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Xiphydriidae (Hymenoptera) of Tochigi Prefecture, Japan

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Abstract Based on the examination of 117 specimens, 14 species of six genera of the family Xiphydriidae are recorded from Tochigi prefecture. Of these, four species, *Euxiphydria leucopoda* Takeuchi, 1938, *Konowia kojimai* Shinohara and Hara, 2021, *Platyxiphydria miyakei* Togashi, 1963, and *Xiphydria annulitibia* Takeuchi, 1936, are new to the fauna of Tochigi prefecture. The 14 species here treated account for 78% of the 18 xiphydriid species recorded in Honshu. Most of the species have been obtained from northwestern mountainous areas in the prefecture.
Key words: Xiphydriidae, Tochigi prefecture, fauna, new collection records.

Introduction

The Xiphydriidae is a family of long-necked woodwasps with 30 species currently known in Japan (Shinohara, 2020a, b; Shinohara *et al.*, 2020; Shinohara and Smith, 2020, 2021; Shinohara and Hara, 2021). In Honshu, 18 species have been recorded, but published distribution records are not abundant for most species and species composition is poorly investigated at the prefectural level. Even in several prefectures where the woodwasp fauna has been comparatively well investigated, only up to nine species have been recorded (see below for more details).

We have recently studied the xiphydriid fauna of Tochigi prefecture, central Honshu, and recognized 14 species of six genera. This is a remarkable result as it covers most of the species known to occur in Honshu. Here we enumerate collection data of all the 117 specimens of Xiphydriidae examined.

Materials and Methods

Abbreviations of the depositories of the material used are: EK—Eisuke Katayama collection, Ohtawara; HU—Hokkaido University, Faculty of Agriculture, Sapporo; NM—Nasunogahara Museum, Nasushiobara; NSMT—National Museum of Nature and Science, Tsukuba; TPM—Tochigi Prefectural Museum, Utsunomiya; UU—Utsunomiya University, School of Agriculture, Utsunomiya. All the specimens listed below were identified by A. Shinohara except for those with an asterisk which were identified by E. Katayama.

Results and Discussion

Based on the examination of 117 specimens, the present work has revealed the occurrence of 14 species of six genera of Xiphydriidae in Tochigi prefecture. Previously, Nakamura (2003) listed six species and Katayama and Nakamura (2018) updated the number to seven. Shinohara (2019), Shinohara and Kameda (2019), Shinohara *et al.* (2020) and Shinohara and Hara (2021)

added four species to this list, whereas Shinohara and Matsumoto (2019) synonymized two species in Katayama and Nakamura's (2018) list, thus reducing the total number to ten. Here we add four species, *Euxiphydria leucopoda* Takeuchi, 1938, *Konowia kojimai* Shinohara and Hara, 2021, *Platyxiphydria miyakei* Togashi, 1963, and *Xiphydria annulitibia* Takeuchi, 1936, to the Tochigi list of Xiphydriidae.

The xiphydriid faunae of other prefectures are less known. According to the literature, nine species have been recorded in Kanagawa prefecture (Nagase and Watanabe, 2018; Shinohara, 2019; Shinohara and Kameda, 2019; Shinohara and Matsumoto, 2019), eight species each in Hyogo (Naito *et al.*, 2004; Shinohara, 2019; Shinohara and Kameda, 2019) and Ishikawa prefectures (Togashi, 1998; Shinohara, 2019; Shinohara and Kameda, 2019; Shinohara and Matsumoto, 2019), six species in Aomori prefecture (Shimoyama, 1986) and five species in Fukui prefecture (Haneda *et al.*, 1998). From other prefectures, at most only a few species have been recorded.

Tochigi prefecture, with 14 recorded species, has the best known and the richest xiphydriid fauna among the prefectures in Japan. This figure accounts for 78% of the 18 xiphydriid species recorded in Honshu (Shinohara, 2020a; Shinohara *et al.*, 2020; Shinohara and Hara, 2021). With thorough sampling in the future, three more species of Xiphydriidae already recorded from Honshu, *Platyxiphydria yamamotoi* Togashi, 1997, known only from Ehime prefecture, Shikoku, and Nara prefecture (Naito, 2008), *Xiphydria konishii* Shinohara, Hara & Smith, 2020, known only from Hokkaido and Iwate prefecture (Shinohara *et al.*, 2020) and *Xiphydria nagasei* Shinohara, 2019, known only from Saitama, Kanagawa and Okayama prefectures (Shinohara, 2022), may also be found in Tochigi prefecture.

In Tochigi prefecture, almost all species of the family have been collected in northwestern mountainous areas. Notably, in Nikko city, 13 species, or 72% of the 18 species known in Honshu, have been recorded. Only one species, *Platyxiphydria tiphiiformis*, has been found in low mountains or plains along the edge of the northwestern mountains. Also, it should be noted that not a single specimen of Xiphydriidae has been obtained in fairly large southeastern regions, which are plains or low mountains. We need to see if the existence of this apparent "blank zone" is real or if it mainly reflects biased sampling so far.

Euxiphydria leucopoda Takeuchi, 1938

Specimen examined. **Nikko city**: 1 ♂, Senjugahama, Chûgûshi, 11. VII. 2016, S. Maehara (NSMT).

Remarks. This species was described from Tottori prefecture (Takeuchi, 1938), western Honshu, and later recorded from Aomori (Shimoyama, 1986), Ishikawa (Togashi, 1998; Smith and Shinohara, 2011) and Hyogo prefectures (Okutani, 1972), northern to western Honshu, Ehime prefecture (Togashi, 1974), Shikoku, and Nagasaki prefecture (Seiyama, 1989), Kyushu. This is the first record from Tochigi prefecture. The life history and host plant of this species are still unknown.

Euxiphydria potanini (Jakowlew, 1891)

Specimens examined. **Nasushiobara city**: 1 ♀*, Sanku-cho, 21–26. V. 2006, T. Matsumura (Malaise Trap) (NM, cited by Katayama, 2010). **Nikko city**: 1 ♀, Shôbugahama, Chûgûshi, 29. VI. 2013, S. Maehara (NSMT); 1 ♀, Shôbugahama, Chûgûshi, 26. VI. 2019, S. Maehara (NSMT).

Remarks. This conspicuous and widespread northeast Asian species (Smith and Shinohara, 2011) is already known to occur in Tochigi prefecture (Nakamura, 2003; Katayama, 2010). The life history of this species is unknown.

Hyperxiphia nakanishii (Takeuchi, 1938)

Specimens examined. **Yaita city**: 1 ♀ (holotype of *Platyxiphydria saitoi* Togashi, 2003), "Happogahara, Yaita-shi [Tochigi Pref.], 20. VI.

1976, T. Saito" "Holotype *Platyxiphydria saitoi* new species" (NSMT, cited as *Platyxiphydria* sp. by Nakamura, 2003). **Nikko city**: 1 ♂, Chûgûshi, 10. VIII. 2012, S. Maehara (NSMT); 1 ♀, Senjugahama, Chûgûshi, 19. VI. 2017, S. Maehara (NSMT).

Remarks. Takeuchi (1938) described this species as *Euxiphydria leucopoda* var. *nakanishii*, but Maa (1949) treated it as a separate species and transferred it to the genus *Hyperxiphia* Maa, 1949. The holotype, the only specimen then known, is from Tottori prefecture (Takeuchi, 1938; Smith and Shinohara, 2011), western Honshu, and the species was later recorded from Kanagawa and Nagano prefectures (Hara and Shinohara, 2018). Togashi (2003) described *Platyxiphydria saitoi* from Tochigi prefecture based on the holotype with the collection data "♀, 20. vi. 1976, Happogahara, Yaita City, Tochigi Pref, T. Saito leg." "*Platyxiphydria* sp." in Nakamura (2003) is *Platyxiphydria saitoi*, as noted by Nakamura (2004). Hara and Shinohara (2018) synonymized *Platyxiphydria saitoi* with *Hyperxiphia nakanishii*. This is a rare species and nothing is known about its life history.

Konowia kojimai Shinohara and Hara, 2021

Specimens examined. **Nikko city**: 1 ♀, Shôbugahama, Chûgûshi, 3. VI. 2022, S. Maehara (NSMT); 2 ♀, Shôbugahama, Chûgûshi, 7. VI. 2024, S. Maehara (NSMT).

Remarks. Shinohara and Hara (2021) described this species from the holotype from Nagano prefecture and seven paratypes from Hokkaido. The holotype was the only recorded specimen of this species collected in Honshu and the three females from Nikko represent the first record from Tochigi prefecture. The life history and host plant of this species are unknown.

Konowia yasumatsui (Togashi, 1972)

Specimen examined. **Nikko city**: 1 ♀, Utagahama, Chûgûshi, 2. VII. 2014, S. Maehara (NSMT, cited by Shinohara and Hara, 2021).

Remarks. Togashi (1972) described this species from Fukuoka prefecture, Kyushu, and Shinohara and Hara (2021) recorded it from Fukushima, Tochigi and Nagano prefectures, Honshu, Ehime prefecture, Shikoku, and Oita and Miyazaki prefectures, Kyushu. Shinohara and Kojima (2024) recently reported on the emergence of the adult of this species from a dead branch of *Betula ermanii* Cham. in Gunma prefecture.

Monoxiphia harai (Shinohara, 2019)

Specimens examined. **Nasushiobara city**: 1 ♀ (paratype), Shiobara Enna Skyline, 15. VI. 2014, E. Katayama (EK, cited by Shinohara, 2019). **Nikko city** (all cited by Hara *et al.*, 2022, except for those with **): 1 ♀, Shôbugahama, Chûgûshi, 11. VI. 2005, S. Maehara (NSMT); 1 ♂, Shôbugahama, Chûgûshi, 26. VI. 2019, S. Maehara (NSMT); 1 ♂**, Shôbugahama, Chûgûshi, 29. V. 2021, S. Maehara (NSMT); 1 ♀, Shôbugahama, Chûgûshi, 23. V. 2022, A. Shinohara (NSMT); 1 ♂, Shôbugahama, Chûgûshi, em. 18. VI. 2022 from dead and fallen branch (2–3 cm thick) of *Acer* sp. coll. 1. VI. 2022, A. Shinohara (NSMT); 1 ♀1 ♂, Senjugahama, Chûgûshi, 19. VI. 2017, S. Maehara (NSMT); 1 ♂**, Senjugahama, Chûgûshi, 5. VI. 2024, S. Maehara (NSMT); 1 ♂**, Tamozawa, 28. V. 2008, T. Nakamura (Malaise Trap) (TPM).

Remarks. This species is distributed in Hokkaido, Honshu and Shikoku (Shinohara, 2019). The specimen from Nasushiobara is a paratype of this species. The known host plant is *Acer* sp. (Hara *et al.*, 2022).

Platyxiphydria miyakei Togashi, 1963

Specimen examined. **Nikko city**: 1 ♀, Senjugahama, Chûgûshi, 7. VI. 2023, S. Maehara (NSMT).

Remarks. This species is distributed in Hokkaido, Honshu, Shikoku and Kyushu (Shinohara and Smith, 2020). The holotype female is from Fukuoka prefecture, Kyushu, and the only para-

type, a male, is from Ishikawa prefecture, Honshu. Shinohara and Smith (2020) erroneously mentioned "This species was described from one female (holotype) from Honshu and one male (paratype) from Kyushu". The specimen from Nikko is the first female recorded in Honshu and represents the first record of this species in Tochigi prefecture. The life history and host plant are still unknown.

Platyxiphydria tiphiiformis Takeuchi, 1938

Specimens examined. **Yaita city**: 1 ♂, Happôgahara, 20. VI. 1976, T. Saito (NSMT, cited by Shinohara and Matsumoto, 2019). **Ohtawara city**: 1 ♀, Shimoishigami, 30. IV. 2004, E. Katayama (EK, cited by Katayama, 2005, and Shinohara and Matsumoto, 2019); 1 ♀, Shimoishigami, 21. V. 2005, E. Katayama (EK, cited by Katayama, 2005, and Shinohara and Matsumoto, 2019). **Utsunomiya city**: 1 ♀, Himuro-machi, 6–15. V. 2009, T. Nakamura (Malaise Trap) (TPM). **Kanuma city**: 1 ♂, Kobugahara, 29. V. 1988, T. Saito (NSMT, cited by Shinohara and Matsumoto, 2019); 1 ♂, Mt. Hagabasan, 25. V. 2011, M. Inaizumi (EK, cited by Shinohara and Matsumoto, 2019); 1 ♂, Mino, 26. IV. 2015, T. Saito (NSMT, cited by Shinohara and Matsumoto, 2019). **Sano city**: 1 ♂, Mt. Karasawa, 14. V. 1978, T. Saito (EK, cited by Nakamura, 2003, and Shinohara and Matsumoto, 2019). **Tochigi city**: 1 ♂, Mt. Umairazu, Miya, Iwafune, 6. V. 2017, T. Kurihara. (TPM).

Remarks. This species is known to occur in Hokkaido, Honshu, Shikoku and Kyushu (Shinohara and Matsumoto, 2019). From Tochigi prefecture, Nakamura (2003) first recorded *Platyxiphydria flavipes* and Katayama (2005) first recorded *Platyxiphydria tiphiiformis*. Shinohara and Matsumoto (2019) showed that these two *Platyxiphydria* taxa were different sexes of the same species and thus synonymous. Known host plants are *Sambucus* and *Paulownia* (Shinohara and Matsumoto, 2019). Unlike other Xiphydriidae from Tochigi prefecture, *Platyxiphydria tiphiiformis* has been found mainly on low mountains and plains.

Xiphydria annulitibia Takeuchi, 1936

Specimens examined. **Nikko city**: 1 ♀, Yunishigawa, 13. VI. 2022, S. Maehara (NSMT); 1 ♀, Senjugahama, Chûgûshi, 6. VIII. 2020, S. Maehara (NSMT); 2 ♀, Senjugahama, Chûgûshi, 26. VII. 2021, S. Maehara (NSMT).

Remarks. This species is widely distributed in Japan (Hara and Shinohara, 2018; Shinohara *et al.*, 2020) but has not been recorded from Tochigi prefecture. The male, life history and host plant of this species are still unknown.

Xiphydria buyssoni Konow, 1903

Specimens examined. **Nasushiobara city**: 1 ♀, Ônuma, 13. VII. 2015, S. Maehara (NSMT). **Nikko city**: 1 ♀, "Chuzenji, 29-7-1917, Edme Gallois" (HU, cited by Matsumura, 1927); 1 ♀, "Chuzenji, 17-7-16, Edme Gallois" (HU).

Remarks. This is an uncommon species, though it is known to occur in Hokkaido, Honshu, Shikoku and Kyushu (Shinohara and Smith, 2020). The life history and host plant are unknown.

Xiphydria camelus (Linné, 1758)

Specimen examined. **Nikko city**: 1 ♀, Shôbugahama, Chûgûshi, 26. VI. 2019, S. Maehara (NSMT; cited by Shinohara *et al.*, 2024).

Remarks. This species occurs widely from Europe to Japan, but, in Honshu, it is uncommon with the known habitat limited to the highlands of Tochigi, Gunma, Yamanashi and Nagano prefectures (Shinohara and Kameda, 2019; Shinohara *et al.*, 2024). A closely related and more common species, *X. eborata*, was previously treated as a synonym of *X. camelus* (e.g., Takeuchi, 1936; Taeger *et al.*, 2010). It is likely that most of the collection records for "*X. camelus*" in Tochigi prefecture, such as those in Nakamura (2003) and in the references therein, actually referred to *X. eborata*. Those previous records

should be reconfirmed by examining the specimens recorded. Known host plants of *X. camelus* are *Cerasus*, *Acer*, *Alnus*, *Betula*, *Ulmus*, *Quercus*, *Ostrya* and *Populus* (Shinohara *et al.*, 2024).

Xiphydria eborata Konow, 1899

Specimens examined (cited by Shinohara and Kameda, 2019, except for those with**). **Nasushiobara city**: 1 ♀1 ♂**, Santogoya, Nasu, 17. VIII. 1980, K. Morishima (TPM). **Nikko city**: 5 ♀**, Yasugamori, Yunishigawa, 24–25. VI. 1980, T. Tanaka (TPM); 3 ♀3 ♂**, Yasugamori, Yunishigawa, 15. VII. 1980, K. Nakamura (TPM); 3 ♀3 ♂**, Yunishigawa, 24. VI. 1980, K. Kubota (TPM); 1 ♀2 ♂**, Yunishigawa, 17. VII. 1980, K. Kubota (TPM); 1 ♀, Dorobu, Kuriyama-mura, 10. VI. 1979, I. Nozawa (NSMT); 1 ♀, Okukinu Spa, 23. VII. 1961, N. Fukuda (NSMT); 1 ♀**, Mt. Maeshiranesan, 28. VII. 1971, R. Suzuki (TPM); 1 ♂**, Nishiyama Kinzan Atochi Hukin, 10. VII. 2009, H. Ohkawa (TPM); 2 ♂, Sanno-toge, Oku-nikko, 6. VII. 1961, T. Nakane (HU); 2 ♀, Konsei-toge, Oku-nikko, 25. VII. 1966, K. Tsuji (NSMT); 1 ♀1 ♂, Yumihari-toge, 25. VIII. 1968, K. Kimura (NSMT); 1 ♀, Chûzenji, 7. VII. 1940, H. Hasegawa (NSMT); 1 ♀**, Senjugahama, Chûgûshi, 19. VII. 2024, S. Maehara (NSMT); 1 ♀, Kasuo Pass, Mae-nikko, Ashio Town, 5. VII. 1987, S. Tsuyuki (NSMT). 1 ♂**, Hitotsuishi, Nishikawa, 6. VI. 2011, Ta. & To. Kurihara (TPM). **Sakura city:** 1 ♀, Kamikoudo, 21. V. 2007, T. Nakayama (EK).

Remarks. This is the most common species of Xiphydriidae in Hokkaido and Honshu. Until recently (Shinohara and Kameda, 2019), it was treated as a synonym of *X. camelus* and was recorded as *X. camelus* (e.g., Takeuchi, 1936; Naito *et al.*, 2004). The previous collection records for *X. camelus* from Tochigi prefecture (e.g., Nakamura, 2003) need confirmation as discussed above. The known host plants are *Betula*, *Alnus* and *Juglans* (Shinohara *et al.*, 2024).

Xiphydria kanba
Shinohara, Hara and Smith, 2020

Specimens examined. **Yaita city**: 1 ♂, Happôgahara, 4. VIII. 2015, S. Maehara (NSMT, cited by Hara *et al.*, 2022). **Nikko city**: 1 ♂, Yumoto, 20. VIII. 2012, S. Maehara (NSMT, cited by Hara *et al.*, 2022); 3 ♀, Shôbugahama, Chûgûshi, ca. 1270 m alt., emerged 4–6. VIII. 2024 from dead branch of *Betula platyphylla* var. *japonica* collected 1. VIII. 2024, A. Shinohara (NSMT); 1 ♀ (paratype), Chûgûshi, ca. 1300 m alt., emerged 10. VIII. 2019 from dead branch of *Betula platyphylla* var. *japonica* collected 7. VIII. 2019, A. Shinohara (NSMT, cited by Shinohara *et al.*, 2020); 2 ♀, Chûgûshi, ca. 1300 m alt., emerged 2 and 20. VII. 2020 from dead branch of *Betula platyphylla* var. *japonica* collected 10. VI. 2020, A. Shinohara (NSMT, cited by Shinohara and Hara, 2020); 2 ♂, Chûgûshi, ca. 1300 m alt., emerged 13 and 17. VI. 2022 from dead branch of *Betula platyphylla* var. *japonica* collected 19. V. 2022, A. Shinohara (NSMT, cited by Hara *et al.*, 2022); 2 ♀2 ♂, Chûgûshi, ca. 1300 m alt., emerged 5–14. VIII. 2024 from dead branch of *Betula platyphylla* var. *japonica* collected 2. VIII. 2024, A. Shinohara (NSMT); 5 ♂, Senjugahama, Chûgûshi, 26. VII. 2021, S. Maehara (NSMT); 4 ♂, Senjugahama, Chûgûshi, 3. VIII. 2024, S. Maehara (NSMT).

Remarks. This recently described species has been recorded from Hokkaido and Tochigi and Gunma prefectures, central Honshu (Shinohara *et al.*, 2020; Shinohara and Hara, 2020; Hara *et al.*, 2022). One of the paratypes is from Tochigi prefecture. The known host plants are two birch species, *Betula ermanii* Cham. and *Betula platyphylla* var. *japonica*.

Xiphydria ogasawarai Matsumura, 1927

Specimens examined. **Nasushiobara city**: 1 ♀, Kamishiobara, 16. VII. 2013, E. Katayama (EK, cited by Katayama, 2017, as *X. alnivora* and Shinohara, 2019); 1 ♂, Ohkawa-rindo (Malaise trap), 11–25. VIII. 2010, T. Nakayama (EK, cited

by Shinohara, 2019); 1 ♀*, Sandogoya, Nasu, 24. VII. 1955, N. Hukuda (UU). **Nikko city**: 1 ♀, Yunishigawa, 25. VI. 1980, T. Tanaka (TPM); 1 ♀, Yunishigawa, 17. VII. 1980, K. Kubota (TPM); 1 ♀*, Yunishigawa, 22. IX. 1993, Y. Yokomizo (TPM); 1 ♀, Yasugamori, Yunishigawa, 15. VII. 1980, K. Nakamura (TPM); 1 ♀, Dorobu, 10. VI. 1979, T. Saito (NSMT, cited by Shinohara, 2019); 1 ♀, Tashiroyama-rindo, 6. VIII. 1983, K. Emoto (NSMT, cited by Shinohara, 2019); 1 ♀, Kawamata, 2. VII. 2013, S. Maehara (NSMT); 1 ♀, Okukinu Spa, 30. VII. 1963, N. Fukuda (NSMT, cited by Shinohara, 2019); 1 ♀, Kinunuma, 19. VII. 2004, Makihara (Malaise Trap) (TPM); 1 ♀, Yumoto, 1. VIII. 2016, S. Maehara (NSMT); 1 ♂, Shôbugahama, Chûgûshi, 19. VI. 2012, S. Maehara (NSMT); 1 ♀, Shôbugahama, Chûgûshi, 8. VI. 2016, S. Maehara (NSMT); 1 ♀1 ♂, Shôbugahama, Chûgûshi, 26. VI. 2019, S. Maehara (NSMT); 1 ♂, Shôbugahama, Chûgûshi, 7. VI. 2024, S. Maehara (NSMT).

Remarks. This is a fairly common species distributed in Hokkaido, Honshu and Shikoku (Shinohara, 2019). Known host plants are *Juglans*, *Pterocarya*, *Acer*, *Aesculus*, *Kalopanax* and *Sorbus* (Shinohara, 2022).

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