1999
Amphinemura baei Ham & Lee, 1999: 120.

8. *Amphinemura coreana* Zwick, 1973
Amphinemura coreana Zwick, 1973a: 157.

9. 2* *Amphinemura denstigris* Zwick, 2010
Amphinemura denstigris Zwick, 2010: 77.

10. *Amphinemura rai* Ham & Lee, 1999
Amphinemura rai Ham & Lee, 1999: 119.

11. *Amphinemura steinmanni* Zwick, 1973
Amphinemura steinmanni Zwick, 1973a: 158.

12. *Amphinemura verrucosa* Zwick, 1973
Amphinemura verrucosa Zwick, 1973a: 161.

Genus *Nemoura* Latreille, 1796

13. 3* *Nemoura aquila* Murányi, 2011
Nemoura aquila Murányi, 2011 (in: Murányi & Park, 2011):
 76.

14. *Nemoura brevicercia* Zhiltzova, 1982
Nemoura brevicercia Zhiltzova, 1982: 37.

15. 4* *Nemoura chinonis* Okamoto, 1922
Nemoura chinonis Okamoto, 1922: 30.

16. 5* *Nemoura despinosa* Zhiltzova, 1977
Nemoura despinosa Zhiltzova, 1977a: 5.

17. *Nemoura espera* Ham & Lee, 1999
Nemoura espera Ham & Lee, 1999: 123.

18. 6* *Nemoura geei* Wu, 1929
Nemoura geei Wu, 1929: 200.

19. *Nemoura gemma* Ham & Lee, 1998
Nemoura gemma Ham & Lee, 1998: 357.

20. 7* *Nemoura jejuensis* Zwick & Baumann, 2011
Nemoura jejuensis Zwick & Baumann, 2011: 149.

21. *Nemoura jezoensis* (Okamoto), 1922
Protonemura jezoensis Okamoto, 1922: 32.

22. 8* *Nemoura jilinesis* Zhu & Yang, 2003
Nemoura jilinesis Zhu & Yang, 2003: 477.

23. 9* *Nemoura papilla* Okamoto, 1922
Nemoura papilla Okamoto, 1922: 34.

24. *Nemoura phasianusa* Ham, 2009
Nemoura phasianusa Ham, 2009: 95.

25. 10* *Nemoura rugosa* Zwick, 2010
Nemoura rugosa Zwick, 2010: 85.

26. 11* *Nemoura sahlbergi* Morton, 1896
Nemoura sahlbergi Morton, 1896: 56.

New material. Korea. 2♂♂, GB: Yeongju-si, Punggi-eup, Gyochon-ri, Birosa, Mt. Sobaeksan, 26 Jun 2015 [KU].

Remarks. This species is the first record from the Republic of Korea.

27. *Nemoura tau* Zwick, 1973
Nemoura tau Zwick, 1973b: 150.

28. 12* *Nemoura tripotini* Zwick, 2010
Nemoura tripotini Zwick, 2010: 86.

29. 13* *Nemoura ussuriensis* Zhiltzova, 1997 (Fig. 1A)
Nemoura ussuriensis Zhiltzova, 1997 (in Teslenko & Zhiltzova, 1997): 24. Type locality: Russia.

Material examined. Korea: 1♂, GB: Cheongdo-gun, Unmun-myeon, Unmunsa-gil, Munsuseonwon, 35°38'32"N, 128°57'50"E, Malaise trap, 8–30 Apr 2016, Lee JW [NIBR]; 1♂ 2♀♀, Cheongdo-gun, Unmun-myeon, Unmunsa-gil, Munsuseonwon, 35°38'32"N, 128°57'50"E, Malaise trap, 8–30 Apr 2016, Lee JW [KU]; 2♂♂ 1♀, GW: Hoengseong-

Korean name: 1*얼룩메추리강도래속 (신칭), 2*호랑이이빨민강도래 (신칭), 3*독수리민강도래 (신칭), 4*장미민강도래 (신칭), 5*나도민강도래 (신칭), 6*나팔꽃민강도래 (신칭), 7*제주민강도래 (신칭), 8*지리민강도래 (신칭), 9*돌기민강도래 (신칭), 10*거친민강도래 (신칭), 11*비로민강도래 (신칭), 12*뫼민강도래 (신칭), 13*북방민강도래 (신칭)

gun, Cheongil-myeon, Yudong-ri, 37°35'47.5"N, 128°10'19.4"E, Sweeping, 30 Mar 2019, Jung KS [KU].

Diagnosis. This species can be distinguished from other congeners by the following characters: (1) epiproct widely oval, its tip with a small notch; (2) ventral sclerite of epiproct comparatively narrow, lateral spines short; (3) paraproct large, its outer lobe extended, apex rounded; and (4) cerci stout, wide, strongly sclerotized, apex with large size of the light spot and small dark spot.

Distribution. Korea (New to Korea), Russia (Far East).

Genus *Protonemura* Kempny, 1898

30. *Protonemura villosa* Ham & Lee, 1999

Protonemura villosa Ham & Lee, 1999: 122.

¹*Genus *Zapada* Ricker, 1952

31. ²Zapada quadribranchiata* (Zhiltzova), 1977**

Amphinemura quadribranchiata Zhiltzova, 1977a: 3.

Family Capniidae Banks, 1900

³*Genus *Capnia* Pictet, 1841

32. ⁴Capnia sidimiensis* Zhiltzova, 1979 (Fig. 1B)**

Capnia sidimiensis Zhiltzova, 1979: 15. Type locality: Russia.

Material examined. Korea: 1♂, GB: Yeongyang-gun, Yeongyang-eup, Gowol-gil, Hwawoncheon Stream, 36°38'21.32"N, 129°9'9.70"E, Malaise trap, 7–13 Mar 2019, Hwang JM, Ham DS [NIBR]; 10♂♂ 16♀♀, Yeongyang-gun, Yeongyang-eup, Gowol-gil, Hwawoncheon Stream, Malaise trap, 26 Feb–6 Mar 2019, Hwang JM, Ham DS [KU]; 24♂♂ 95♀♀, Sangju-si, Hwabuk-myeon, Ipseok-ri, 36°36'40", 127°53'41", Malaise trap, 29 Mar–22 Apr 2019, Kim YG [KU].

Diagnosis. This species can be distinguished from other congeners by the following characters: (1) male tergum VII with small process curved upward, tergum X halves with sinuous inner margins; (2) ventral vesicle absent, subgenital plate widely fused; (3) epiproct cylindrical, recurved over tergum X, apical projection moderately long and with rounded apex; (4) paraproct with wide and long apex, fusion plate narrow; and (5) cercus long.

Distribution. Korea (New to Korea), Russia (Far East).

Genus *Eucapnopsis* Okamoto, 1922

33. *Eucapnopsis stigmatica* Okamoto, 1922

Eucapnopsis stigmatica Okamoto, 1922: 9.

34. ⁵Eucapnopsis quattuorsegmentata* Okamoto, 1922 (Fig. 1C)**

Eucapnopsis quattuorsegmentata Okamoto, 1922: 1–46.

Type locality: Japan.

Material examined. Korea: 1♀, GB: Yeongju-si, Punggi-eup, Geumgye-ri, Geumseon, Mt. Sobaeksan, 36°57'25.1"N, 128°25'47.6"E, sweeping, 13 May 2016, Jung JC [NIBR]; 25♀♀, GG: Yangpyeong-gun, Okcheon-myeon, Yongjeon-ri, Sanasa valley, Satancheon Stream, sweeping, 19 Mar 2019, Hwang JM [KU].

Diagnosis. This species can be distinguished from other congeners by the following characters: (1) female subgenital plate white, membranous with two lateral sclerites that extend medially; and (2) cercus with five segmented; apical segmental whorls.

Distribution. Korea (New to Korea), Japan.

Genus *Paracapnia* Hanson, 1946

35. *Paracapnia recta* Zhiltzova, 1984

Paracapnia recta Zhiltzova, 1984: 78.

Family Leuctridae Klapálek, 1905

⁶*Genus *Despaxia* Ricker, 1943

36. ⁷Despaxia asiatica* Zwick, 2010**

Despaxia asiatica Zwick, 2010: 90.

Genus *Leuctra* Stephens, 1836

37. *Leuctra fusca* (Linnaeus), 1758

Phryganea fusca Linnaeus, 1758: 549.

Genus *Megaleuctra* Neave, 1934

38. *Megaleuctra saebat* Ham & Bae, 2002

Megaleuctra saebat Ham & Bae, 2002: 338.

Genus *Paraleuctra* Hanson, 1941

39. *Paraleuctra cercia* (Okamoto), 1922

Leuctra cercia Okamoto, 1922: 37.

40. ⁸Paraleuctra malaisei* Zwick, 2010**

Paraleuctra malaisei Zwick, 2010: 88.

41. ⁹Paraleuctra paramalaisei* Murányi & Hwang, 2017**

Paraleuctra paramalaisei Murányi & Hwang, 2017: 47.

Genus *Perlomyia* Banks, 1906

42. ¹⁰Perlomyia baei* Murányi & Hwang, 2017**

Perlomyia baei Murányi & Hwang, 2017: 49.

Korean name: ¹*두새민강도래속 (신칭), ²*두새민강도래 (신칭), ³*뿔민강도래속 (신칭), ⁴*뿔민강도래 (신칭), ⁵*꼬리민강도래 (신칭), ⁶*꼬마강도래속 (신칭), ⁷*한계령꼬마강도래 (신칭), ⁸*중간꼬리강도래 (신칭), ⁹*긴꼬리강도래 (신칭), ¹⁰*멧쟁이애기강도래 (신칭)

43. *Perlomyia kiritshenkoi* Zhiltzova, 1974*Perlomyia kiritshenkoi* Zhiltzova, 1974: 362.**New material.** Korea. 1♀, CN: Gyeryong-si, Sindooan-myeon, Bunam-ri, Mt. Gyeryongsan, 14 Mar–28 Aug 2012, Jung CH [KU].**Remarks.** This species is the first record from the Republic of Korea.**44. ^{1*}*Perlomyia koreana* Murányi & Hwang, 2017***Perlomyia koreana* Murányi & Hwang, 2017: 51.**45. ^{2*}*Perlomyia lamellata* Murányi & Hwang, 2017***Perlomyia lamellata* Murányi & Hwang, 2017: 53.**46. *Perlomyia levanidovae* (Zhiltzova), 1975***Rhopalopsale levanidovae* Zhiltzova, 1975: 225.**47. *Perlomyia mahunkai* (Zwick), 1973***Rhopalopsale mahunkai* Zwick, 1973a: 163.**48. *Perlomyia martynovi* (Zhiltzova), 1975***Rhopalopsale martynovi* Zhiltzova, 1975: 225.**49. *Perlomyia secunda* (Zapekina-Dulkeit), 1955***Strobliella secunda* Zapekina-Dulkeit, 1955: 32.**50. *Perlomyia smithae* Nelson & Hanson, 1973***Perlomyia smithae* Nelson & Hanson, 1973: 192.

Family Peltoperlidae Claassen, 1931

Genus *Cryptoperla* Needham, 1909**51. *Cryptoperla japonica* Okamoto, 1912***Cryptoperla japonica* Okamoto, 1912: 136.Genus *Yoraperla* Ricker, 1952**52. *Yoraperla han* Stark & Nelson, 1994***Yoraperla han* Stark & Nelson, 1994: 254.**53. *Yoraperla uchidai* Stark & Nelson, 1994***Yoraperla uchidai* Stark & Nelson, 1994: 257.**54. ^{3*}*Yoraperla uenoi* (Kohno), 1946 (Fig. 1D)***Nogiperla uenoi* Kohno, 1946: 12. Type locality: Japan.*Yoraperla uenoi* Uchida & Isobe, 1988: 26.**Material examined.** Korea: 1♀, GW: Wonju-si, Sillim-myeon, Seongnam-ri, Mt. Chiaksan, 14 May 2016, Hwang JM [NIBR]; 1♀: Wonju-si, Sillim-myeon, Seongnam-ri, Mt.

Chiaksan, 14 May 2016, Hwang JM [KU].

Diagnosis. This species can be distinguished from other congeners by the following characters: (1) femora dark brown; and (2) female subgenital plate large and round, with a deep notch on the hind margin, with lateral bars straight, anterior bar wide.**Distribution.** Korea (New record), Japan.

Family Pteronarcyidae Newman, 1853

Genus *Pteronarcys* Newman, 1838**55. *Pteronarcys sachalina* Klapálek, 1908***Pteronarcys sachalina* Klapálek, 1908: 237.

Family Perlodidae Klapálek, 1909

^{4*}Genus *Arcynopteryx* Klapálek, 1904**56. ^{5*}*Arcynopteryx polaris* Klapálek, 1912***Arcynopteryx polaris* Klapálek, 1912: 20.Genus *Isoperla* Banks, 1906**57. *Isoperla flavescens* Zhiltzova & Potikha, 1983***Isoperla flavescens* Zhiltzova & Potikha, 1983: 22.**58. ^{6*}*Isoperla kozlovi* Zhiltzova, 1972 (Figs. 1E, 1F)***Isoperla kozlovi* Zhiltzova, 1972: 134. Type locality: Mongolia.**Material examined.** Korea: 1♂, GB: Uiseong-gun, Bianmyeon, Jangchun-ri, 15 May 2003, Lee JW [NIBR]; 2♂♂ 4♀♀, Uiseong-gun, Bianmyeon, Jangchun-ri, 15 May 2003, Lee JW [KU].**Diagnosis.** This species can be distinguished from other congeners by the following characters: (1) head infusate on the anterior half, with a pale oval spot in the ocellar region bordered by a black, U-shaped line which connects all the ocelli; (2) pronotum well delimited pale stripe with darker rugosities; and (3) paraproct usually curved upward, sharp and extended on to tergum X.**Distribution.** Korea (New record), Mongolia, Russia.**59. *Isoperla sowerbyi* Wu & Claassen, 1934***Isoperla sowerbyi* Wu & Claassen, 1934: 115.^{7*}Genus *Levanidovia* Teslenko & Zhiltzova, 1989**60. ^{8*}*Levanidovia mirabilis* Teslenko & Zhiltzova, 1989***Levanidovia mirabilis* Teslenko & Zhiltzova, 1989 (in: Zhiltzova & Teslenko 1989): 8.Genus *Megaperlodes* Yokoyama, Isobe & Yamamoto, 1990Korean name: ^{1*}고려애기강도래 (신칭), ^{2*}고은애기강도래 (신칭), ^{3*}둥근가슴강도래 (신칭), ^{4*}참그물강도래속 (신칭), ^{5*}북극성참그물강도래 (신칭), ^{6*}뽕죽강도래 (신칭), ^{7*}갈색강도래속 (신칭), ^{8*}갈색강도래 (신칭),

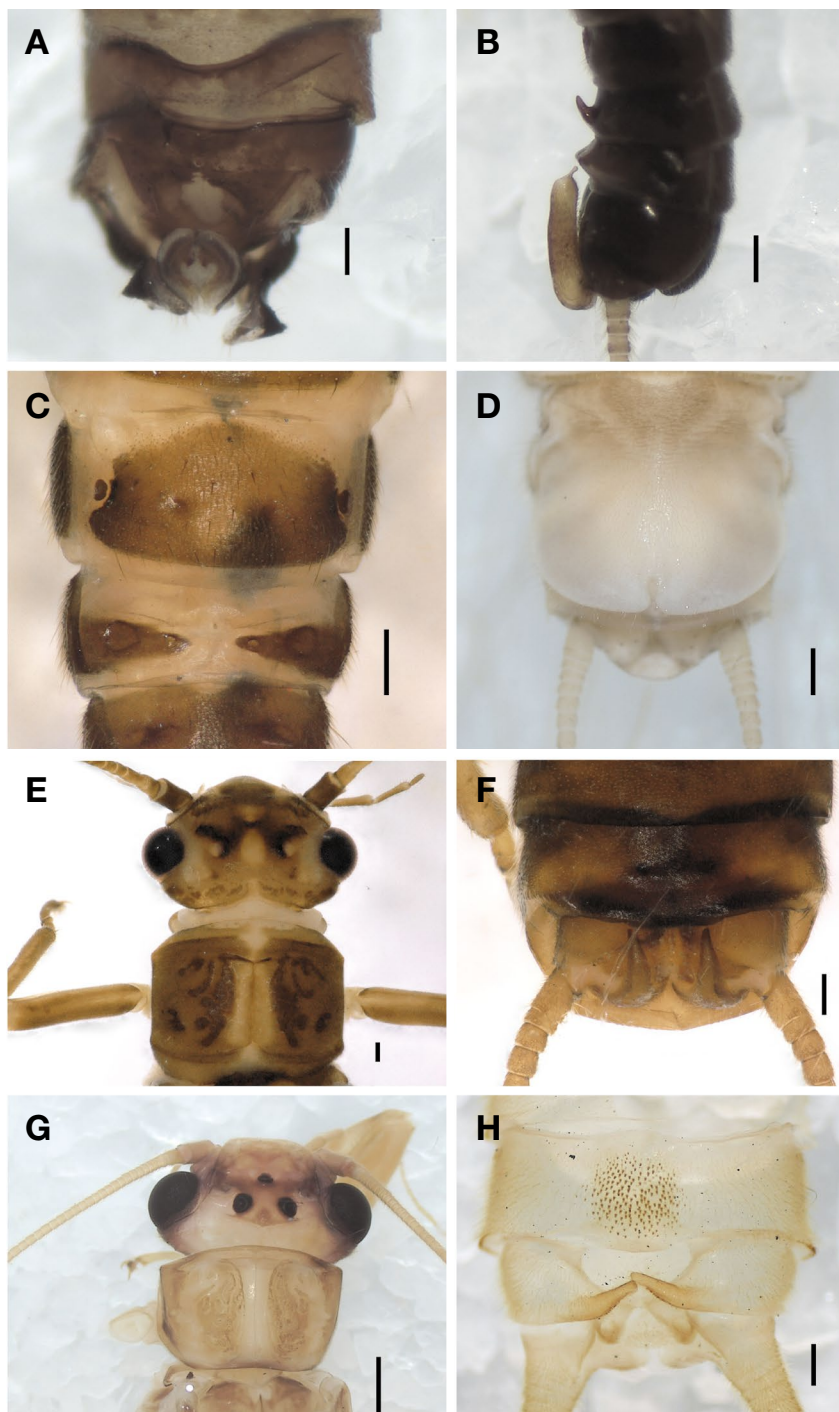


Fig. 1. A, Terminal abdominal segments of *Nemoura ussuriensis* Zhiltzova, dorsal; B, Terminal abdominal segments of *Capnia dimiensis* Zhiltzova, lateral; C, Female sternum VIII of *Eucapnopsis quattuorsegmentata* Okamoto; D, Female genital plate of *Yoraperla uenoi* (Kohno); E, F, *Isoperla kozlovi* Zhiltzova: E, Adult head pattern; F, Terminal abdominal segments, dorsal; G, H, *Kamimuria lyubaretsi* Teslenko: G, Adult head pattern; H, Terminal abdominal segments, dorsal. Scale bars: A-H=1 mm.

61. *Megaperlodes tiunovi* Teslenko, 2015
Megaperlodes tiunovi Teslenko, 2015: 554.

Genus *Megarcys* Klapálek, 1912
62. *Megarcys ochracea* Klapálek, 1912
Megarcys ochracea Klapálek, 1912: 10.

63. ^{1*}*Megarcys teslenkonis* Zwick, 2010
Megarcys teslenkonis Zwick, 2010: 93.

Genus *Perlodes* Banks, 1903

64. *Perlodes kippenhani* Stark, 2010
Perlodes kippenhani Stark, 2010: 7.

65. *Perlodes stigmata* Ra, Kim, Kang, & Ham, 1994
Perlodes stigmata Ra, Kim, Kang, & Ham, 1994: 4.

Genus *Pictetiella* Illies, 1966

66. *Pictetiella asiatica* Zwick & Levanidova, 1971
Pictetiella asiatica Zwick & Levanidova, 1971: in Zwick et al., 1971: 853.

Remarks. This species recorded only from the Democratic People's Republic of Korea.

Genus *Stavsolus* Ricker, 1952

67. *Stavsolus japonicus* (Okamoto), 1912
Isogenus japonicus Okamoto, 1912: 111.

68. ^{2*}*Stavsolus manchuricus* Teslenko, 1999
Stavsolus manchuricus Teslenko, 1999: in Teslenko & Minakawa, 1999: 26.

Family Perlidae Latreille, 1802

Genus *Claassenia* Wu, 1934

69. *Claassenia radiata* (Klapálek), 1916
Adelungia radiata Klapálek, 1916: 59.

Remarks. This species is recorded only from the Democratic People's Republic of Korea.

Genus *Kamimuria* Klapálek, 1907

70. *Kamimuria coreana* Ra, Kim, Kang, & Ham, 1994
Kamimuria coreana Ra, Kim, Kang, & Ham 1994: 7.

71. ^{3*}*Kamimuria lyubaretzi* Teslenko, 2006 (Fig. 1G, H)
Kamimuria lyubaretzi Teslenko, 2006: 56. Type locality: Russia.

Material examined. Korea: 1♂, JN: Haenam-gun, Samsan-myeon, Gurim-ri, Mt. Duryunsan, 34°29'03.01"N, 126°36'54.13"E, Sweeping, 8 Jul 2016, Ham DS [NIBR]; 1♂ 1♀, CB: Danyang-gun, Daegang-myeon, Yongbuwon-ri, Sweeping, 25 Jul 2016, Jung SW [KU].

Diagnosis. This species can be distinguished from other congeners by the following characters: (1) head pale with dark

brown ocellar rectangle; (2) pronotum pale with a narrow median pale band, rugosities brown, anterior and lateral margins dark; (3) epiproct with a pair of weak sclerites and a median membranous swelling; (4) hemitergites short, figner-like, covered with long setae and sensilla basiconica; and (5) aedeagus with oval membranous basal envelope, ventral tip of the tube with 7 small brown spines, sac short and round apically with a pair of long heavily sclerotized spines ventrolaterally.

Distribution. Korea (New record), Russia.

72. *Kamimuria tibialis* (Pictet), 1841
Perla tibialis Pictet, 1841: 217.

73. *Kamimuria zwicki* Stark & Sivec, 2008
Kamimuria zwicki Stark & Sivec, 2008: 1.

Genus *Kiotina* Klapálek, 1907

74. *Kiotina decorata* (Zwick), 1973
Schistoperla decorata Zwick, 1973a: 166.

75. *Kiotina pictetii* Klapálek, 1907
Kiotina pictetii Klapálek, 1907: 8.

Genus *Neoperla* Needham, 1905

76. *Neoperla adamantea* Murányi & Li, 2015
Neoperla adamantea Murányi & Li, 2015 (in: Murányi et al., 2015): 114.

New material. Korea. 1♂1♀, CB: Danyang-gun, Daegang-myeon, Yongbuwon-ri, Boguksa, Sweeping, 26 Jul 2016, Jung SW; 2♂♂ 2♀♀, GB: Yeongju-si, Punggi-eup, Gyo-chon-ri, Birosa, Mt. Sobaeksan, Sweeping, 27 Jul 2016, Jung SW [KU].

Remarks. This species is the first record from the Republic of Korea.

77. *Neoperla coreensis* Ra, Kim, Jang & Ham, 1994
Neoperla coreensis Ra, Kim, Jang & Ham, 1994: 9.

78. *Neoperla goguryeo* Murányi & Li, 2015
Neoperla goguryeo Murányi & Li, 2015 (in: Murányi et al., 2015): 118.

79. *Neoperla quadrata* Wu & Claassen, 1934
Neoperla quadrata Wu & Claassen, 1934: 124.

80. *Neoperla ussurica* Sivec & Zhiltzova, 1996
Neoperla ussurica Sivec & Zhiltzova, 1996: 14.

Korean name: ^{1*}맨드리그물강도래 (신칭), ^{2*}나도그물강도래불이 (신칭), ^{3*}두류강도래 (신칭)

Genus *Oyamia* Klapálek, 1907

81. *Oyamia nigrubasis* Banks, 1920

Oyamia nigrubasis Banks, 1920: 316.

Genus *Paragnetina* Klapálek, 1907

82. *Paragnetina flavotincta* (McLachlan), 1872

Perla flavotincta McLachlan, 1872: 54.

83. *Paragnetina tinctipennis* (McLachlan), 1875

Perla tinctipennis McLachlan, 1875: 171.

Genus *Xanthoneuria* Uchida, Stark & Sivec, 2011

84. *Xanthoneuria unimaculata* (Zhiltzova), 1981

Acroneuria unimaculata Zhiltzova, 1981: 5.

Remark. This species is recorded only from the Democratic People's Republic of Korea.

Family Chloroperlidae Okamoto, 1912

Genus *Alloperla* Banks, 1906

85. *Alloperla joosti* Zwick, 1971

Alloperla joosti Zwick, 1971: 37.

86. *Alloperla mediata* (Navás), 1925

Chloroperla mediata Navás, 1925: 210.

87. ^{1*}*Alloperla picta* Zwick, 1973

Alloperla picta Zwick, 1973a: 165.

88. *Alloperla rostellata* (Klapálek), 1923

Isopteryx rostellata Klapálek, 1923: 29.

Genus *Kathroperla* Banks, 1920

89. *Kathroperla doma* Stark, 2010

Kathroperla doma Stark, 2010: 1.

Genus *Sweltsa* Ricker, 1943

90. ^{2*}*Sweltsa colorata* Zhiltzova & Levanidova, 1978

Sweltsa colorata Zhiltzova & Levanidova, 1978: 20.

91. *Sweltsa illiesi* Zhiltzova & Levanidova, 1978

Sweltsa illiesi Zhiltzova & Levanidova, 1978: 18.

92. *Sweltsa lepnevae* Zhiltzova, 1977

Sweltsa lepnevae Zhiltzova, 1977b: 24.

93. *Sweltsa nikkoensis* (Okamoto), 1912

Chloroperla nikkoensis Okamoto, 1912: 147.

94. ^{3*}*Sweltsa zhiltzovae* Zwick, 2010

Sweltsa zhiltzovae Zwick, 2010: 94.

95. *Sweltsa* sp. Ko (temporary name)

Sweltsa sp. Ko Murányi et al., 2016: 116.

Remarks. This species is recorded only from the Democratic People's Republic of Korea.

ORCID

Jeong Mi Hwang: <https://orcid.org/0000-0003-4743-4474>

David Murányi: <https://orcid.org/0000-0002-3907-5590>

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

ACKNOWLEDGMENTS

We are sincerely grateful to Prof. Jong Wook Lee (Yeongnam University), Dr. Snag Woo Jung (DASARI Research Institute of BioResources, Inc.), Dr. Wang Kyu Kim, Miss Dasel Ham and Mr. Sunghwan Park (Korea University), and Dr. Hong Geun Kim (National Institute of Ecology, Division of Restoration Research), Korea National Park Service for providing specimen available for this study. This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea (NIBR201801201, NIBR201902205).

REFERENCES

- Banks N, 1920. New neuropteroid insects. Bulletin of the Museum of Comparative Zoology, Harvard College, 64:299-362.
- Fochetti R, Tierno de Figueroa JM, 2008. Global diversity of stoneflies (Plecoptera; Insecta) in freshwater. Hydrobiologia, 595:365-377. <https://doi.org/10.1007/s10750-007-9031-3>
- Ham SA, 2009. *Nemoura phasianusa*, a new species of Nemouridae (Insecta: Plecoptera) from Korea. Korean Journal of Systematic Zoology, 25:95-98.
- Ham SA, Bae YJ, 2002. The stonefly genus *Megaleuctra* (Plecoptera: Leuctridae) new to East Palearctic region, with description of *Megaleuctra saebat* new species. Entomological News, 113:336-341.
- Ham SA, Lee JB, 1998. *Nemoura gemma*, a new species of the Nemouridae (Insecta: Plecoptera) from Korea. Korean Journal of Systematic Zoology, 14:357-360.
- Ham SA, Lee JB, 1999. Four new species of Nemouridae (Ple-

Korean name: ^{1*}우리민무늬강도래 (신칭), ^{2*}가온녹색강도래 (신칭), ^{3*}새녹색강도래 (신칭)

- coptera: Insecta) from Korea. Korean Journal of Biological Sciences, 3:119-125. <https://doi.org/10.1080/12265071.1999.9647474>
- Hwang JM, Murányi D, 2015. Checklist of the Korean Plecoptera. Entomological Research Bulletin, 31:120-125.
- Hwang JM, Murányi D, Bae YJ, 2016. New records of Plecoptera from Korea. Entomological Research Bulletin, 32:176-178.
- Jin YH, Bae YJ, 2005a. The wingless stonefly family Scopuridae (Plecoptera) in Korea. Aquatic Insects, 27:21-34. <https://doi.org/10.1080/01650420400021417>
- Jin YH, Bae YJ, 2005b. A new wingless stonefly, *Scopura jiri* (Plecoptera: Scopuridae), from Korea. Entomological News, 116:89-92.
- Kim JS, Bae YJ, Zhiltzova LA, 1998. Bibliographic review, systematic status, and biogeographic notes on Korean and Far East Russian stoneflies (Insecta: Plecoptera) with their new Korean records. Korean Journal of Biological Sciences, 2:419-425. <https://doi.org/10.1080/12265071.1998.9647440>
- Klapálek F, 1907. Japoneské druhy podceledi Perlinae. Rozpravy České akademie ved a umení. Trída II (Mathematicko-přirodovedecká), 16:1-28.
- Klapálek F, 1908. *Pteronarcys sachalina* sp. n., die zweite asiatische Art der Gattung Neuroptera, Plecoptera. Bulletin de l'Académie Impériale des Sciences de St.-Petersbourg, 2:237-238.
- Klapálek F, 1912. Plécoptères I. Fam. Perlodidae. Collections Zoologiques du Baron Edm. de Sélys-Longchamps, 4:1-66.
- Klapálek F, 1916. Subfamilia Acroneuriinae Klp. Casopis Československé Společnosti Entomologické, 13:45-84.
- Klapálek F, 1923. Plecopteres II. Fam. Perlidae. Collections Zoologiques du Baron Dem. de Selys Longchanmps, 4:1-66.
- Kohno M, 1946. Corrigenda of my paper 'My observation of genus *Nogiperla* and *Peltoperla* with description of new genus *Neopeltoperla* (order Plecoptera). Insect World, 49:1-13.
- Linnaeus C, 1758. Systema Naturae, sive regna tria naturae systematice proposita per classes, ordines, genera et species. Holmiae (Stockholm), pp. 1-824.
- Matsumura S, 1904. The Illustrated Thousand Insects of Japan. Tokyo-shoin, Tokyo, 1:1-213 (in Japanese).
- McLachlan MR, 1872. Matériaux pour une Faune Névroptérologique de l'Asie Septentrionale. Seconde partie. Non-Odonates. Annales de la Société Entomologique de Belgique, 15:47-77.
- McLachlan MR, 1875. A sketch of our present knowledge of the Neuropterons Fauna of Japan (excluding Odonata and Trichoptera). Transactions of the Entomological Society of London, pp. 167-190.
- Morton KJ, 1896. New and little known Palaerctic Perlidae. Transactions of the Entomological Society, 1896:55-63.
- Murányi D, Hwang JM, 2017. Four new species and further contributions to the Leuctridae (Plecoptera) of the Korean Peninsula. Zootaxa, 4282:43-61. <https://doi.org/10.11646/zootaxa.4282.1.2>
- Murányi D, Hwang JM, Jeon MJ, Seo HY, 2016. New species records of systellognathan stoneflies (Plecoptera: Systellognatha) for the fauna of the Korean Peninsula. Opuscula Zoologica, Budapest, 47:111-121.
- Murányi D, Li W, Jeon MJ, Hwang JM, Seo HY, 2015. Korean species of the genus *Neoperla* Needham, 1905 (Plecoptera: Perlidae). Zootaxa, 3918:113-127. <https://doi.org/10.11646/zootaxa.3918.1.5>
- Murányi D, Park SJ, 2011. Contribution to the fall stonefly (Plecoptera) fauna of Korea. Illiesia, 7:70-85.
- Navás L, 1925. Neuropteren, Megalopteren, Plecopteren und Trichopteren. I. Serie. III. Plecopteren, Entomologische Mitteilungen, 14:205-212.
- Nelson CH, Hanson JF, 1973. The genus *Perlomyia* (Plecoptera: Leuctridae). Journal of the Kansas Entomological Society, 46:187-199.
- Okamoto H, 1912. Erster Beitrag zur Kenntnis der Japanischen Plecopteren. Transactions of the Sapporo Natural History Society, 4:105-170.
- Okamoto H, 1922. Zweiter beitrage zur Kenntnis der Japanischen Plecopteren. Bulletin of the Agricultural Experiment Station, Government General of Chosen, 1:1-46.
- Pictet FJ, 1841. Histoire naturelle générale et particulière des insectes Névroptères. Famille des Perlides. Kessmann, Genève and Baillièrre, Paris, pp. 1-423.
- Ra CH, Kim JS, Kang YW, Ham SA, 1994. Taxonomic study on three families (Peltoperlidae, Perlodidae, Perlidae) of stoneflies (Plecoptera) in Korea. The Korean Journal of Systematic Zoology, 10:1-15.
- Sivec I, Zhiltzova LA, 1996. Description of *Neoperla ussurica* sp. n. from the Russian Far East (Plecoptera: Perlidae). Acta Entomologica Slovenica, 4:13-18.
- Stark BP, 2010. Studies on Korean stoneflies (Insecta: Plecoptera) with descriptions of two new species. Illiesia, 6:1-10.
- Stark BP, Nelson CR, 1994. Systematics, phylogeny and zoogeography of genus *Yoraperla* (Plecoptera: Peltoperlidae). Entomologica Scandinavica, 25:241-273. <https://doi.org/10.1163/187631294X00072>
- Stark BP, Sivec I, 2008. New stoneflies (Plecoptera) from Asia. Illiesia, 4:1-10.
- Teslenko VA, 2006. A new species of *Kamimuria* (Plecoptera, Perlidae) from the Russian Far East. Zootaxa, 1307:55-62. <https://doi.org/10.11646/zootaxa.1307.1.4>
- Teslenko VA, 2015. A new species of *Megaperlodes* Yokoyama et al. 1990 (Plecoptera, Perlodidae) from the South of the Russian Far East. Zootaxa, 3904:553-562. <https://doi.org/10.11646/zootaxa.3904.4.4>
- Teslenko VA, Minakawa N, 1999. Two new species of the genus *Stavsolus* Ricker from the Asian Far East (Plecoptera: Perlodidae). Aquatic Insects, 21:19-32. <https://doi.org/10.1076/aqin.21.1.19.4544>
- Teslenko VA, Zhiltzova LA, 1997. New and little known species of stoneflies (Plecoptera: Nemouridae and Perlodidae) from the Russian Far East. Aquatic Insects, 19:23-35. <https://doi.org/10.1080/01650429709361633>
- Uchida S, Isobe Y, 1988. *Cryptoperla* and *Yoraperla* from Ja-

- pan and Taiwan (Plecoptera: Peltoperlidae). *Aquatic Insects*, 10:17-31. <https://doi.org/10.1080/01650428809361306>
- Uchida S, Maruyama H, 1987. What is *Scopura longa* Uéno, 1929 (Insecta: Plecoptera)? A revision of the genus. *Zoological Science*, 4:699-709.
- Wu CF, 1929. A second species of stonefly from Peiping. *China Journal of Science and Arts*, 10:200-201.
- Wu CF, Claassen PW, 1934. Aquatic insects of China. Article XXI. New species of Chinese stoneflies (Order Plecoptera). *Peking Natural History Bulletin*, 9:111-129.
- Zaparkina-Dulkeit JI, 1955. Plecopteren aus dem nord-östl. Altai. *Sametki po Faune y Flore Sibirsk*, 18:30-38.
- Zhiltzova LA, 1972. On the fauna of stoneflies (Plecoptera) of the Mongolian People's Republic. *Nasekomye Mongolii*, 1:113-150 (in Russian).
- Zhiltzova LA, 1974. Rare genera of the family Leuctridae (Insecta, Plecoptera) in the fauna of the USSR. *Zoologicheskii Zhurnal*, 53:359-364.
- Zhiltzova LA, 1975. *Rhopalopsola*, a new for the USSR genus of stoneflies (Plecoptera, Leuctridae). *Zoologicheskii Zhurnal*, 54:221-230 (in Russian).
- Zhiltzova LA, 1977a. New species of stoneflies (Plecoptera) from Primorye Territory. *Trudy Zoologicheskogo Instituta Akademia Nauk*, 70:3-9.
- Zhiltzova LA, 1977b. Material on the Plecoptera (Insecta) fauna of the upper parts of Ussuri river basin in Primorye Region. *Trudy Biol.-pochvenn. Inst., Vladivostok*, 46:17-27.
- Zhiltzova VA, 1979. A new species of stoneflies of the family Capniidae (Plecoptera) from the Far East. *Publications of the Soviet Entomological Society (Leningrad)*, 61:15-17.
- Zhiltzova LA, 1981. New species of stoneflies (Plecoptera) from the Far East. *Trudy Zoologicheskogo Instituta Akademia Nauk*, 92: 3-7.
- Zhiltzova LA, 1982. New stonefly species (Plecoptera, Nemouridae) from the Far East. *Vestnik Zoologii*, 1982:37-44.
- Zhiltzova LA, 1984. A new species of genus *Paracapnia* Hanson (Plecoptera: Capniidae) in Primorje. In: *Biology of the Fresh Waters of the Far East* (Eds., Levanidova IM, Markatchenko EA, Setentchejko AY). *Academia Nauk SSSR, Vladivostok*, pp. 78-80 (in Russian).
- Zhiltzova LA, Levanidovae IM, 1978. New species of stoneflies (Plecoptera) from the Far East. *Trudi Zool. Inst. (Leningrad)*, 71:3-29 (in Russian).
- Zhiltzova LA, Potikha EV, 1983. Materials on the fauna of stoneflies of the Sikhote-Alin National Forest. *Ecology and classification of fresh-water organisms of the Far East. Academy of Sciences of the USSR, Far-Eastern Science Center, Biological Pedological Institute, Vladivostok*, pp. 20-26 (in Russian).
- Zhiltzova LA, Teslenko VA, 1989. Description of *Levanidovia mirabilis* gen. et sp. n. and genera key for larvae of Perlodinae (Plecoptera, Perlodidae) from Soviet Far East. In: *Systematics and Ecology of River Organisms: Collections of Scientific Articles* (Eds., Levanidova IM, Makarchenko EA). *DVO an SSSR, Vladivostok*, pp. 5-14 (in Russian).
- Zhu F, Yang D, 2003. Two new species of *Nemoura* from China (Plecoptera, Nemouridae). *Acta Zootaxonomica Sinica*, 28:474-477.
- Zwick P, 1971. *Alloperla joosti* nov. spec. und andere asiatische Chloroperlidae (Plecoptera). *Mitteilungen aus dem Zoologischen Museum in Berlin*, 48:35-39.
- Zwick P, 1973a. Plecoptera from Korea. *Annales Historico-naturales Musei Nationalis Hungarici*, 65:157-169.
- Zwick P, 1973b. On the stoneflies from Korea (Insecta, Plecoptera). *Fragmenta Faunistica*, 19:149-157. <https://doi.org/10.3161/00159301FF1973.19.8.149>
- Zwick P, 2010. New species and new records of Plecoptera from Korea and the Russian Far East. *Illiesia*, 6:75-97.
- Zwick P, Baumann RW, 2011. *Nemoura jejuensis* a new species of stonefly and the redescription of *Amphinemura baei* Ham and Lee (Plecoptera, Nemouridae) from Jeju Island, Korea. *Illiesia*, 7:148-155.
- Zwick P, Levanidova IM, Zhiltzova L, 1971. On the fauna of Plecoptera from the Soviet Far East. *Revue d'Entomologie de l'URSS*, 50:849-869.

Received November 11, 2019
Revised December 18, 2019
Accepted December 18, 2019