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原著論文

更新統塩原層群（栃木県）から産出した魚類化石とウグイ現生種
Tribolodon hakonensis の比較Comparison of Fossil Fish from the Pleistocene Shiobara Group (Tochigi
Prefecture) and Modern *Tribolodon hakonensis*山本将太¹⁾・相場博明²⁾・佐藤たまき¹⁾Shota YAMAMOTO¹⁾, Hiroaki AIBA²⁾ & Tamaki SATO¹⁾

Abstract. Twelve specimens of fossil fish from the lacustrine sediments of the Middle Pleistocene Miyajima Formation of Shiobara Group in Tochigi Prefecture are described in this study. Prior to their description, the extant species *Tribolodon hakonensis* is osteologically examined for a detailed morphological comparison. Our study identified seven individuals of *Tribolodon* sp. and five individuals of indeterminate cyprinids in the examined fossil specimens. *Tribolodon* dominates the known published records of fossil fish from this formation, and we attempted to estimate the pH of the Paleo-Shiobara Lake based on the data of Japanese lakes with modern *Tribolodon* population.

Key words: Cyprinidae, osteology, paleontology, Shiobara Group

はじめに

栃木県那須塩原市にある中部更新統の塩原層群宮島層は、古塩原湖の湖成堆積物からなり、保存状態の良い化石が産出することで知られている。これまでに、多種多様な植物化石と昆虫化石が報告されているが、脊椎動物化石の記載は非常に限られており、魚類化石の研究に至っては上野（1967）においてコイ科魚類のウグイが記載されたのみである（後述「地質概説」参照）。そこで、本研究では塩原層群宮島層から産出した魚類化石 12 個体の記載を行った。なお、本研究の調査対象の多くは標本ラベルの予察的同定でウグイの可能性が示されており、上野（1967）もウグイ

Tribolodon cf. *T. hakonensis* を報告していることから、化石種と現生種との形態の比較に先立ち、ウグイの現生種 *Tribolodon hakonensis* の骨学的記載を行い、骨学的情報のアップデートを行った。

また、先行研究では塩原から産出する化石を現生種の分布域と比較することで古環境の推定も行われてきた。植物化石を用いた研究例では Endo (1935)、尾上 (1989) などがあり、昆虫化石では Fujiyama (1979)、Nakano *et al.* (2018)、堀口 (2019) が挙げられる。しかし、脊椎動物化石を用いた古環境の推定は未だ行われていない。常に水中で生活する魚類は、周囲の水質等の影響を受けやすいことから、魚類化石の研究によって古塩原湖における当時の水温や pH などの水質の推定に役立つことが期待される。そのため、本研究では現生種が生息する日本の湖沼のデータに基づいて古塩原湖の pH を推定した。

化石標本の地質概説

本研究で調査した化石標本は、中部更新統塩原層群宮島層から産出した（図 1B）。塩原層群の

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岩相層序区分や堆積環境については、郷原ほか (1952)、Akutsu (1964)、尾上 (1989)、Tsuji no & Maeda (1999)、Tuzino *et al.* (2009) などの先行研究がある。最近の研究では Tsuji no & Maeda (1999) による層序区分が支持されていることから、本研究ではこの層序区分に従った。塩原層群はカルデラ湖の湖成堆積物であり、カルデラの南側で活発な火山活動が起こり、山体が形成されると同時に大量の安山岩質溶岩が湖に流れ込むことで、三日月形のカルデラ湖になったと考えられている (尾上, 1989)。なお、Itaya *et al.* (1989) では安山岩質溶岩を用いた K-Ar 法による年代測定により、この火山活動は約 30 万年前に起こったとしている。

塩原層群宮島層から産出する化石の多くは木の葉化石であり、産出の報告は 19 世紀からなされている (Nathorst, 1888)。その後、Endo (1935) や小泉 (1940)、尾崎 (1982) によって多くの植物化石の同定がなされ、尾上 (1989) は 51 科 104 属 171 種もの植物化石を報告した。また、阿久津 (1960) および Akutsu (1964) では珪藻化石の同定が行われ、35 種が記載されている。

動物化石としては昆虫と脊椎動物が報告されている。昆虫化石については、大石 (1931)、日浦 (1966)、Fujiyama (1968, 1969, 1979, 1983) 等が報告しているほか、近年では相場 (2015) が 9 目 31 科の昆虫およびクモ目を報告した。また、カメムシ目エゾハルゼミ *Terpnosia nigricosta*、カメ

ムシ目トドキジラミ比較種 *Cacopsylla cf. abieti*、トンボ目サナエトンボ科の一種、カメムシ目マエジロカメムシ *Okeanos quelpartensis*、カメムシ亜目 *Philostephanus fulvus*、*Adomerus variegatus*、*Dinorhynchus dybowskyi*、*Lelia decempunctata* が報告されるなど、活発な研究が行われている (相場, 2019, 2020; 相場ほか, 2019; 堀口 2019; Horiguchi *et al.*, 2020; Nakano, 2018; Nakano *et al.*, 2018)。その一方で脊椎動物化石の報告は少なく、これまでにアカガエル科のシオバラガエル *Rana siobarensis*、ウグイ *Triborodon cf. hakonensis*、ネズミ科ヒメネズミ *Apodemus argenteus* 及びアカネズミ *A. speciosus* が報告されるに留まり (Shikama, 1955; 上野, 1967; 長谷川・青島, 1988)、著者らが確認できた範囲では本研究が魚類化石の記載としては 2 例目である。

材料と方法

本研究に用いた化石及び現生標本の採取地点を図 1 に、魚類化石標本の一覧を表 1 に示す。標本の所蔵機関の略称は以下のとおりである：神奈川県立生命の星・地球博物館現生魚類標本 (KPM-NI)、木の葉化石園 (SFMV)、慶應義塾幼稚舎 (KYFSI)。

魚類化石 12 個体 (2 個体はパートとカウンターパートからなる) は、栃木県那須塩原市中塩原に

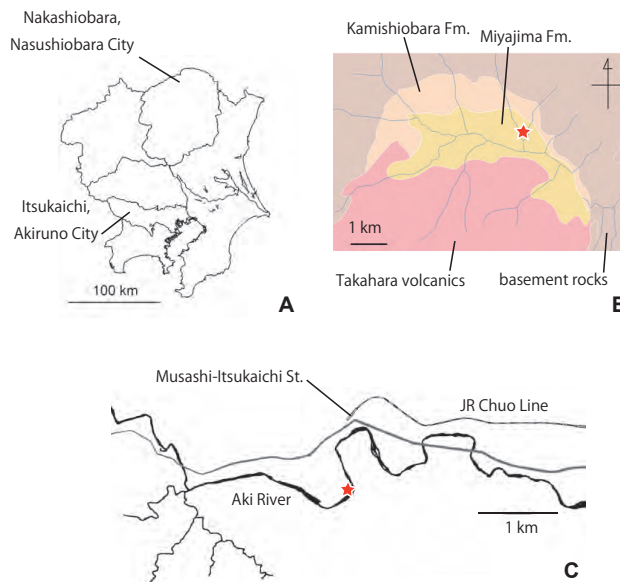


Fig. 1. (A) Regional map, (B) geological map of Shiobara (after Tuzino *et al.* 2009), and (C) Aki River in Itsukaichi area. Stars indicate localities of fossils (B) and live specimens (C) in this study.

図 1. (A) 広域図, (B) 塩原の地質図 (Tuzino *et al.* 2009), 及び (C) 五日市の秋川。星印は本研究の化石標本 (B) 及び現生標本 (C) 採取地を示す。GPS : 36° 58' 52" N, 139° 48' 24" E (塩原、木の葉化石園露頭) 及び 35° 43' 28" N, 139° 13' 39" E (五日市市、秋川の採取地)。

Table 1. List of fossil specimens in this study
表 1. 本研究で調査した化石標本のリスト

標本番号 Specimen number	本研究による同定 ID in this study
SFMV 0003a, b	<i>Tribolodon</i> sp.
SFMV 0004	<i>Tribolodon</i> sp.
SFMV 0006	<i>Tribolodon</i> sp.
SFMV 0008	<i>Tribolodon</i> sp.
SFMV 0009	<i>Tribolodon</i> sp.
KYFSI 077	<i>Tribolodon</i> sp.
KYFSI 078	<i>Tribolodon</i> sp.
SFMV 0002a, b	Cyprinidae gen. et sp. indet.
SFMV 0005	Cyprinidae gen. et sp. indet.
SFMV 0007	Cyprinidae gen. et sp. indet.
KYFSI 076	Cyprinidae gen. et sp. indet.
KYFSI 079	Cyprinidae gen. et sp. indet.

ある木の葉化石園の露頭から産出したもので、いずれも採取年月日と採取者は不明である。SFMV 2 と 3 はパートとカウンターパートの 2 点から成る。魚類化石の標本ラベルには、SFMV 2a, b がハゼ科ヨシノボリ属種不明、その他はすべてコイ科ウグイ属種不明という予察的な同定がなされていた。それぞれの標本は、一匹の魚類の全身または体の一部がシルト質の泥岩に埋まっており、顕微鏡 (Leica DMS-1000) 下で昆虫針を用いてクリーニングを行った。

化石種との比較に用いる現生種のウグイ (*T. hakonensis*) は、東京都あきる野市五日市の多摩川水系秋川において、著者の一人 (山本) らが 2019 年 5 月 29 日に釣りによって採取した 5 個体を用いた (表 2)。採取したいずれの個体も、婚姻色が確認できなかったため性別は不明である。標本のうち、標本番号 KPM-NI 58790 58791, 58792, 58793 の 4 個体を用いて透明二重染色骨格標本作製し、KPM-NI 58794 の 1 個体を用いて乾燥骨格標本作製した。透明二重染色骨格標本の基本的な作製手順は河村・細谷 (1991) に従い、具体的な手順は以下の通りである。

1. 固定 : 5 %ホルマリン溶液で標本を 7 日間固定する。
2. 水洗 : ホルマリンを抜くために流水中に 2 日間放置する。

3. 漂白 : 3 %過酸化水素水に漬け、1 日間色素を漂白する。
4. 水洗 : 過酸化水素水を抜くために流水中に 1 日間放置する。
5. 軟骨染色 : アルシアンブルー 10 ml、100 %エタノール 350 ml、氷酢酸 150 ml を混ぜ合わせて染色液を作成し、1 日間漬けて軟骨を青く染色する。
6. 脱水 : 50 %エタノール溶液に 2 日間浸漬した後、100 %エタノールに 2 時間浸漬する。
7. 透明化 : 4 %水酸化カリウム溶液に 2 日間漬け、軟組織を透明化させる。
8. 硬骨染色 : アリザリンレッドの粉末、100 %グリセリン、1 %抱水クロラル溶液の 3 つを 1 : 2 : 12 の割合で混ぜ合わせ、染色原液を作成する。次に、2 %水酸化カリウム溶液 700 ml に染色原液を少しずつ加えて染色液を作成する。このとき、染色液の色が赤紫色に変化するタイミングで染色原液を加えるのを止める。最後に、作成した染色液の中に標本を 1 日間漬け、硬骨を赤く染色する。
9. 脱色 : 3 %水酸化カリウム溶液に 1 日間浸漬し、脱色する。
10. 脱水 : 50 %エタノール溶液に 3 日間漬けた後、100 %エタノールに 2 時間浸漬する。
11. 脱脂 : 100 %キシレンに 2 時間漬け、脱脂を行う。
12. キシレン抜き : 70 %エタノール溶液に 1 日間漬け、キシレンを脱液する。
13. 浸透 : 100 %グリセリンと 100 %エタノールを 1 : 1 の割合で混ぜ、1 日間浸漬する。
14. 保存 : 100 %グリセリンに防腐剤のチモール粉末を少量加え、そこに標本を漬けて保存する。なお、博物館への標本寄贈に際して、アルコール液浸に変更した。

作製した透明骨格標本は、宮田・藪本 (2018) で用いられている骨格の分け方を参考に各部を解剖した。咽頭歯の観察に用いた乾燥骨格標本については、標本を 15 分間湯煎した後にピンセットを用いて除肉を行った。

Table 2. Standard length of the modern *Tribolodon hakonensis* specimens in this study
表 2. 本研究で調査したウグイ (現生種) 標本の標準体長

標本番号 Specimen number	標準体長 Standard length	標本の状態 Condition
KPM-NI 58790	73 mm	透明骨格標本 transparent specimen
KPM-NI 58791	123 mm	透明骨格標本 transparent specimen
KPM-NI 58792	94 mm	透明骨格標本 transparent specimen
KPM-NI 58793	140 mm	透明骨格標本 transparent specimen
KPM-NI 58794	205 mm	乾燥骨格標本 dried skeleton

透明骨格標本および乾燥骨格標本は、実体顕微鏡 Leica DMS-1000 (Leica Microsystems 社製、東京学芸大学所蔵) を用いて観察を行った。なお、*T. hakonensis* 以外の現生のコイ科魚類の骨学情報は、簀本ほか (2008, 2010)、宮田ほか (2011, 2012)、宮田・簀本 (2018) を参考にした。

全ての化石標本および透明骨格標本は、同じデジタル顕微鏡とデジタルカメラを用いて観察および撮影を行った。それらの画像は、Leica Application Suite Ver. 4.8 (Leica Microsystems) と MediBang Paint Ver. 24.6 (株式会社 MediBang) を用いて処理した。解剖学的用語は宮田・簀本 (2018) に従い、同定する際の比較対象となる分類群は全て東アジア原産種に限った。

記 載

Tribolodon hakonensis の現生個体の骨学的記載

ウグイ (*T. hakonensis*) の骨格のうち、化石に比較的良好に保存されている 11 の領域 (1: 眼下骨、2: 顎骨、3: 鰓蓋骨、4: 懸垂骨、5: 尾鰭骨格、6: 背鰭骨格、7: 臀鰭骨格、8: ウェーバー器官、9: 上神経棘、10: 舌弓、11: 咽頭骨) の記載を以下に示す。

眼下骨 (infraorbitals)

(図 2A, B)

眼下骨は眼窩の下に位置しており、眼窩の下縁に沿って第 1 眼下骨から第 5 眼下骨までの 5

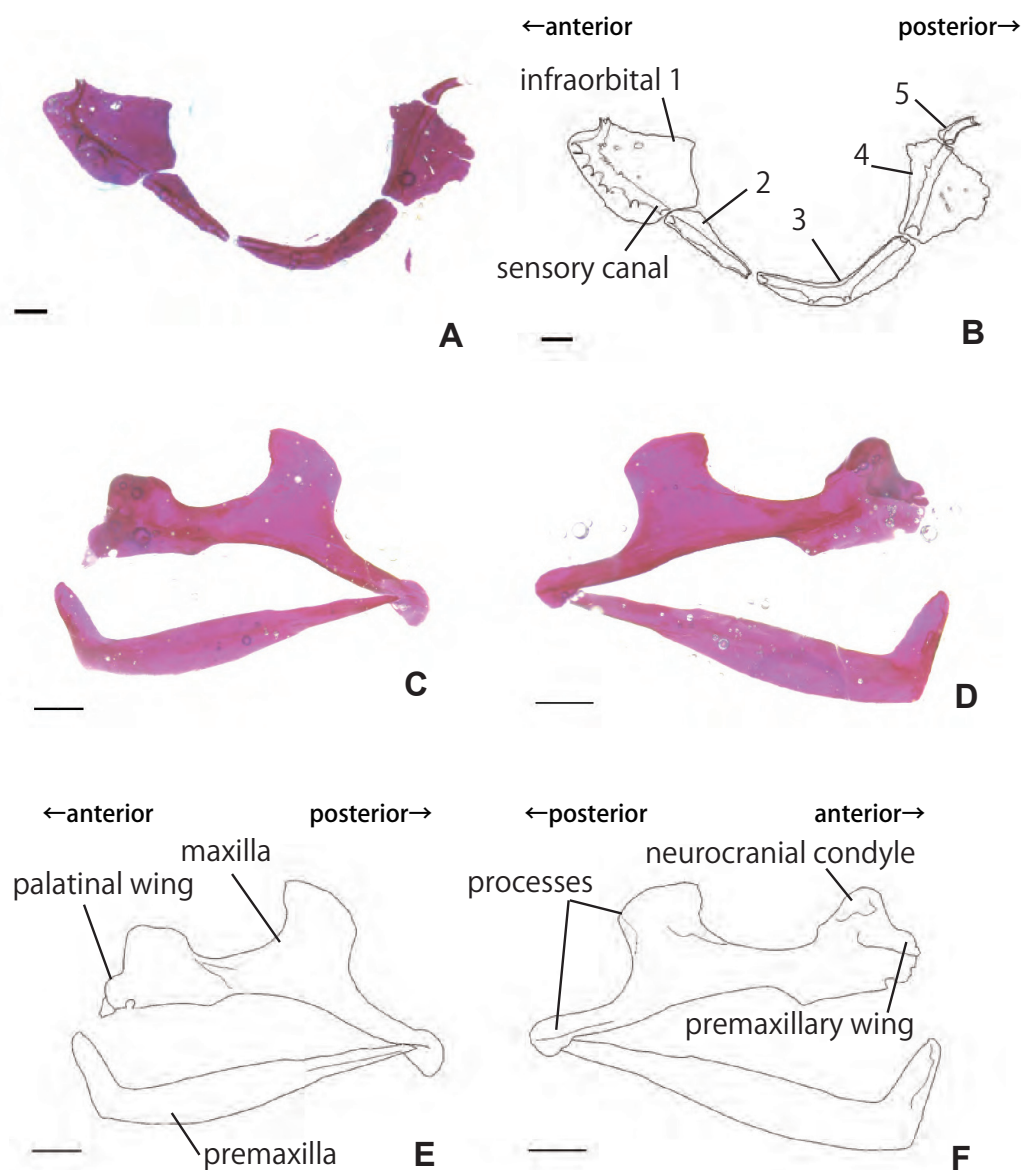


Fig. 2. *Tribolodon hakonensis* KPM-NI 58791, infraorbitals and upper jaw bones. (A) Lateral view of the left infraorbitals and (B) their interpretation. (C) Lateral and (D) medial views of the left upper jaw bones, and their sketches (E, F). Scale bar = 1 mm.

図 2. *Tribolodon hakonensis* KPM-NI 58791 の眼下骨及び上顎。 (A) 左眼下骨外側面とスケッチ (B)。 (C) 左上顎の外側面と (D) 内側面、及びそれらのスケッチ (E, F)。スケールバーは全て 1 mm。

つの骨が並んでいる。また、それぞれの骨には側線感覚管が通る細い管 (sensory canal) が存在している (図 2B)。

第1眼下骨 (別名: 涙骨 lachrymal) は五角形で幅広く、上縁が背側へ突出している。感覚管が中央よりもやや腹側を通り、骨の前後に1つずつ開口部がある。感覚管は骨の前端および終端まで伸びている。第2眼下骨は細く、前端から後端に向かうにつれて幅が狭くなる。長さは、第1眼下骨に比べてやや短い。前端近くの上縁が背側へ緩やかに突出している。感覚管は中央よりもやや腹側を通り、開口部は前後端にそれぞれ1つずつと、中央に2つ存在している。第3眼下骨は最も長く、第2眼下骨の約1.5倍である。全体的に細長く、前端では幅が狭くなる。感覚管は中央よりやや背側を通り、開口部は前後端にそれぞれ1つずつと、中央付近に2つ存在する。第4眼下骨は幅広く、前端から後端に向かって幅広となり、三角形に近い台形を呈する。後端幅は前端幅の約3倍である。長さは、第1眼下骨とほぼ同程度である。感覚管は中央よりもやや背側を通り、前後端にそれぞれ1つずつ開口部が存在する。第5眼下骨は細く棒状で、最も短い。長さは第2眼下骨の約1/2である。感覚管は中央を通り、前後端にそれぞれ1つずつ開口部が存在する。

顎骨 (jaw bones)

(図 2C–F、図 3)

顎骨は上顎および下顎に分けられる。上顎は、前上顎骨 (premaxilla)、および主上顎骨 (maxilla) の2つの骨で構成されている。下顎は、歯骨 (dentary)、角関節骨 (angular-articular)、後関節骨 (retroarticular) の3つの骨で構成されている。

前上顎骨は口縁の上縁部分に該当する骨で、上顎の前部に位置している。全体的に細く、L字型の形状をしている。前端部は背側へ突き出ており、この突起で左右の前上顎骨が癒合している。骨の中央部はやや幅広くなり、後端へ向かうにつれて細くなる。主上顎骨は上顎の後部に位置している。前端には外側に口蓋骨翼 (palatinal wing)、内側に前上顎骨翼 (premaxillary wing) の2つの突起が存在している。また、前端上部には、神経頭蓋顆 (neurocranial condyle) という丸みを帯びた突起が存在する。骨の中央および後端には、突出した翼状部 (process) が存在する。中央の翼状部は背側へ伸び、台形の形を呈する (図 2C–F)。後端の翼状部はやや丸みを帯びており、この部分で前上顎骨および下顎の歯骨と関節する。

歯骨は口縁の下縁部分に該当する骨で、下顎の先端に位置している (図 3)。先端部分の腹側がやや括れている。上縁中央には鉤状突起

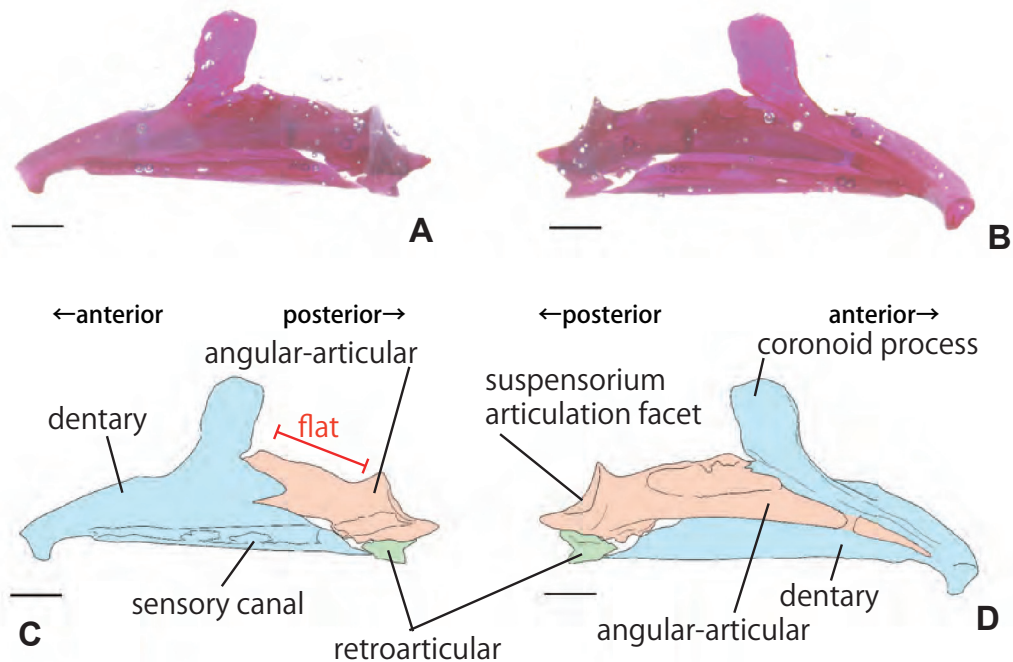


Fig. 3. *Tribolodon hakonensis* KPM-NI 58791, lower jaw bones. (A) lateral and (B) medial views of the left lower jaw bones and (C, D) their interpretation. Scale bar = 1 mm.

図 3. *Tribolodon hakonensis* KPM-NI 58791 の下顎. (A) 左下顎の外側面と (B) 内側面, およびそのスケッチ (C, D). スケールバーは全て 1 mm.

(coronoid process) が、上縁に対してほぼ垂直に突出している。歯骨の先端付近の上縁は直線的で、鉤状突起の基部付近ではやや腹側へ落ち込む。後端の内側は凹んでおり、そこに角関節骨の前部が収まっている。感覚管が中央よりやや腹側を通り、前後端および中央付近に開口部が見られる。角関節骨は細長い三角形を呈し、前端に向かうにつれて幅が狭くなる。上縁は突出せずに平坦であるため (図 3C)、下顎全体を観察した際には歯骨の鉤状突起だけが背側に突出して見える。前部は歯骨後端の凹みに挿入されている (図 3D)。後端上部には懸垂骨関節面 (suspensorial articulation facet) があり、ここで懸垂骨の方骨と関節している。また、後端下部では後関節骨と関節している。感覚管は後部の腹側を通り、前後端に開口部が存在する。後関節骨は三角形の形を呈し、後端が内側へ湾入している。上縁で角関節骨の下縁と関節する。

鰓蓋骨 (opercular bones) (図 4A, B)

鰓蓋骨は鰓を覆っている骨を指し、主鰓蓋骨 (opercle)、下鰓蓋骨 (subopercle)、前鰓蓋骨 (preopercle)、間鰓蓋骨 (interopercle) の 4 つで構成されている。

主鰓蓋骨は最も幅広く、台形を呈する薄い板状の骨である。背側縁および後縁はほぼ同じ長さであり、どちらも内側に緩く湾入している (図 4B)。下縁はほぼ直線である。前縁上部は前方へ突出している。また、前縁上部では、懸垂骨の舌顎骨と関節する。下鰓蓋骨は鰓蓋骨の中でも最も内側に位置しており、主鰓蓋骨の下端内側に存在する。三角形を呈し、前端は幅広く、後端に向かうにつれて幅が狭くなり、後端は尖っている。下縁は丸みを帯びて湾曲している。

前鰓蓋骨はブーメランのような折れ曲がった三日月形を呈し、感覚管が上部では中央を通り、下部では中央よりやや腹側を通っている。開口部は腹側に向かって開いている。間鰓蓋骨は前鰓蓋骨の下端内側に位置し、三角形を呈する。長さは、下鰓蓋骨とほぼ同じである。前端が尖り、後端に向かうにつれて幅が広がる。後端幅は、下鰓蓋骨の前端幅の約 1.5 倍である。

懸垂骨 (suspensorium) (図 4A, C)

懸垂骨は鰓蓋骨の前方に位置しており、口蓋骨 (autopalatine)、内翼状骨 (endopterygoid)、外翼状骨 (ectopterygoid)、後翼状骨 (metapterygoid)、方骨 (quadrate)、接続骨 (symplectic)、舌顎骨

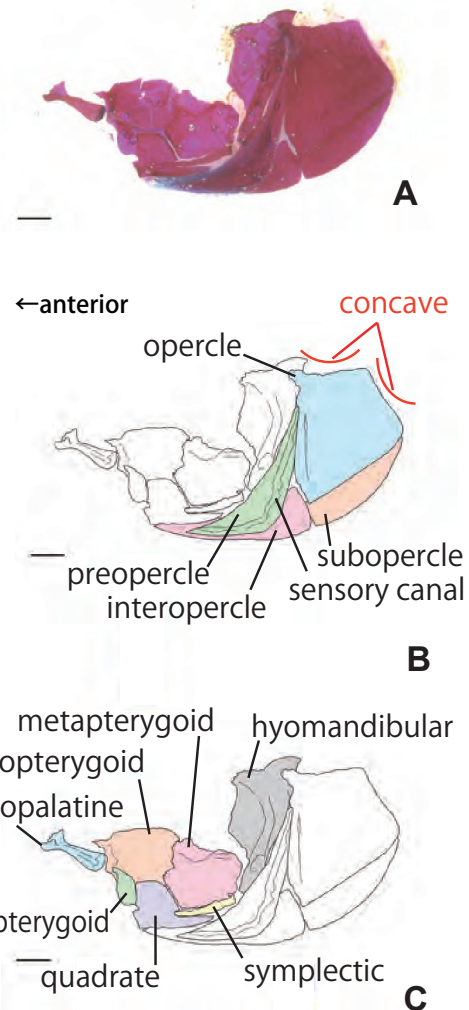


Fig. 4. *Tribolodon hakonensis* KPM-NI 58791, opercular bones and suspensorium. (A) lateral view of the left opercular bones and suspensorium, and (B, D) their interpretation. Scale bar = 2 mm.

図 4. *Tribolodon hakonensis* KPM-NI 58791 の鰓蓋骨と懸垂骨. (A) 左側の鰓蓋骨と懸垂骨の外側面 (A) と、それぞれのスケッチ (B, C). スケールバーはいずれも 2 mm.

(hyomandibular) の 7 つで構成されている。

口蓋骨は最も先端に位置する小さな骨であり、骨の中央部分は幅が狭くなっている。前端は三方向に分かれて突出しており、外側の突出部で前上顎骨の先端部分と関節する。また、後端で内翼状骨と関節する。内翼状骨は板状で幅広く、前縁で口蓋骨に関節する。下縁には外翼状骨と方骨が接し、後縁には後翼状骨が接している。全体的に薄い骨であるが、前縁にある口蓋骨との関節面のみ厚くなっている。外翼状骨は薄い板状の骨で、内翼状骨の下部に位置している。骨の中央が最も幅広く、前端に向かうにしたがって細くなり、先端

は腹側に向かって曲がる。後翼状骨は五角形を呈する薄い板状の骨であり、中央部が外側に向かってやや膨らんでいる (図 4C)。前縁および上縁は緩やかに湾入しており、下縁は腹側に大きく突出している。大きさは、内翼状骨と同程度である。

方骨は扇形を呈する丸みを帯びた骨で、下縁後端は後方へ鋭く突出している。また、下縁前端にある突出した下顎関節面で、下顎の角関節骨と関節する。内側には細い凹みが存在し、そこに接続骨の前部が収まる。接続骨は細長くやや扁平な棒状の骨で、前部は方骨の凹みに挿入されている。わずかに背側に反り返っている。また、前端から後端に向かうにつれてわずかに幅が広くなる。舌顎骨は懸垂骨の後端に位置する骨である。中央より上は幅広く四角形を呈し、中央より下は急激に幅が狭まり、棒状となっている。上縁の後端部分で主鰓蓋骨と関節し、懸垂骨と鰓蓋骨を結びつけている。

尾鰭骨格 (caudal fin skeleton)

(図 5A, B)

尾鰭骨格は、尾鰭椎前椎体 (preural centrum)、上尾骨 (epural)、側尾棒骨 (pleurostyle)、下尾骨 (hypural)、準下尾骨 (parhypural) の 5 種類の骨から構成される。

尾鰭椎前椎体の内、最も後方にある尾鰭椎前第 1 椎体 (first preural centrum) は、第 1 尾鰭椎 (first ural vertebra) と癒合し、尾鰭椎前第 1 椎体 + 尾鰭第 1 椎体 (以下 $pu1+u1$ と呼称) を形成している。 $pu1+u1$ からは、尾鰭椎前第 1 椎体神経棘 (neural spine of preural centrum 1: 以下 $npu1$ と呼称) が背側に突出している。 $npu1$ の形は扁平で幅広く、先端は尖っている。上尾骨は棒状で細長く、 $npu1$ の後方に位置する骨である。なお、上尾骨は $npu1$ の基部の付近まで伸びている (図 5B)。側尾棒骨は上尾骨の後方に位置し、 $pu1+u1$ に癒合する左右 1 対の骨である。やや扁平で細長い形状をしており、上尾骨の上端付近まで伸びている。上部は第 2 尾神経骨という細い棒状の骨に左右から挟まれる。

下尾骨は尾鰭骨格の後端に位置する骨であり、第 1 下尾骨から第 6 下尾骨まで、合計 6 つ存在している (図 5B)。第 1 下尾骨は後端に向かうにつれて幅が広くなり、後端の幅は 6 つの下尾骨の中で最大である。第 2 下尾骨は幅が一定で、長さは第 1 下尾骨と同程度である。また、基部で $pu1+u1$ に癒合している。第 3 下尾骨は $pu1+u1$ に関節しており、後端に向かうにつれてわずかに幅広となる。長さは第 2 下尾骨と同程度である。第 4 下尾骨、第 5 下尾骨、第 6 下尾骨は側尾棒

骨の後方に位置している。これら 3 つの内、第 6 下尾骨が最も短く、第 4 下尾骨の長さの約 1/2 である。準下尾骨は第 1 下尾骨の前方に位置する、扁平で細長い骨である。骨の幅は変化せず、一定である。なお、準下尾骨の基部は、第 1 下尾骨の基部と癒合している。

背鰭骨格 (dorsal fin skeleton)

(図 5C, D)

背鰭骨格は、鰭を支持する担鰭骨 (pterygiophore) および鰭条から成る。また、担鰭骨には、近担鰭骨 (proximal pterygiophore)、遠担鰭骨 (distal pterygiophore)、間担鰭骨 (median pterygiophore) の 3 種類が存在している。

Tribolodon hakonensis の全ての鰭 (尾鰭、背鰭、臀鰭、腹鰭、胸鰭) の鰭条は、柔軟性に富んだ軟条である。背鰭の鰭条は 10 本存在し、前方の 3 本が不分岐軟条で、後方の 7 本が分岐軟条である。また、第 1 鰭条は他の 9 本の鰭条と比べて短く、棘のような形である。

近担鰭骨は担鰭骨の中で最も大きく 10 本存在し、骨の前後に翼が発達している。長さは、第 1 近担鰭骨が最長で、後方に向かうにつれて次第に短くなる。また、第 1 近担鰭骨の前翼は深く湾入しており (図 5D)、湾入は骨の約 1/2 の長さまで達する。遠担鰭骨は短く小さな骨であり、骨の後端で鰭条の基部と接している。前端および後端は丸みを帯びている。間担鰭骨は、遠担鰭骨と同様に短く小さな骨であり、第 4 近担鰭骨より後方にのみ存在している。また、後端の間担鰭骨の腹側には、背鰭終端骨 (stay) という四角形の板状の骨が関節している。

臀鰭骨格 (anal fin skeleton)

(図 5E, F)

臀鰭骨格は背鰭骨格と同様に、近担鰭骨、遠担鰭骨、間担鰭骨の 3 種類の担鰭骨と鰭条から構成されている。臀鰭の鰭条は 10 本もしくは 11 本存在し (KPM-NI 58791 のみ 10 本)、前方の 3 本が不分岐軟条で、後方の 7 本もしくは 8 本が分岐軟条である。

近担鰭骨は担鰭骨の中で最も大きく、9 本もしくは 10 本存在し (KPM-NI 58790 のみ 10 本)、骨の前後に翼が発達している。長さは、第 1 近担鰭骨が最長で、後方に向かうにつれて次第に短くなる。また、第 1 近担鰭骨の前翼の中央付近に湾入 (図 5F) が確認できる。遠担鰭骨は短く小さな骨であり、骨の後端で鰭条の基部と接している。前端および後端は丸みを帯びている。間担鰭骨は、長方形を呈する粒状の骨であり、第 4

近担鰭骨より後方にのみ存在している。また、後端の間担鰭骨の背側には、臀鰭終端骨 (stay) という四角形の骨が関節している。

ウェーバー器官 (Weberian apparatus)
(図 6A, B)

ウェーバー器官とは、骨鰾上目の魚類に存在する、特殊化した椎骨から成る構造であり、結骨 (claustrum)、舟状骨 (scaphium)、挿入骨 (intercalarium)、三脚骨 (tripus) で構成される。

結骨は、第2上神経棘の下方に位置しており、4種類の骨片の中で最も背側に存在する。舟状骨

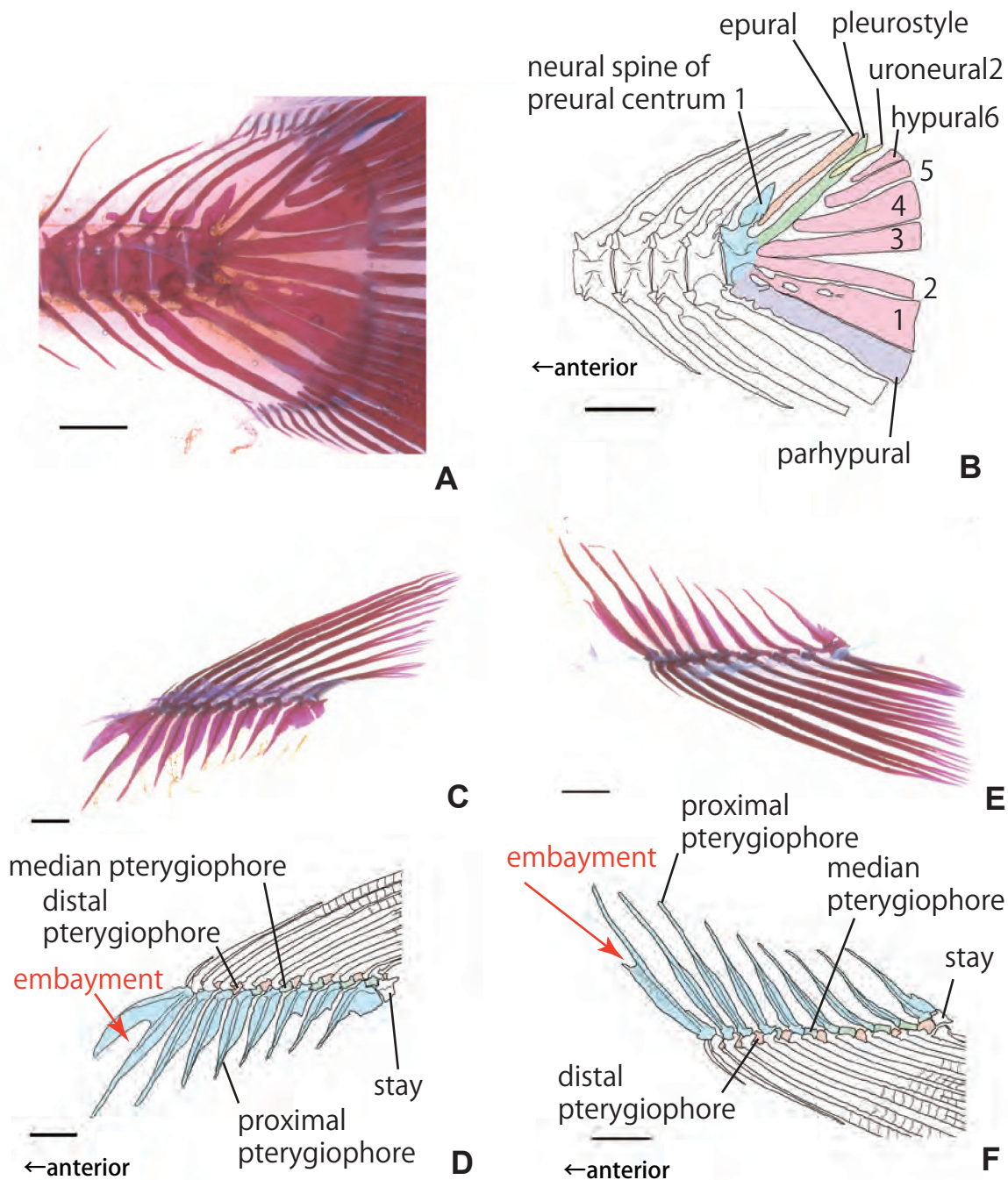


Fig. 5. *Tribolodon hakonensis* KPM-NI 58791, caudal, dorsal, and anal fin skeleton. (A) left lateral view of the caudal fin and (B) interpretation, asterisk indicating fused first preural centrum and first caudal vertebra. (C) left lateral view of the dorsal fin and (D) interpretation. (E) left lateral view of the anal fin and (F) interpretation. Scale bar = 2 mm.

図 5. *Tribolodon hakonensis* KPM-NI 58791 の尾鰭・背鰭・臀鰭骨格. (A) 尾鰭骨格の左側面及びスケッチ (B), アステリクスは尾鰭椎前第1椎体+尾鰭第1椎体. (C) 背鰭骨格の左側面及びスケッチ (D). (E) 臀鰭骨格の左側面及びスケッチ (F). スケールバーはいずれも 2 mm.

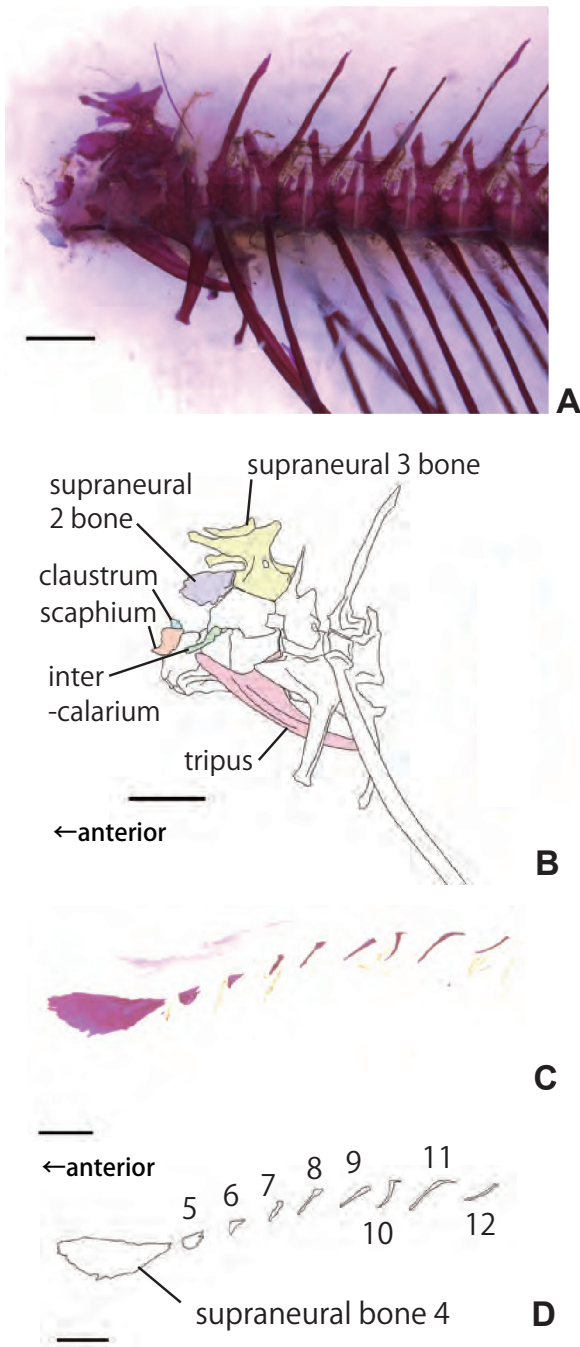


Fig. 6. *Tribolodon hakonensis* KPM-NI 58791, Weberian apparatus and supraneural bones. (A) Left lateral view of the Weberian apparatus and (B) interpretation. (C) Left lateral view of the supraneural bones and (D) interpretation. Scale bar = 2 mm.

図 6. *Tribolodon hakonensis* KPM-NI 58791 のウェーバー器官及び上神経棘. (A) ウェーバー器官左側面とスケッチ (B), 及び上神経棘左側面 (C) とスケッチ (D). スケールバーはいずれも 2 mm.

は、結骨の下方に位置する四角形の骨である。挿入骨は、舟状骨の後方に位置する細く短い棒状の骨である。三脚骨は、4つの骨の中で最も大きい三角形の骨であり、後方へ伸びる突起は腹側に膨らむように緩やかにカーブしている。第2上神経

棘は楕円形で平坦である。また、第3上神経棘は背側へ伸びており、上端が前方と後方へ突出している逆三角形を呈する (図 6B)。

上神経棘 (supraneural bones)

(図 6)

上神経棘は、背鰭骨格の前方に存在する複数の小さな骨である。ウェーバー器官を構成する第2、第3上神経棘を除き、8もしくは9本存在する (KPM-NI 58792 のみ 8 本)。それぞれの骨は、各椎骨から伸びる神経棘の間に挟まるように位置している。最も前方のもの (第4上神経棘) は板状で楕円形を呈する。また、第5、第6上神経棘の2つは粒状となり、それより後方のものは棒状となる。

舌弓 (hyoid arch)

(図 7)

舌弓は舌を支持する骨であり、左右の間鰓蓋骨の間に位置している。上位下舌骨 (upper hypohyal)、下位下舌骨 (lower hypohyal)、前角舌骨 (anterior ceratohyal)、後角舌骨 (posterior ceratohyal)、間舌骨 (interhyal)、鰓条骨 (branchiostegal)、尾舌骨 (urohyal) の7種類の骨で構成されている。

上位下舌骨は舌弓の先端に位置する骨であり、腹側面で下位下舌骨と関節する。形状は後端がやや膨らんだ楕円形で、大きさは下位下舌骨よりもやや小さい。下位下舌骨は、上位下舌骨と同じく舌弓の先端に位置する三角形の骨であり、後端で後角舌骨と関節する。前角舌骨は下位下舌骨の後方に位置する骨であり、中央が括れた長方形を呈する。また、後端幅は前端幅の約2である。内面に第1、第2鰓条骨の基部が関節する。後角舌骨は台形を呈する骨であり、前端で前角下骨と関節する。長さは、前角舌骨の約1/2である。また、後端の一部がわずかに凹んでおり、そこに間舌骨が関節する。間舌骨は舌弓の中で最も小さく、短い棒状の骨である。上端に比べて下端はやや尖っている。また、下端で後角舌骨と関節する。鰓条骨は左右に3対存在するアーチ状の骨である (図 7A–D)。第1、第2鰓条骨は、基部で前角舌骨と関節し、第3鰓条骨は基部で後角舌骨と関節する。また、第1鰓条骨は他の2本に比べて前半部分の幅が狭い。

尾舌骨は、左右の舌弓の間に位置する骨である。前端は二又に分かれており (図 7F, I)、背側から見るとU字型をしている。下縁に沿って左右にフランジが発達し、フランジの後端は尖っている。また、前端から後端に向かうにつれて幅広となる翼状部が背側に発達している (dorsal

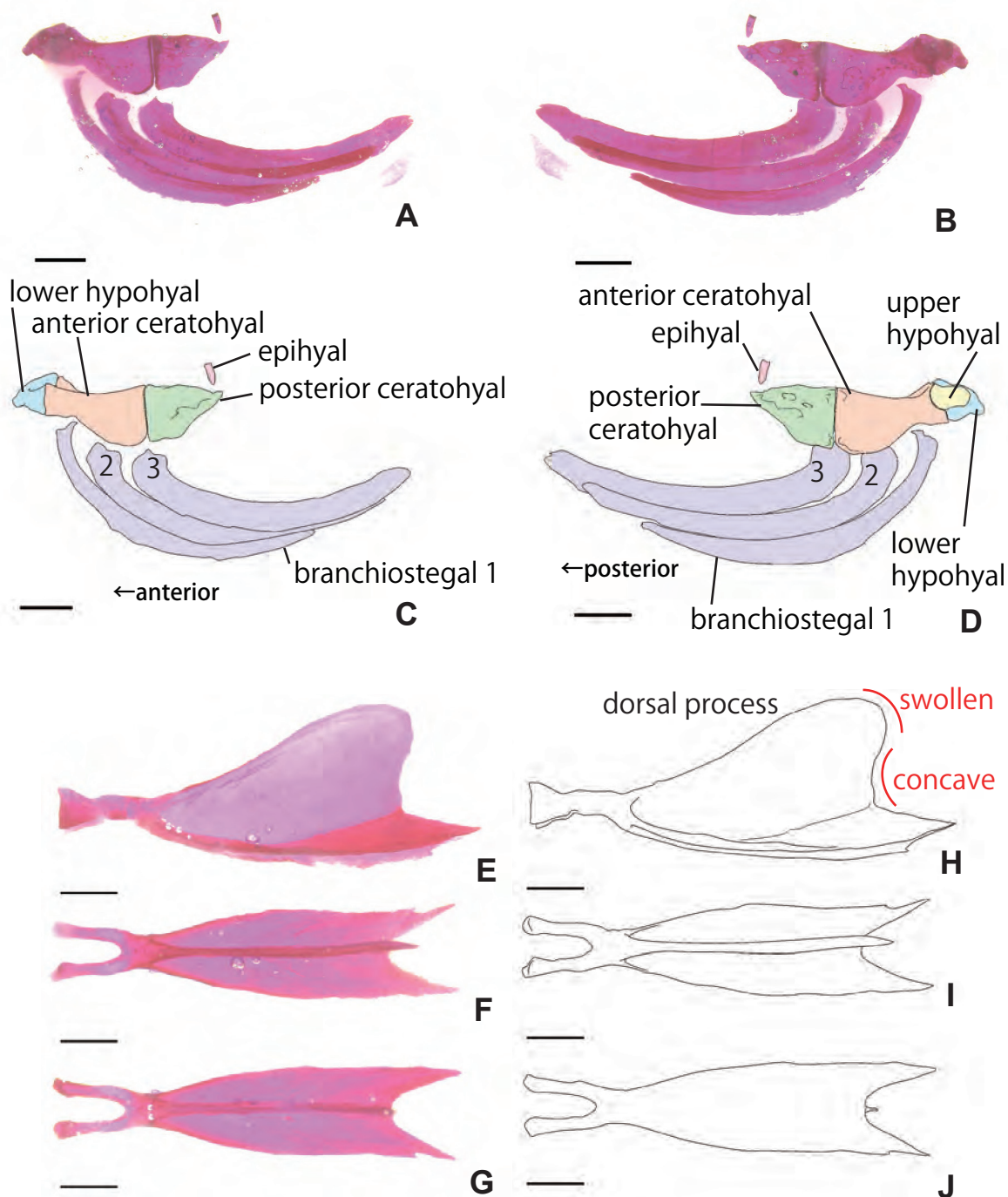


Fig. 7. *Tribolodon hakonensis* KPM-NI 58791, hyoid arch. (A) left lateral and (B) medial views of the left hyoid arch, and (C, D) their interpretation. (E) left lateral, (F) dorsal, and (G) ventral views of urohyal, and (H-J) their interpretation. Scale bar = 2 mm (A-D) and 1 mm (E-J).

図 7. *Tribolodon hakonensis* KPM-NI 58791 の舌弓. (A) 左側の舌弓の外側面, (B) 内側面, 及びスケッチ (C, D). (E) 尾舌骨の左側面, (F) 背側面, (G) 腹側面, 及びそのスケッチ (H, I, J). スケールバーは 2 mm (A-D) 及び 1 mm (E-J).

process、図 7E, H)。翼状部の後縁は、上部で丸みを帯びて膨らんだ後、下部では緩やかに湾入する。

咽頭骨 (pharyngeal)

(図 8)

咽頭骨とは、5 対ある鰓弓のうち最も後方の第

5 鰓弓が特殊化したものであり、咽頭骨の後面には咽頭歯という複数の歯が並んでいる。咽頭骨は三日月状で、下端は内側へ向かって約 90 度の角度でカーブしている。咽頭歯は 2 列確認でき、内列に 5 本もしくは 4 本、外列に 2 本並んでいる。また、外列の咽頭歯は内列のものと比べて短く細

い。咽頭歯の形は円柱状であり、先端は尖っている。また、内列の咽頭歯の中には、先端が鉤爪のように内側へ曲がるものも存在する。

現生個体と東アジア原産種の骨学的特徴の比較

記載した現生種のウグイ (*Tribolodon hakonensis*) の骨学的情報を、東アジア原産の現生コイ科魚類のうち全身骨格の骨学的記載がなされている5種 (*Hemiculter leucisculus* [藪本ほか, 2008]、*Xenocypris argentea* [藪本ほか, 2010]、*Zacco platypus* [宮田ほか, 2011]、*Candidia barbatus* [宮田ほか, 2012]、*Nipponocypris temminckii* [宮田・藪本, 2018]) と比較し、ウグイと他のコイ科魚類5種との間に違いが見られた骨学的特徴を表3にまとめた。なお、表にまとめた骨学的特徴は、観察した全ての標本 (KPM-NI 58790–58793) に共通して確認できたものである。

化石標本の記載

条鰭綱 Class **Actinopterygii** Klein 1885

コイ目 Order **Cypriniformes** Bleeker 1859

コイ科 Family **Cyprinidae** Rafinesque 1815

ウグイ亜科 Subfamily **Leuciscinae** Bonaparte 1835

ウグイ属 Genus ***Tribolodon*** Sauvage 1883

ウグイ属 種不明 ***Tribolodon* sp.**

(図 9–11)

記載標本 : SFMV 3a, b (パートとカウンターパート), SFMV 4, SFMV 6, SFMV 8, SFMV 9, KYFSI 77, KYFSI 78.

SFMV 3a, b は 83 mm の胴体部分で、いずれの標本でも頭部の大部分と尾鰭が欠損している。SFMV 3a では、背鰭、臀鰭、下顎の歯骨が保存されている。SFMV 4 は、頭部の後半から尾鰭骨格の直前までの 60 mm の胴体部分で、尾鰭は完全に欠損している。主鰓蓋骨などの頭部の骨と、背鰭、臀鰭、咽頭骨が保存されている。SFMV 6 は、頭部の後半から尾鰭骨格までが残る 90 mm の胴体部分である。背鰭、臀鰭、腹鰭が保存されており、尾鰭に関しては基部のみ保存されている。SFMV 8 は、133 mm の全身が保存されており、背鰭、尾鰭、咽頭骨が確認できるが、臀鰭は完全に欠損している。SFMV 9 は、頭部の背側半分

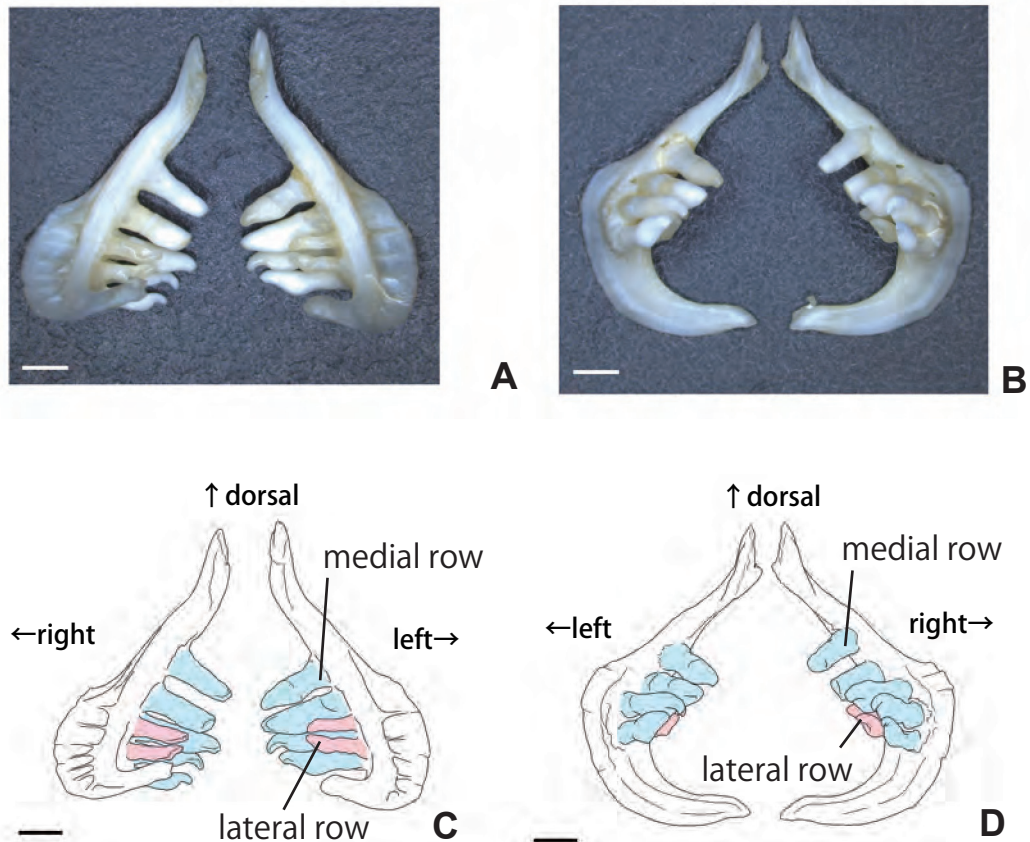


Fig. 8. *Tribolodon hakonensis* KPM-NI 58791, pharyngeals. (A) anterior and (B) posterior views and (C, D) their interpretation. Scale bar = 1 mm.

図 8. *Tribolodon hakonensis* KPM-NI 58794 の咽頭骨. (A) 前面, (B) 後面, 及びそれらのスケッチ (C, D). スケールバーは全て 1 mm.

Table 3. Osteological characters of extant *Tribolodon hakonensis*

表 3. ウグイ（現生種）の骨学的特徴

部位 element	骨学的特徴 osteological characteristics
眼下骨 infraorbital	・第3眼下骨の幅が狭い. ・第4眼下骨が三角形に近い台形を呈する. ・第5眼下骨が短く棒状である.
顎骨 jaw bones	・主上顎骨の中央の翼状部が台形. ・角関節骨の上縁が平坦. ・歯骨の鉤状突起が背側にほぼ垂直に突出する.
鰓蓋骨 opercular bones	・主鰓蓋骨の背側縁と後縁の長さが同じで, どちらも内側に緩やかに湾入する.
懸垂骨 suspensorium	・後翼状骨の前縁が湾入し, かつ下縁が腹側へ大きく突出している.
尾鰭骨格 caudal fin skeleton	・上尾骨が棒状で細長く, かつ尾鰭椎前第1椎体神経棘の基部付近まで伸びる.
背鰭骨格 dorsal fin skeleton	・第1鰭条が棘状である. ・第1近担鰭骨の前翼が深く湾入し, 湾入が骨の約1/2の長さに達する.
臀鰭骨格 anal fin skeleton	・近担鰭骨が9もしくは10本で, 第1近担鰭骨の前翼が湾入する.
ウェーバー器官 Weberian ossicles	・背側に向かって伸びる第3上神経棘の上端が, 前後に突き出た逆三角形を呈する.
上神経棘 supernural bones	・第2, 3上神経棘の後方に8もしくは9本存在する. ・第4上神経棘は板状かつ楕円形で, 第5, 6上神経棘は粒状で, それより後方のものは棒状となる.
舌弓 hyoid arch	・尾舌骨の先端がU字型で, 左右のフランジの後端は尖り, 翼状部の後縁は上部では膨出して下部では湾入する.
咽頭骨 pharyngeal bone	・咽頭歯が2列並んでおり, 内列に4もしくは5本, 外列に2本存在する.

および尾鰭が欠損した 142 mm の胴体部分で、背鰭、臀鰭が確認できるが、損傷や欠損が見られる。また、頭部には咽頭骨が保存されている。KYFSI 77 は、頭部の先端が欠損している 76 mm の胴体部分で、背鰭、臀鰭、尾鰭および咽頭骨が保存されている。また、胴体下部に鱗が 1 枚確認できる。KYFSI 78 は、下顎の歯骨および咽頭骨が残る 62 mm の胴体部分で、背鰭、臀鰭は完全に欠損し、腹鰭、胸鰭のみが保存されている。なお、上記の 8 つの標本全てに細い肉間骨が保存されている。

これら 8 つの標本には、以下のようなコイ科の形態学的特徴（上野, 1967）が確認できる。(1) 細くてひげ状の肉間骨が発達する、(2) 背鰭の真下に腹鰭が存在する、(3) 背鰭が 1 基のみ存在する、(4) 鱗が円鱗である、(5) 咽頭歯が生えた咽頭骨が存在する、(6) 顎骨に歯が存在しない。標本ごとの 6 つの特徴の有無については表 4 にまとめた。これらの形態学的特徴から、上記の 8 標本はコイ科であると同定した。

また、コイ科に見られる咽頭歯の形状は分類に用いることが可能である（Chu, 1935）とされており、5 つの標本（SFMV 4、8、9、KYFSI 77、

78）に保存されている咽頭歯の情報を表 5 にまとめ、スケッチを図 10 に示した。これら 5 つ標本の咽頭歯の歯列数および本数がウグイ属のものと同じ（小林・前田, 1962）し、本研究で観察した KPM-NI 58794 の特徴とも一致している。SFMV 3a, b については、歯骨の鉤状突起がほぼ垂直に突出する点、角関節骨の上縁が平坦である点が KPM-NI 58791 と一致しており、かつ鰭条が全て軟条である点（上野, 1967）から、ウグイ属であると同定した（図 11A, F）。SFMV 6 については、尾鰭骨格の上尾骨が棒状で npu1 の基部付近まで伸びる点、頭部の主鰓蓋骨の上縁と後縁がほぼ同じ長さで、かつ内側へ湾入する点、背鰭の第 1 近担鰭骨の前翼が深く湾入する点、臀鰭の近担鰭骨が 9 本である点が KPM-NI 58791 と一致し、椎骨の数が 44 個である点もウグイ属の範囲（上野, 1967）に当てはまることから、ウグイ属であると同定した（図 11B, C, D, G, H）。

現在の日本に生息しているウグイ属は、ウグイ（*T. hakonensis*）、マルタウグイ（*T. brandtii*）、ジュウサンウグイ（*T. brandtii brandtii*）、エゾウグイ（*T. sachalinensis*）、ウケクチウグイ（*T.*

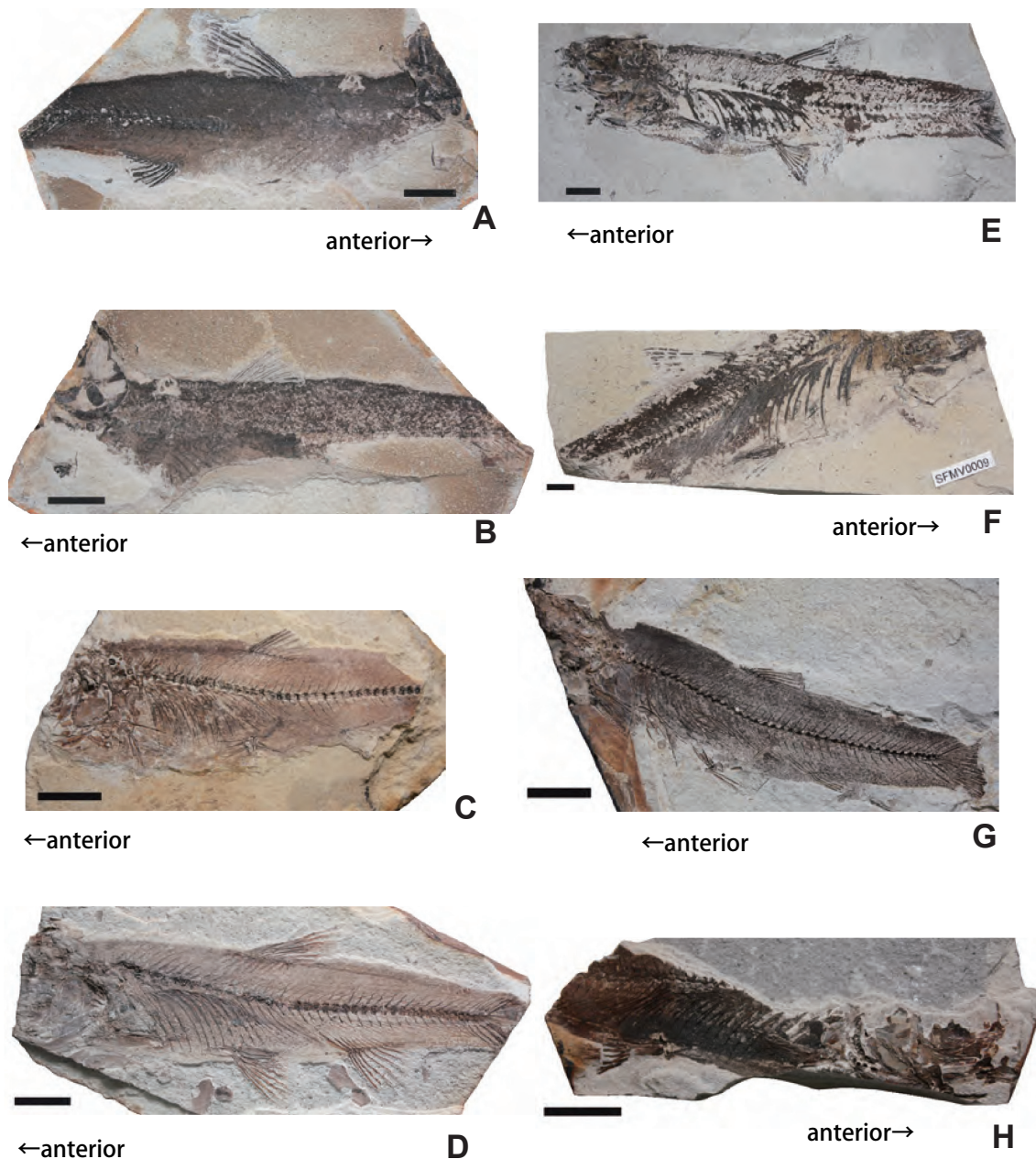


Fig. 9. Fossil specimens of *Tribolodon* sp. (A) SFMV 0003a, (B) SFMV 0003b, (C) SFMV 0004, (D) SFMV 0006, (E) SFMV 0008, (F) SFMV 0009, (G) KYFSI 077, (H) KYFSI 078. Scale bars = 10 mm.

図 9. ウグイ属 (種不明) の化石標本. (A) SFMV 0003a, (B) SFMV 0003b, (C) SFMV 0004, (D) SFMV 0006, (E) SFMV 0008, (F) SFMV 0009, (G) KYFSI 077, (H) KYFSI 078. スケールバーは全て 10 mm.

nakamurai) の 5 種であり、これらの種の同定には椎骨の数、鱗の数、頭部の側線感覚管の形状と開口部の数、および婚姻色を用いるとされている (天野・酒井 2014)。これらのうち、大型のマルタウグイ (*T. brandtii*) およびジュウサンウグイ (*T. brandtii brandtii*) は椎骨の数が 45 個以上であることから (天野・酒井, 2014)、SFMV 6 は上記の 2 種以外であるといえる。また、エゾウグイ (*T. sachalinensis*) では臀鰭鰭条の後縁が湾入せず、ウケクチウグイ (*T. nakamurai*) では下顎が

上顎よりも突き出るといった形態学的特徴が報告されている (中坊, 2013)。SFMV 6 では臀鰭鰭条の後縁は湾入していることから (図 11D)、エゾウグイ (*T. sachalinensis*) 以外の種であり、SFMV 8 では下顎が上顎よりも突出していないため (図 11E)、ウケクチウグイ (*T. nakamurai*) 以外の種であるといえる。その他の標本に関しては、種を同定するための形態学的特徴が見られないため、属までしか同定できない。

Table 4. List of character states in the eight fossil specimens of *Tribolodon* sp. (based on Uyeno, 1967)

表 4. 種不明のウグイ属 *Tribolodon* sp. 標本で確認できるコイ科の形態学的特徴（上野, 1967 に基づく）

標本番号 Specimen number	(1)	(2)	(3)	(4)	(5)	(6)
SFMV 0003a	○	×	×	×	×	○
SFMV 0003b	○	×	×	×	×	×
SFMV 0004	○	○	×	×	○	×
SFMV 0006	○	○	○	×	×	×
SFMV 0008	○	○	○	×	○	○
SFMV 0009	○	○	×	×	○	×
KYFSI 077	○	○	○	○	○	×
KYFSI 078	○	×	×	×	○	×

(1) Narrow intermuscular bones, (2) pelvic fin right beneath the dorsal fin, (3) only one dorsal fin, (4) cycloid scales, (5) toothed pharyngeal bones, (6) edentulous jaw bones. Circle: confirmed; cross: not confirmed due to preservation.

(1) 細くてひげ状の肉間骨が発達する, (2) 背鰭の真下に腹鰭が存在する, (3) 背鰭が1基のみ存在する, (4) 鱗が円鱗である, (5) 咽頭歯が生えた咽頭骨が存在する, (6) 顎骨に歯が存在しない. ○は確認できるもの, ×は部位の欠損により確認できないもの.

Table 5. Number of tooth rows and number of teeth in the pharyngeals of *Tribolodon* sp. specimens

表 5. 種不明のウグイ属 *Tribolodon* sp. 標本における咽頭歯列の数および咽頭歯の本数のリスト

標本番号 Specimen number	咽頭歯列 # of tooth rows	内列歯数 # of teeth in inner row	外列歯数 # of teeth in outer row
SFMV 0004	2列	4本	2本
SFMV 0008	2列	4本	2本
SFMV 0009	2列	5本	2本
KYFSI 077	2列	4本	2本
KYFSI 078	2列	4本	2本

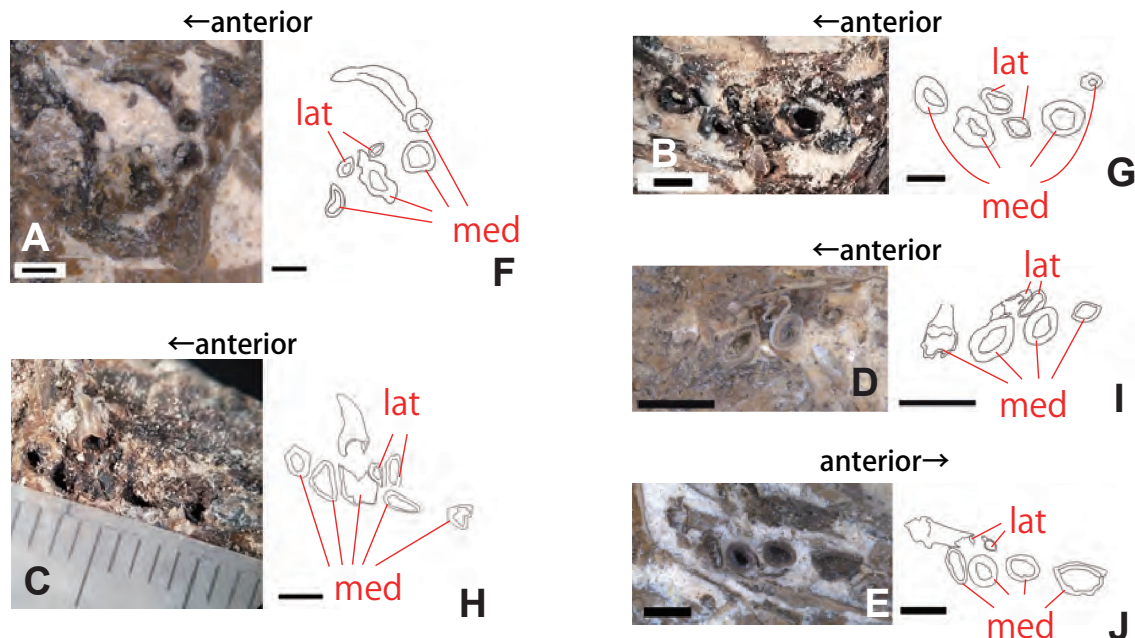


Fig. 10. Pharyngeals of fossil specimens of *Tribolodon* sp. Images [(A) SFMV 0004, (B) SFMV 0008, (C) SFMV 0009, (D) KYFSI 077, (E) KYFSI 078] and interpretation (F to J). Scale bar = 0.5 mm (A), 1 mm (B, D, E), 2 mm (C).

図 10. ウグイ属（種不明）化石標本の咽頭歯の画像 [(A) SFMV 0004, (B) SFMV 0008, (C) SFMV 0009, (D) KYFSI 077, (E) KYFSI 078] とスケッチ (F-J). スケールバーは (A) が 0.5 mm, (B)・(D)・(E) が 1 mm, (C) が 2 mm. SFMV 0008, (F) SFMV 0009, (G) KYFSI 077, (H) KYFSI 078. スケールバーは全て 10 mm.

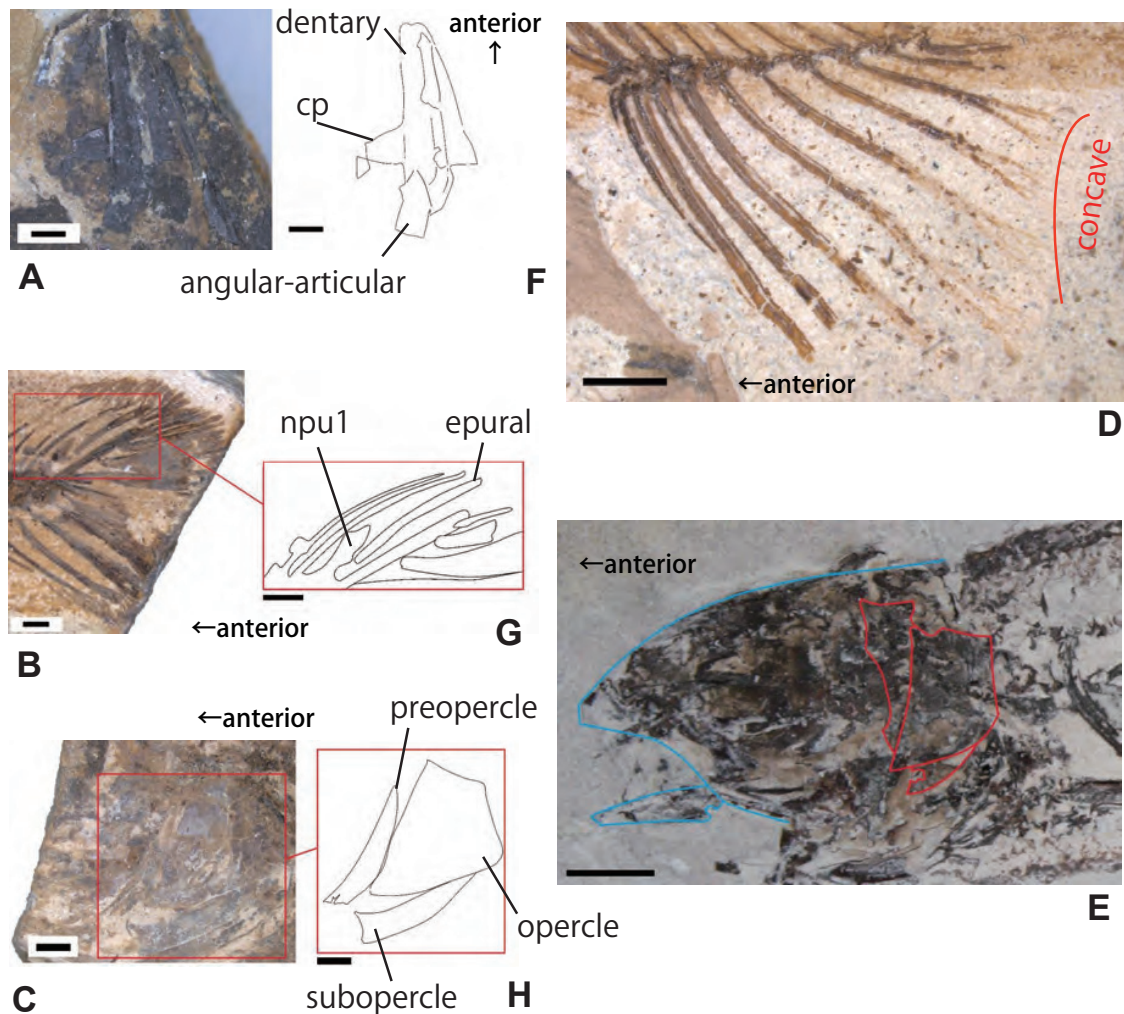


Fig. 11. Fossil specimens of *Tribolodon* sp. Images [(A) lower jaw of SFMV 0003a, (B) caudal skeleton, (C) opercular bones, (D) pelvic fin of SFMV0006, (E) head of SFMV0008 (red and blue lines indicating the outlines of opercular bones and jaws)] and interpretation (F to H). Abbreviations: cp = coronoid process, npu1 = neural spine of 1st preural centrum. Scale bar = 1 mm (A, B), 2 mm (C, D), 10 mm (E).

図 11. ウグイ属 (種不明) の化石標本の画像[(A) SFMV 0003a の下顎, SFMV0006 の (B) 尾鰭骨格, (C) 鰓蓋骨, (D) 臀鰭, (E) SFMV0008 の頭部 (赤線は鰓蓋骨, 青線は上顎と下顎の輪郭を示す)] とスケッチ (F-H). 略称: cp, coronoid process; npu1, neural spine of 1st preural centrum. スケールバーは (A) (B) が 1 mm, (C) (D) が 2 mm, (E) が 10 mm.

コイ科 属・種不明 *Cyprinidae* gen. et sp. indet.
(図 12)

記載標本: SFMV 2a, b (パートとカウンターパート), SFMV 5, SFMV 7, KYFSI 76, KYFSI 79.

SFMV 2a, b は上下方向に圧縮されている 35 mm の胴体部分で、2a では体の背側が、2b では腹側が保存されており、背鰭と臀鰭は観察できない。また、2a には主鰓蓋骨および顎骨が確認できる。SFMV 5 は、頭部の先端が欠損した 110 mm の胴体部分で、頭部には前鰓蓋骨らしき骨が確認できるものの、全体的に損傷が激しくその他の骨の同定が不可能である。SFMV 7 は、背鰭と臀鰭の一部が残る 70 mm の胴体部分で、頭部と尾部は

完全に欠損している。KYFSI 76 は、尾部が欠損した 45 mm の胴体部分で、背鰭と臀鰭の一部が保存されている。また、頭部の先端に、上顎の主上顎骨と下顎の歯骨と思われる骨が確認できる。KYFSI 79 は、頭部と尾部が完全に欠損した 35 mm の胴体部分で、背鰭、臀鰭、腹鰭の一部が保存されている。また、背鰭前方に上神経棘が 6 本確認できる。なお、上記の 6 つの標本全てに細い肉間骨が保存されている。

SFMV 5, SFMV 7, KYFSI 76, KYFSI 79 の 4 つの標本には、コイ科の 4 つの形態学的特徴 [1: 細くてひげ状の肉間骨が発達する、2: 背鰭の真下に腹鰭が存在する、3: 鱗が円鱗である、4: 顎骨に歯が存在しない: 上野 1967] が確認できる。ただし、咽頭骨および咽頭歯は保存されていない。

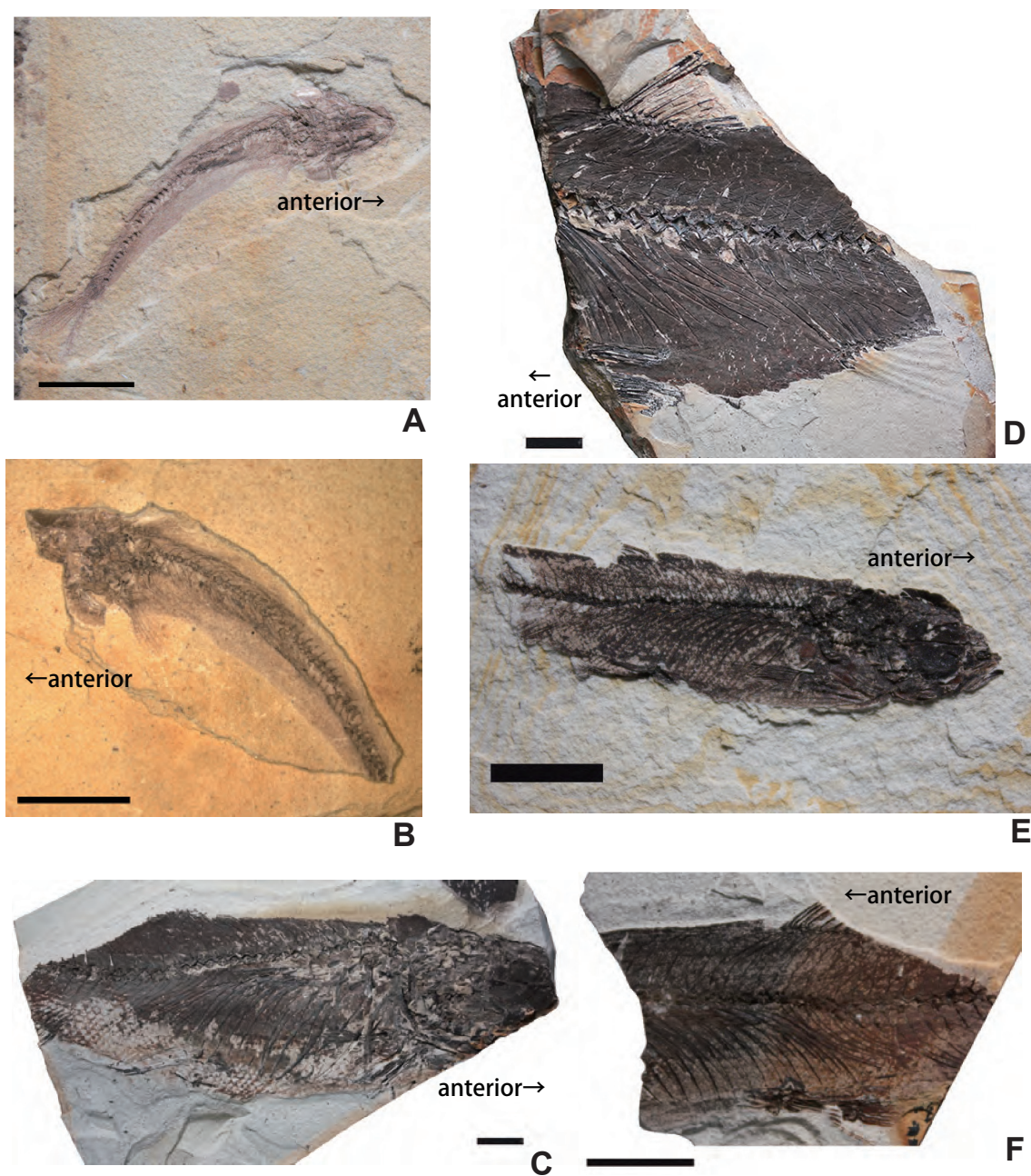


Fig. 12. Fossil specimens of Cyprinidae gen. et sp. indet. (A) SFMV 0002a, (B) SFMV 0002b, (C) SFMV 0005, (D) SFMV 0007, (E) KYFSI 076, (F) KYFSI 079. Scale bar = 10 mm.

図 12. コイ科属種不明の化石標本. (A) SFMV 0002a, (B) SFMV 0002b, (C) SFMV 0005, (D) SFMV 0007, (E) KYFSI 076, (F) KYFSI 079. スケールバーは全て 10 mm.

標本ごとの 4 つの特徴の有無については表 6 にまとめた。これらの形態学的特徴から、上記の 4 標本はコイ科であると同定したが、咽頭骨や角関節骨等の属を同定する上で有用な骨が保存されていないため、属および種までは同定できない。

SFMV 0002a, b は、元のラベルにおいて *Rhinogobius* sp. (ハゼ科ヨシノボリ属、種不明) とされていた標本である。ヨシノボリ属の形態学的特徴 (Yabumoto, 1987; Suzuki *et al.*, 2017; Huang *et al.*, 2016) は以下のとおりである。(1) 第 1 背鰭と第 2 背鰭が存在する、(2) 腹鰭が胸鰭の下に

位置する、(3) 体は櫛鱗で覆われている、(4) 下尾骨が一部癒合している、(5) 歯骨および前上顎骨に小さな円錐形の歯がある、(7) 椎骨は 25 から 29 個存在する。SFMV 2a, b では、腹鰭が胸鰭より後方に位置している点、顎骨に歯が存在しない点、椎骨が少なくとも 44 個存在する点が確認でき、このことから標本はヨシノボリ属ではないといえる。また、上記の標本の特徴に加え、主鰓蓋骨が台形を呈する点、鰭条が全て軟条である点から、ハゼ科ではなくコイ科であると同定した。ただし、背鰭および臀鰭が観察できないため、

Table 6. List of character states in the four fossil specimens of Cyprinidae gen. et sp. indet. (based on Uyeno, 1967)

表 6. コイ科属種不明 Cyprinidae gen. et sp. indet. 4 標本における、コイ科の形態学的特徴のリスト（上野, 1967 に基づく）

標本番号 Specimen number	(1)	(2)	(3)	(4)
SFMV 0005	○	×	○	×
SFMV 0007	○	○	×	×
KYFSI 076	○	○	○	○
KYFSI 079	○	○	×	×

(1) Narrow intermuscular bones, (2) pelvic fin right beneath the dorsal fin, (3) cycloid scales, (4) edentulous jaw bones.

Circle: confirmed; cross: not confirmed due to preservation.

(1) 細くてひげ状の肉間骨が発達する, (2) 背鰭の真下に腹鰭が存在する, (3) 鱗が円鱗である, (4) 顎骨に歯が存在しない. ○は確認できるもの, ×は部位の欠損により確認できないもの.

近担鰭骨や鰭条の本数といった属を同定する上で有用な情報を得ることができず、かつ咽頭骨や角関節骨等の骨も保存されていないため、属および種を同定することはできない。

6 つの標本のうち、SFMV 5、SFMV 7、KYFSI 76、KYFSI 79 においては、背鰭の近担鰭骨が 8 本確認でき、この特徴は *T. hakonensis* (KPM-NI 58791)、および他の東アジア産コイ科魚類 [*H. leucisculus* (藪本ほか, 2008)、*X. argentea* (藪本ほか, 2010)、*Z. platypus* (宮田ほか, 2011)、*C. barbatus* (宮田ほか, 2012)、*N. temminckii* (宮田・藪本, 2018)] と一致している。また、KYFSI 79 では背鰭の前方に複数の上神経棘が保存されており、それらの形状は *T. hakonensis* (KPM-NI 58791) のものと類似しているが、第 4 上神経棘は欠損しているため形状は分からない。

考 察

古塩原湖の水質については、Akutsu (1964) が珪藻化石を現生種のものと比較し、湖の pH は中性から弱アルカリ性であったと推測した。また Tsujino & Maeda (1999) は、宮島層に珪藻質泥岩の葉理が発達し、かつ生痕化石などの底生生物が生息していた痕跡が見られない点から、湖の深層は貧酸素環境もしくは毒性の環境であったとしている。一方、Nakano (2018) では、コウチュウ目のヒラタドロムシの幼虫化石を記載し、現生のヒラタドロムシの生態から、当時の湖の水質は β - 中腐性（少し汚い水）であったと結論付けた。

本研究では、現生種のウグイの生態から古塩原湖における pH を推定した。なお、ウグイ属は日本国内において北海道から九州まで広く分布していることから（細谷ほか, 2015）、植物化石や昆

虫化石に基づく先行研究（前述「はじめに」参照）のように古気温を見積もることはしなかった。

研究で用いた魚類化石 12 個体のうち、7 個体がコイ科ウグイ属（種不明）、5 個体がコイ科属種不明であり、後者の 5 個体についてもウグイ属の形態と比較して明確な違いを示すものは見られなかった。また、上野 (1967) において記載された 9 個体の魚類化石は全てウグイ *Tribolodon* cf. *hakonensis* と同定されており、本研究と上野 (1967) の結果を合わせて考慮すると、魚類化石 21 個体中 16 個体がウグイ属もしくはウグイ属に非常に似た魚類である。現在、ウグイを産する湖にはウグイ以外の魚類も多く生息しており、例えば河口湖ではウグイを含む 14 種（平林・吉田, 1998）の淡水魚類が確認されている。このことから、ウグイが寡占する古塩原湖は特殊な環境だったのではないかと考え、現生のウグイの生息環境を調査した。

湖沼に生息するウグイの中でも、青森県むつ市の宇曽利山湖というカルデラ湖に生息するウグイ (*T. hakonensis*) は、湖水の pH が 3.0–4.0 を示す強酸性条件下で生息していることが知られている（田中, 1984）。宇曽利山湖は、湖岸に存在する噴気孔から排出される pH 2.6–3.6 の水が湖へ流入することで強酸性を示し（田中, 1984）、生息しているウグイは鰓の細胞が特殊化していることで酸性条件下に適応しており（広瀬・金子, 2003）、この湖はウグイ以外の魚類は生息できない環境となっている。また、アルカリ性条件下への適応については、ウグイ属が生息する湖の中でも、pH に関する定期的な調査が行われている富士五湖と琵琶湖のデータ（山梨県大気水質保全課, 2016; 環境省, 2009）から推測した。その結果、富士五湖および琵琶湖において計測された湖水の pH の最大値は、富士五湖では 2016 年に河口湖で計測された 9.2、琵琶湖では山田港沖で計測された 10.0 であった。ただし、琵琶湖の面積は広大であるため、山田港沖の pH が 10.0 であっても琵琶湖全体の pH は必ずしも 10.0 の値を示しているわけではない。そこで、琵琶湖全体の pH を推定するために、年度ごとに各計測地点で記録された pH の最大値を平均して算出した結果、琵琶湖全体の pH は 2005 年の 9.1 という値が最大であり、河口湖で計測された 9.2 という値にはわずかに及ばなかった。このことからウグイ属の生息可能な pH の範囲は、3.0–9.2 程度であると考えられる。

現生のウグイの生息環境から、古塩原湖の湖水の pH は 3.0–9.2 の範囲にあると推測できるものの、より詳細な水質を明らかにするために、宇

曾利山湖の動物相と古塩原湖の化石動物相における水生昆虫を目レベルで比較した。古塩原湖の堆積物である宮島層からは、トンボ目、カゲロウ目、カワゲラ目、トビゲラ目、ハエ目（ガガンボ科）、コウチュウ目（ヒラタドロムシ科）の6目が産出している（相場, 2015; Hayashi & Aiba, 2016）一方、現在の宇曾利山湖にはトンボ目、ハエ目（ユスリカ科）、カメムシ目（ミズムシ科）の3目が生息している程度であり（田中, 1984）、水生昆虫の多様性に大きな違いが見られた。このことから、水生昆虫に関しては現在の宇曾利山湖よりも当時の古塩原湖の方が多様化しており、カルデラ湖であったとしても宇曾利山湖のような強酸性の水が流れ込む過酷な環境ではなかったことが推察できる。

過去の研究では、塩原層群から産出した珪藻に含まれる *Fragilaria construens*（中性を好む種）、*Epithemia turgida*（アルカリ性を好む種）の生態から、古塩原湖の水質は中性～アルカリ性であるとしている（Akutsu, 1964）。Akutsu (1964) で述べられている日本国内の両種の生息地を基に文献を用いて調査した結果、中性を好む *F. construens* は長野県の本栖湖において最も低い pH の環境に生息しており、1984 年に pH 5.5 を記録している（山本ほか, 2004）。アルカリ性を好む *E. turgida* は、富士五湖および琵琶湖に生息していることから、計測されている生息可能な pH の最大値は、河口湖において 2016 年に記録された 9.2 である（山梨県大気水質保全課, 2016）。これら 2 種の珪藻の生息環境を踏まえ、ウグイの生息可能な pH の範囲（3.0：宇曾利山湖の最低値～9.2：河口湖の最高値）と、塩原層群宮島層と強酸性の湖である宇曾利山湖の水生昆虫の多様性の差を考慮すると、当時の古塩原湖の pH は 5.5–9.2 程度であったと考えられる。

結 論

本研究では、現生のコイ科ウグイ属魚類であるウグイ（*T. hakonensis*）の骨学的記載を行った後、現生種の骨学的情報を基に栃木県那須塩原市の塩原層群宮島層から産出した魚類化石 12 個体の記載を行い、咽頭歯の本数、尾鰭骨格の上尾骨の形状、下顎の歯骨の形状などの特徴を用いて、7 個体をコイ科ウグイ属（種不明）、5 個体をコイ科属種不明と同定した。

現生のウグイ属が生息する環境を基に古塩原湖における湖水の pH を推定したところ、pH は 3.0–9.2 であったと考えられる。これは、Akutsu (1964) で中性及びアルカリ性の水を好む珪藻 2

種の化石が報告された結果とも矛盾しない。なお、Akutsu (1964) で報告された珪藻 2 種の生息環境も考慮した場合、pH は 5.5–9.2 であったと推測できる。今後ウグイ属魚類の骨学的研究が進展すれば正確な化石の種レベルの同定が可能になり、現生個体の生息環境に基づく推定から古塩原湖の pH などの水質の推定が可能となるかもしれない。

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摘 要

山本将太・相場博明・佐藤たまき, 2021. 更新統塩原層群（栃木県）から産出した魚類化石とウグイ現生種 *Tribolodon hakonensis* の比較. 神奈川県立博物館研究報告（自然科学）, (50): 1–20. [Yamamoto, S., H. Aiba & T. Sato, 2021. Comparison of fossil fish from the Pleistocene Shiobara Group (Tochigi Prefecture) and modern *Tribolodon hakonensis*. *Bull. Kanagawa Pref. Mus. (Nat. Sci)*, (50): 1–20.]

栃木県の塩原層群宮島層（中部更新統）湖成層から産出した魚類化石 12 個体を記載・同定した。これに先立ち、現生種のウグイ *Tribolodon hakonensis* の骨学的記載を行い、化石の同定に必要な形態学的な特徴を確認した。その結果、化石標本の 7 個体をコイ科ウグイ属種不明、5 個体をコイ科属種不明と同定した。本研究の成果を含め、塩原層群の魚類化石で属レベルまで同定された標本はウグイがほとんどを占める。このことから、ウグイの現生種が生息する日本の湖沼のデータに基づいて古塩原湖の pH の推定を試みた。

原著論文

東京都昭島市の下部更新統加住層（上総層群）から産出した
シカ属の化石Fossils of *Cervus* sp. from the Lower Pleistocene Kasumi Formation of the
Kazusa Group, Akishima, Tokyo, Japan前田大智¹⁾・樽 創²⁾・福嶋 徹³⁾・高栴祐司⁴⁾・鏑本武久¹⁾Daichi MAEDA¹⁾, Hajime TARU²⁾, Toru FUKUSHIMA³⁾, Yuji TAKAKUWA⁴⁾ & Takehisa TSUBAMOTO¹⁾

Abstract. Postcranial fossils of *Cervus* sp. (Mammalia, Artiodactyla, Cervidae) newly collected from the lower Pleistocene (ca. 2.00–1.95 Ma) Kasumi Formation of the Kazusa Group, Akishima, Tokyo, Japan are described in this study. They consist of a right radius, right ulna, left metacarpal, and left tibia of a single individual. This individual is probably subadult because of the incompletely fused epiphyses. It is morphologically well comparable to those of living sika deer (*Cervus (Sika) nippon*) and is smaller in size than those of living Père David's deer (*Elaphurus davidianus*).

Key words: Cervidae, fossil, Gelasian, limb bones, Quaternary

はじめに

シカ科の哺乳類は我々にとって身近な大型野生動物の一つであり、日本には現在も野生のニホンジカ *Cervus (Sika) nippon* が生息している。日本では、鮮新統～第四系から数多くのシカ科の化石が報告されていて、絶滅した化石種がいたこともわかっている。例えば、シカマシフゾウ *Elaphurus shikamai*、タマシフゾウ *Elaphurus tamaensis*、カズサジカ *Cervus (Nipponicervus) kazusensis*、ニッポンチタール *Axis japonicus*、キュウシュウサンバー *Rusa kyushuensis* などである(湊, 1974; 長谷川, 1977)。

本報告では、東京都昭島市に分布する鮮新～更新統上総層群加住層から新たに産出したシカ属の四肢骨化石の記載をおこなった。これまで

に、加住層からは、シカ属 *Cervus* の種として、少なくともカズサジカが報告されている(福嶋, 2009; 小泉, 2017)。また未記載ではあるが、シカ科としてはサンバー (“*Cervus*” *unicolor* = *Rusa unicolor*) の存在も指摘されている(小泉, 2017)。

産地と地質概説

本標本は、共著者の1人である福嶋によって、東京都昭島市拝島町にある拝島水道橋下流付近の多摩川河床(左岸)の加住層のシルト層から発見された(図1)。本化石産地は、脊椎動物化石が多く産出する東京都西側部分に位置している。この地域には上総層群加住層が分布しており、本地域の加住層は下位を山田層、上位を小宮

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Tomioka, Gunma 370-2345 Japan

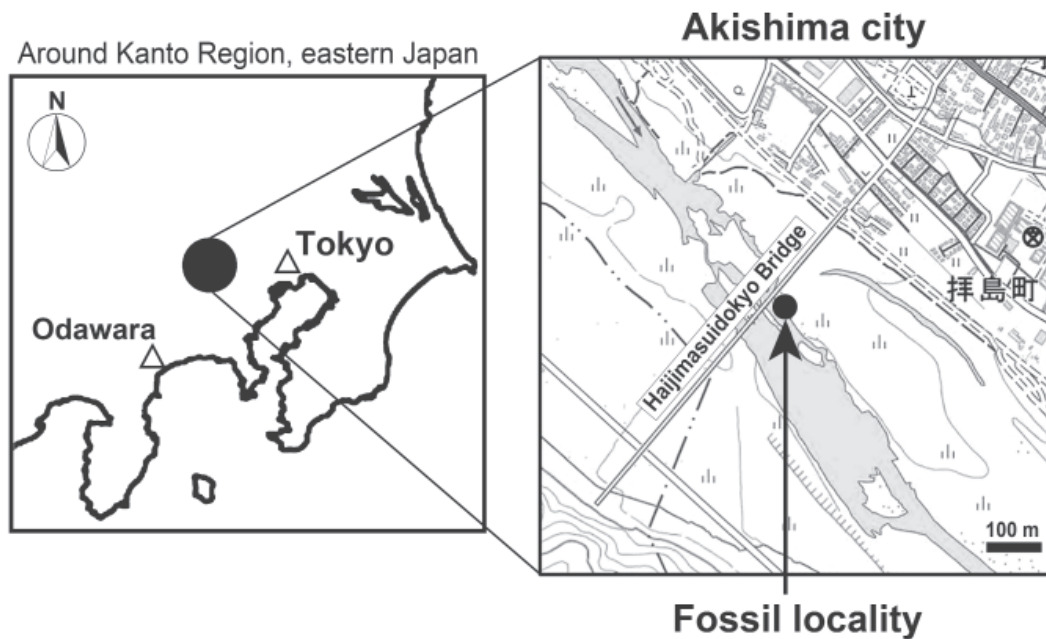


Fig. 1. Fossil locality (35° 42' 11'' N; 139° 20' 18'' E; WGS84 datum) of KPM-NNV 752 (*Cervus* sp.) (after a map of Geospatial Information Authority of Japan).

図 1. KPM-NNV 752 (シカ属未定種 *Cervus* sp.) の産出地点 (35° 42' 11'' N; 139° 20' 18'' E; 世界測地系) の位置図 (国土地理院地図を改変)。

層で挟まれている (植木・酒井, 2007; 植木ほか, 2013)。加住層は全般に下位では巨礫が多く上位になるにつれて細礫が卓越してくる。また、砂・泥の層は下位では少なく、上位に向かうほど多くなる。また、加住層は全体的に脊椎動物化石が多産し、特に本化石産地では、加住層の中でも特に多くの脊椎動物化石が産出している。例えば、エゾジカ比較種 (“*Cervus* cf. *yesoensis*”; 大西, 1940)、オオカミ (*Canis* (*Xenocyon*) *falconeri*; 小泉, 2003)、ハチオウジゾウ (*Stegodon protoaurorae*; Aiba *et al.*, 2010)、およびアケボノゾウ (*Stegodon aurorae*; 福嶋・小泉, 2009) などが報告されている。なお、ここからはシフゾウ属未定種 *Elaphurus* sp. らしき標本の産出も報告されている (樽・長谷川, 2002) が、この標本の属の同定がまだ確定できないので、ここでは議論に含めない。

産 状

本論文で記載する化石は、地層中で、2000 年に産出したシカ類の下顎骨 (小泉明裕博士個人蔵; 小泉, 2017) を起点に、半径 2 m 程度の範囲内に中手骨、橈骨、尺骨、不明骨、脛骨が散らばって保存されていた (図 2)。そのうち橈骨、尺骨、中手骨は同じ母岩から産出している。不明骨に関しては、共著者の 1 人である福嶋の野帳に橈骨、尺骨と同程度の大きさの骨であると記されていたが、現在の所在は不明である。これらの骨化石は全て同じ層準から産出し、部位が重複していな

い事から、同一個体に属するものであると考えられる。上述の下顎骨はその約 10 cm 上位のほぼ同じ層準内から産出している (福嶋, 2009)、サンバーとして紹介されているが (小泉, 2017)、この下顎骨の標本が本論文で記載している標本と同一個体のものかどうかは、小泉 (2017) が掲載した写真では詳細が確認できず、実物化石を確認できていないため、現在のところ不明である。

記 載

シカ科 Family *Cervidae* Goldfuss, 1820

シカ属 Genus *Cervus* Linnaeus, 1758

シカ属未定種 *Cervus* sp.

(図 3–5, 7D, 8F)

標本: KPM-NNV 752、同一個体の右橈骨、右尺骨、左中手骨、および遠位部のない左脛骨。KPM-NNV は神奈川県立生命の星・地球博物館の標本番号。

保管場所: 神奈川県立生命の星・地球博物館 (神奈川県小田原市)。

産出地点: 東京都昭島市拝島町にある拝島水道橋下流付近の多摩川河床 (左岸) (図 1; 35° 42' 11'' N; 139° 20' 18'' E; 世界測地系) (福嶋・岡村, 2009; 松川ほか, 2016)。

層準と時代: 上総層群加住層、前期更新世 (約 2.00–1.95 Ma: 植木・酒井, 2007; 多摩川中上流域上総層群調査研究プロジェクト実行委員会,

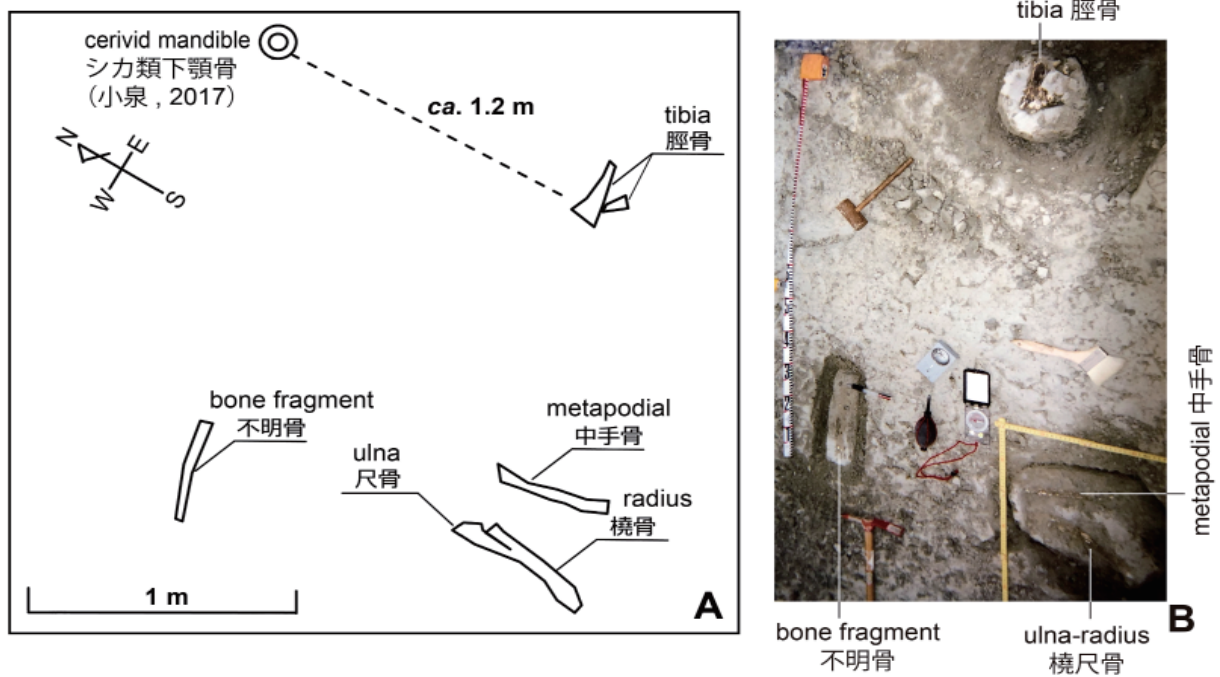


Fig. 2. Mode of occurrence of KPM-NNV 752 (*Cervus* sp.). A: sketch; B: photo.

図 2. KPM-NNV 752 (シカ属未定種 *Cervus* sp.) の産状のスケッチ (A) と写真 (B).

2020; 福嶋・岡村, 2009)。

計測値：表 1 に示す。骨の計測部位は、樽野ほか (2017) にしたがった (図 6)。

記 載

KPM-NNV 752 は、層理面上でおおよそ地層の上下方向あるいは斜め上下方向に強く押しつぶされて変形している。骨端の癒合が完全ではないことから、おそらく垂成獣である。

右橈骨および右尺骨 (図 3) は、互いに一部癒合した状態で保存されている。全体的に強く圧密を受けており、特に骨体中央部や肘頭付近の厚さは 2–3 mm 程度にまで圧縮されている。そのため、近位関節面における鈎状関節突起などの情報は全て失われており、滑車切痕の痕跡が観察できるのみである。尺骨が遠位端に向かって細くなっており、橈骨とも密に癒合している。さらに、橈骨頭窩が平坦な楕円状をしており、関節面の後位縁において尺骨の外側鈎状突起に対応する切れ込みが確認できる。

左中手骨 (図 4) は、骨体中央から外側面にかけて前後方向に大きく圧密を受けており、前後方向の厚さが半分程度になっている。この圧密を受けているため、遠位関節面では並列滑車が内側面に向かって約 30° 傾いているように変形している (図 4F)。近位関節面では上下にやや圧縮を受けているが、傾きは見られない (図 4E)。大きさは中程度であり、最大保存長は 211 mm である。近位端最大幅は 26.7 mm、近位端最大矢状長は

13.9 mm である。また遠位端最大幅は 26.3 mm、遠位端最大矢状長は 13.4 mm である。遠位関節面においては前位面から後面にかけて縦稜の痕跡があるが、あまり発達していない。滑車間切痕は深く、不明瞭ではあるが切れ込みが骨体付近まで伸びている。

左脛骨 (図 5) は、非常に保存状態が悪く、近位端・遠位端ともに欠損している。脛骨体は近位部で三角柱状である。脛骨粗面が外側面 (左側) に対して倒れている。残存部の最大長は 249 mm であるが、全長を復元した場合はもう少しだけ長くなる。

比較と議論

本標本は、第 III 中手骨と第 IV 中手骨が完全に癒合しているので反芻類のものである。また骨体がウシ科に比べ細く長いことから、シカ科のものである。本標本の形態や大きさは、現生ニホンジカのもので基本的によく一致し、シフゾウ属やサンバーのものより小さい (表 1) ことから、シカ属のものであると判断した。

橈骨について、現生のニホンジカおよびサンバーでは橈骨頭窩が弧を描いているが、現生シフゾウの橈骨は、橈骨頭窩が弧を描いておらず、前位面に対して伸びるような形状をしている点で、本標本とは異なる (図 7)。化石種のカズサジカでは琵琶湖博物館の標本 (LBM-0142000803) が



Fig. 3. *Cervus* sp., KPM-NNV 752, a right radius and ulna, from the Pleistocene Kasumi Formation, Japan. A: anterior view; B: posterior view; C: medial view; D: lateral view.

図3. シカ属未定種 *Cervus* sp., KPM-NNV 752, 右橈骨および右尺骨. 東京都昭島市の加住層上部(下部更新統)産. A: 前面観; B: 後面観; C: 内側面観; D: 外側面観.

橈骨及び尺骨が上腕骨と関節していたため、今回は観察できなかった。

中手骨では、現生シフゾウおよび化石種カズサジカの中手骨は、骨体が遠位部の滑車間にせり出し、滑車間切痕が浅くなっている点で、本標本とは異なる(図8)。サンバーでは滑車間切痕が骨

体付近で円状に膨らむが、KPM-NNV 752 では該当部分が不明瞭であるため比較できない。KPM-NNV 752 は全長 213 mm でカズサジカ、ニッポンチタル、シフゾウよりも小さく、ニホンジカおよびサンバーと同程度の大きさである(表1)。また高桑(1997)では骨体最小幅と骨体最小矢

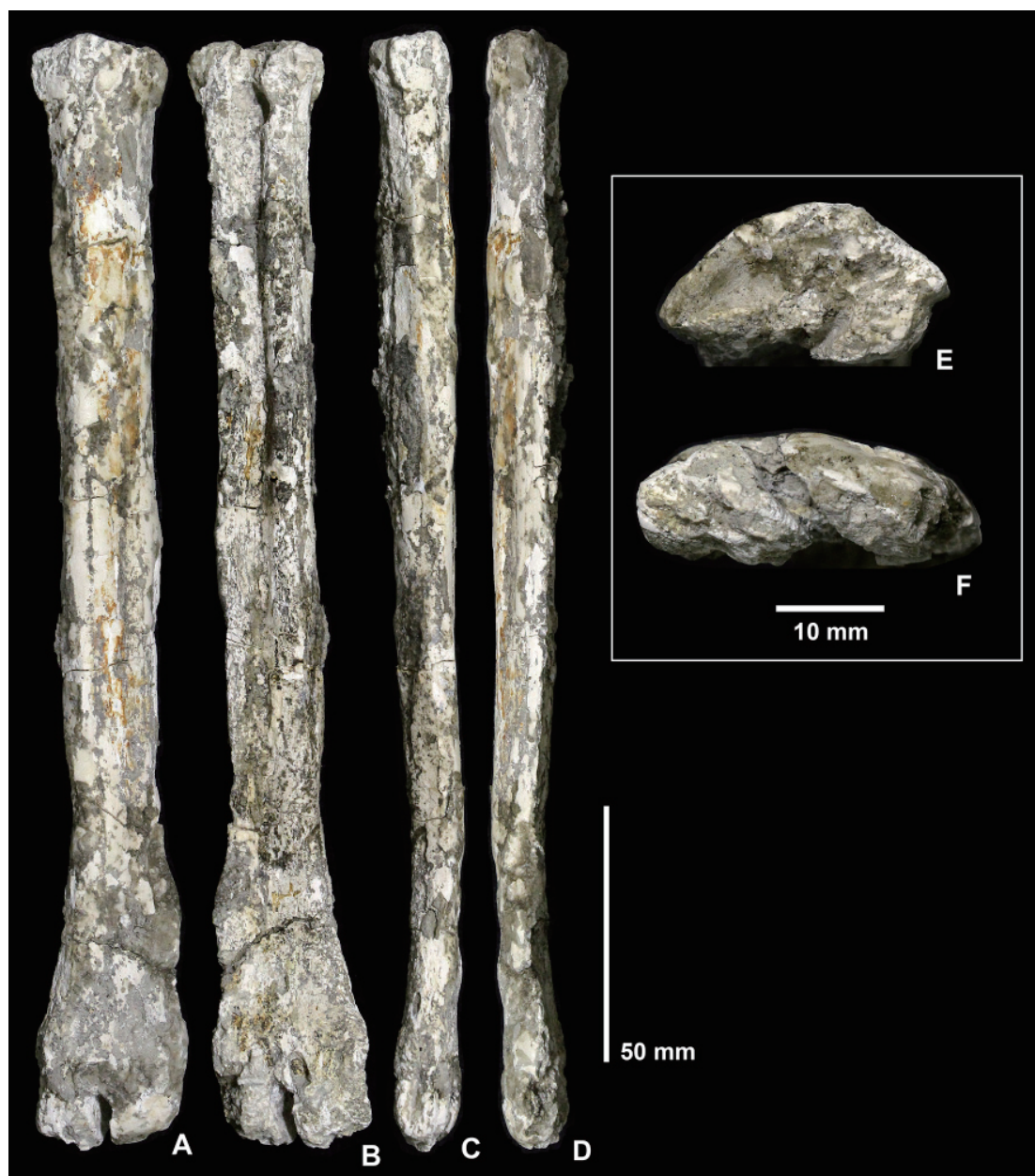


Fig. 4. *Cervus* sp., KPM-NNV 752, a left metapodial, from the Pleistocene Kasumi Formation, Japan. A: anterior view; B: posterior view; C: medial view; D: lateral view.

図4. シカ属未定種 *Cervus* sp., KPM-NNV 752, 左中手骨. 東京都昭島市の加住層上部（下部更新統）産. A: 前面観; B: 後面観; C: 内側面観; D: 外側面観; E: 近位面観; F: 遠位面観.

状長を比較していたが、昭島標本においては前後に強く変形していたため比較することが出来なかった。

左脛骨は、状態が悪いためシカ科他種との形態比較が困難であるが、産出状況からシカ科であると考え。残存部の最大長は249 mmであり、復元すれば、おそらくニホンジカの中のホンシュウジカ *Cervus (Sika) nippon centralis* の脛骨長 (291 mm) と同じ程度になると考えられる (表1)。

上記の比較検討により、KPM-NNV 752 はシカ属のものであり、中でもニホンジカのものに近いと考えられる。ただし、本標本の形態的情報が限られるため、種の同定まではできなかった。

おわりに

KPM-NNV 752 の化石産地である拝島町の拝島水道橋付近の加住層からは、他にもオオカミ、シフゾウ属、カズサジカ、アケボノゾウなどの脊椎動物化石や足跡の化石が発見されている (樽・長谷川, 2002; 小泉, 2003; 福嶋, 2009; 多摩川足跡化石調査団・昭島市教育委員会, 2002; 福嶋・小泉, 2009)。しかし、シカ科化石においてはいずれも角化石が同定されていたのみで、四肢骨化石が詳しく同定されたことはなかった。したがって、本報告はこの化石産地から初めてのシカ科四肢骨化石の記載研究である。今後、この産地からその



Fig. 5. *Cervus* sp., KPM-NNV 752, a left tibia, from the Pleistocene Kasumi Formation, Japan. A: medial view; B: posterior view; C: proximal view.

図 5. シカ属未定種 *Cervus* sp., KPM-NNV 752, 左脛骨. 東京都昭島市の加住層上部（下部更新統）産. A: 内側面観（ややねじれた位置を見ている）; B: 後位面観; C: 近位面観.

他のシカ科化石が産出し、報告されることで、加住層の化石シカ科相の全容が明らかになるものと期待できる。

謝 辞

比較標本の観察において、滋賀県立琵琶湖博物館、愛媛県立とべ動物園、大阪市立自然史博物

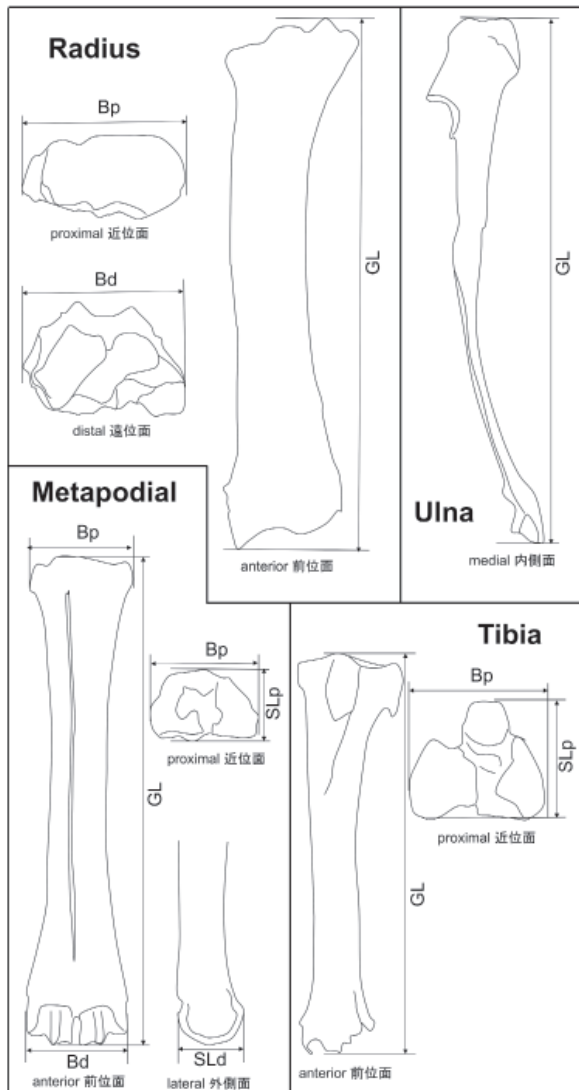
館、広島市安佐動物公園、楠橋 直博士（愛媛大学）および村上達郎氏（愛媛大学／佐賀県立宇宙科学館）にお世話になった。また、比較標本の標本番号について、伊左治鎮司博士（千葉県立中央博物館）にお世話になった。

Table 1. Measurements (in mm) of the metapodial, radius, ulna, and tibia of KPM-NNV 752 and comparative cervid species

表 1. KPM-NNV 752 および比較したシカ科各種の中手骨, 橈骨, 尺骨, 脛骨の計測値 (単位は mm)

species/subspecies name 種/亜種名 Japanese name 和名	specimen number 標本番号	metapodial 中手骨							ulna 尺骨		radius 橈骨				tibia 脛骨				reference 出典
		L/R	GL	Bp (BP)	SLp (BP2)	BD (SD)	Bd (BD)	SLd (BD2)	L/R	GL	L/R	GL	Bp	Bd	L/R	GL	Bp	SLp	
<i>Cervus</i> sp. シカ属未定種	KPM-NNV 752	L	213	26.7	13.9	21.3	26.3	13.4	R	255	R	222	33.8	16.5	L	249+	54.0	41.8	本論文
	TRMS-IV-17	L	233	30.6	20.3	20.8	34.4	19.2	—	—	—	—	—	—	—	—	—	—	高桑 (1997)
<i>Cervus (Nipponicervus) kazusensis</i> カズサシカ	LBM-0142000803	R	232	36.0	22.8	—	40.3	22.9	R	290	R	252	—	—	L	265	59.0	70.0	本論文
<i>Cervus (Nipponicervus) praenipponicus</i> ニホンムカシジカ	TUM-IGPS 65538	?	232	29.0	20.7	18.3	30.0	19.0	—	—	—	—	—	—	—	—	—	—	Shikama (1949)
		?	193	29.2	21.0	20.3	33.6	20.5	—	—	—	—	—	—	—	—	—	—	
		?	—	—	—	19.7	32.8	21.7	—	—	—	—	—	—	—	—	—	—	
		?	—	29.0	21.0	15.8	—	—	—	—	—	—	—	—	—	—	—	—	
		?	—	30.4	23.3	21.4	—	—	—	—	—	—	—	—	—	—	—	—	
	CBM-PV 8323-8	L	183	28.8	19.9	18.1	30.0	19.0	—	—	—	—	—	—	—	—	—	—	市原化石シカ研究グループ (1994)
	NSM-PV 15451	?	211	32.1	24.0	30.3	34.9	19.2	—	—	—	—	—	—	—	—	—	—	高桑 (1997)
<i>Cervus (Axis) japonicus</i> ニッポンチタール	KUM-GK-M1060	R	295	42.5	31.7	26.0	47.4	31.3	—	—	—	—	—	—	—	—	—	—	Otsuka (1967)
	KUM-GK-M1045	L	262	40.5	30.5	20.3	43.1	29.2	—	—	—	—	—	—	—	—	—	—	Otsuka (1967)
<i>Cervus (Sika) nippon yezoensis</i> ニホンシカ (エゾシカ)	OMNH-Z05-149	L	221	32.1	23.2	18.2	33.3	22.8	L	261	R	241	43.6	39.6	R	334	64.6	58.3	本論文
	NSM-PO 01	?	208	30.6	21.6	17.2	30.7	16.5	—	—	—	—	—	—	—	—	—	—	高桑 (1997)
	NSM-PO 02	?	220	30.3	22.3	17.6	31.3	20.3	—	—	—	—	—	—	—	—	—	—	高桑 (1997)
<i>Cervus (Sika) nippon centralis</i> ニホンシカ (ホンシュウシカ)	OMNH-M-353	L	193	28.9	20.8	17.0	29.6	20.8	R	254	R	202	38.5	34.2	R	291	59.4	54.8	本論文
	NSM-PO 10	?	208	28.8	20.9	17.3	28.2	19.5	—	—	—	—	—	—	—	—	—	—	高桑 (1997)
<i>Elaphurus davidianus</i> シフゾウ	AZP-no number	L	245	44.9	30.7	26.2	48.9	30.6	R	360	R	290	55.6	55.1	L	379	86.9	76.1	本論文
<i>Rusa unicorn</i> サンバー	AZP-no number	L	244	42.1	27.0	23.7	43.4	27.9	R	350	R	270	60.3	53.1	L	362	82.0	71.6	本論文
	LBM-1900000154	R	232	44.4	31.7	—	40.0	27.5	L	259	L	203	42.0	31.9	—	—	—	—	本論文

部位の略号: L, 左; R, 右; GL, 最大長; Bp, 近位端最大幅; SLp, 近位端最大矢状長; BD, 骨体最小幅; Bd, 遠位端最大幅; SLd, 遠位端最大矢状長 (図 6; 樽野ほか, 2017). 中手骨の括弧内の略号は, 高桑 (1997) で使用された略号. 標本所蔵機関の略号: KPM, 神奈川県立生命の星・地球博物館; TRMS, 立川市歴史民俗資料館; LBM, 滋賀県立琵琶湖博物館; TUM, 東北大学総合学術博物館; CBM, 千葉県立中央博物館; NSM, 国立科学博物館; KUM, 九州大学総合研究博物館; OMNH, 大阪市立自然史博物館; AZP, 広島市安佐動物公園.



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Fig. 6. Measurement points of the radius, ulna, metapodial, and tibia (after Taruno *et al.*, 2017).

図 6. 橈骨, 尺骨, 中手骨, 脛骨のそれぞれの計測部位 (樽野ほか, 2017 を改変). 略号: GL, 最大長; Bp, 近位端最大幅; SLp, 近位端最大矢状長; BD, 骨体最小幅; Bd, 遠位端最大幅; SLd, 遠位端最大矢状長.

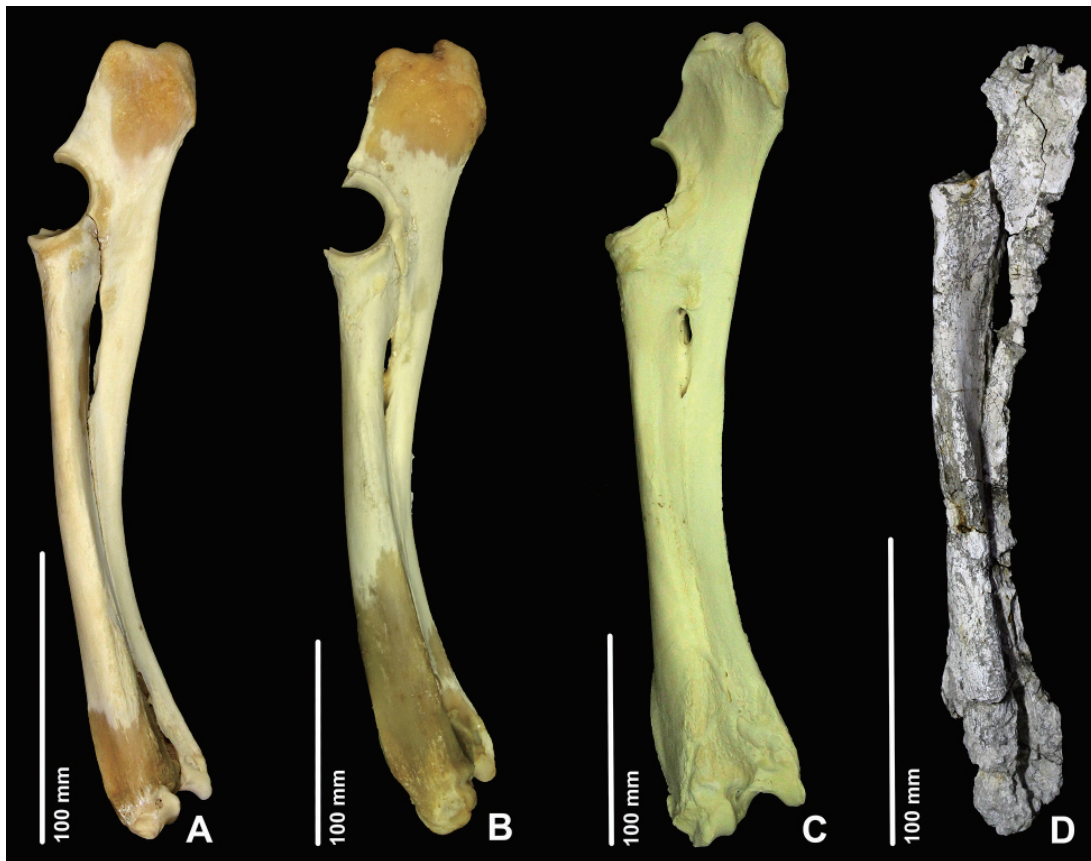


Fig. 7. Comparison of radius-ulna of some cervid species in medial view. A: *Cervus (Sika) nippon*; B: *Rusa unicolor*; C: *Elaphurus davidianus*; D: KPM-NNV 752 (*Cervus* sp.). See institutional abbreviations in Table 1.

図 7. シカ科橈骨および尺骨の側面観の比較. A: ニホンジカ *Cervus (Sika) nippon* (標本番号: OMNH-M-353). B: サンバー *Rusa unicolor* (標本番号: AZP-no number). C: シフゾウ *Elaphurus davidianus* (標本番号: AZP-no number). D: KPM-NNV 752 (シカ属未定種 *Cervus* sp.). 標本番号の所蔵機関の略号は表 1 を参照.

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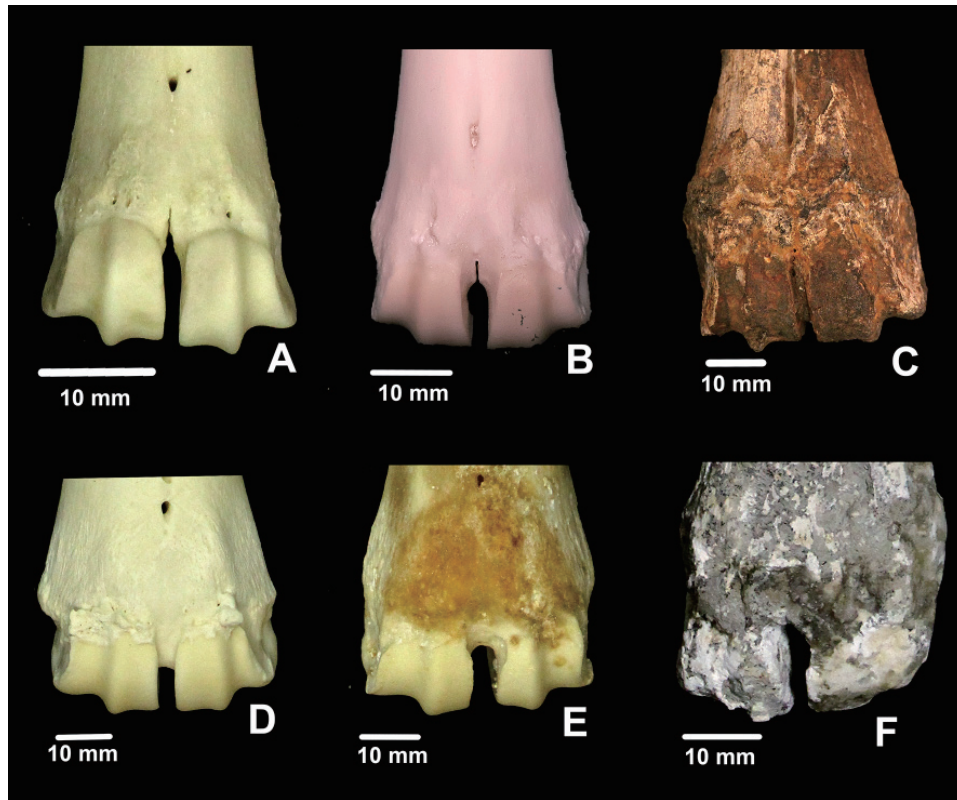


Fig. 8. Comparison of distal metapodial of some cervid species in anterior view. A: *Cervus (Sika) nippon*; B: *Cervus (Sika) nippon centralis*; C: *Cervus (Nipponicervus) kazusensis*; D: *Elaphurus davidianus*; E: *Rusa unicolor*; F: KPM-NNV 752 (*Cervus* sp.). See institutional abbreviations in Table 1.

図 8. シカ科中手骨遠位関節面の前面観の比較. A: ニホンジカ *Cervus (Sika) nippon* (標本番号: OMNH-M-353). B: ホンシュウジカ *Cervus (Sika) nippon centralis* (前田個人標本, 標本番号無し). C: カズサジカ *Cervus (Nipponicervus) kazusensis* (標本番号: 01420008039). D: シフゾウ *Elaphurus davidianus* (標本番号: AZP-no number). E: サンバー *Rusa unicolor* (標本番号: AZP-no number). F: KPM-NNV 752 (シカ属未定種 *Cervus* sp.). 標本番号の所蔵機関の略号は表 1 を参照.

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摘 要

前田大智・樽 創・福嶋 徹・高栞祐司・鏑本武久, 2021. 東京都昭島市の下部更新統加住層 (上総層群) から産出したシカ属の化石. 神奈川県立博物館研究報告 (自然科学), (50): 21-29. [Maeda, D., H. Taru, T. Fukushima, Y. Takakuwa & T. Tsubamoto, 2021. Fossils of *Cervus* sp. from the lower Pleistocene Kasumi Formation of the Kazusa Group, Akishima, Tokyo, Japan. *Bull. Kanagawa Pref. Mus. (Nat. Sci.)*, (50): 21-29.]

東京都昭島市拝島町に分布する上総層群の下部更新統加住層 (約 2.00-1.95 Ma) から産出したシカ属未定種 *Cervus* sp. の四肢骨化石を記載した。本化石は、同一個体の右橈骨、右尺骨、左中手骨、左脛骨の化石からなり、骨端の癒合が完全ではないことから、おそらく亜成獣である。この化石の形態や大きさは、シカ属のものと基本的によく一致し、その中でもニホンジカ *Cervus (Sika) nippon* のものによく似ていて、シフゾウ *Elaphurus davidianus* のものよりもサイズが小さい。

原著論文

静岡県沖から得られたホウボウ科魚類バケソコホウボウの形態変異

Variation in External Morphology and Coloration of *Pterygotrigla cajorarori* (Triglidae) from the Coast off Shizuoka Prefecture, Japan矢頭卓児¹⁾・手良村知功²⁾・江藤 暁³⁾・瀬能 宏⁴⁾Takuji YATO¹⁾, Akinori TERAMURA²⁾, Akira ETO³⁾ & Hiroshi SENOU⁴⁾

Abstract. Two specimens of *Pterygotrigla cajorarori* Richards and Yato, 2012 (Perciformes: Scorpaenoidei: Triglidae) were collected from the Pacific coast, off Shizuoka Prefecture, one from Suruga Bay, and the other from Enshu Nada, Japan. The specimen from Enshu Nada is small (152.8 mm in standard length), lacking hyper-ossification on the rostral projection, and having characteristic coloration of small yellow ocelli scattered on the dorsal surface of the body and a small black blotch on the membrane between the second to third and the third to fourth rays of the second dorsal-fin. Until recently, this species had been collected in Japan only from Kochi Prefecture but, in the recent two years, it has been collected from Shizuoka Prefecture. We consider that this species has extended its distribution northward as a result of the increase in marine temperature. The specimen from Suruga Bay represents the northernmost distribution of this species.

Key words: coloration, Enshu Nada, northernmost distribution

緒 言

ホウボウ科ソコホウボウ属 *Pterygotrigla* Waite, 1899 は、第2背鰭基底に沿った骨質板を欠くこと、吻突起は左右1対の明瞭な棘をもつことを特徴とし、インドー太平洋の熱帯から温帯域に分布し、これまでに30有効種が報告されている (Fricke *et al.*, 2020)。このうち日本周辺には以下の7種が分布する (Richards *et al.*, 2003; Richards & Yato, 2012, 2014; 山田・柳下, 2013; 矢頭ほか, 2020) : ソコホウボウ *Pterygotrigla hemisticta* (Temminck

& Schlegel, 1843)、リュウキュウソコホウボウ *Pterygotrigla ryukyuensis* Matsubara & Hiya, 1932、ハナナガソコホウボウ *Pterygotrigla macrorhynchus* Kamohara, 1936、オニソコホウボウ *Pterygotrigla multiocellata* (Matsubara, 1937)、ウロコソコホウボウ *Pterygotrigla macrolepidota* (Kamohara, 1938)、ヒメソコホウボウ *Pterygotrigla multipunctata* Yatou & Yamakawa, 1983、およびバケソコホウボウ *Pterygotrigla cajorarori* Richards & Yato, 2012。

2019年10月26日に沼津市戸田町主催でおこなわれた駿河湾産深海魚撮影会において 第3著

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者の江藤により本種の1個体が採集されたが、これは本種の北限記録を更新した。また、2020年2月に静岡県遠州灘で操業された底曳網漁獲物から、第2著者の手良村が本種の1個体を拾得した。遠州灘産の標本の標準体長は152.8 mmで、オーストラリア東海岸から得られた標本CSIRO H719-18、標準体長131.0 mm (Richards & Yato, 2012)、台湾から報告された標本NMMB-P27506、標準体長145.0 mm (Yato, 2019)の次に小さい。本研究で調べた2標本の骨化過剰形質をこれまでに報告された標本と比較するとともに、遠州灘産の標本には体背面の生鮮色彩や第2背鰭に特徴的な色斑がみられたので報告する。

材料と方法

入手した個体は、10%中性ホルマリン水溶液で固定した後、70%エタノール水溶液に置換し、保存した。報告に用いた標本は、いずれも神奈川県立生命の星・地球博物館の魚類標本資料 (KPM-NI) として保管されている。なお、同館の資料番号は、電子台帳上では桁を埋めるための0を付加した7桁の数字で表現するが、本稿では0を省略した資料番号として本質的な有効数字で表記した。

標本の計数・計測はYato & Heemstra (2019)にしたがった。計測にはデジタルノギスを用い、0.1 mmまで測定した。標準体長はSL、頭長はHLと略記した。脊椎骨は軟X線写真を撮影して計数した。

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結 果

バケソコホウボウ

Pterygotrigla cajorarori Richards and Yato, 2012

(Figs. 1–4, Table 1)

記載標本

KPM-NI 56583、152.8 mm SL、静岡県遠州灘沖、34°11.28'N, 137°29.04'E、水深312–336 m、底曳網、2020年2月12日；KPM-NI 58680、231.2 mm SL、静岡県駿河湾、2019年10月26日。

記 載

KPM-NI 58680は左側の主鰓蓋骨と上膊棘に奇形がみられるため、この部分は右側を観察した。また、計数・計数値や形質の記載はKPM-NI 56583についておこない、KPM-NI 58680が異なる場合は括弧で示した。

計数形質：背鰭鰭条数 VII-12 (KPM-NI 58680ではVIII-11)、臀鰭鰭条数12、尾鰭分枝鰭条数9、遊離鰭条を含む胸鰭鰭条数15、腹鰭鰭条数 I, 5、背鰭基底に接する骨質板数9 (10)、右側第1鰓弓の鰓耙数1+5、脊椎骨数 (尾部棒状骨を含む) 10+17=27。

体各部測定値のSLに対する割合 (%)：頭長38.2 (37.0)；体高25.7 (23.6)；体幅19.0 (18.0)；第1背鰭前長43.6 (41.7)；臀鰭前長59.4 (57.0)；



Fig. 1. Lateral view of *Pterygotrigla cajorarori*, KPM-NI 56583, 152.8 mm SL, in fresh condition. Photo by Senou.

図1. バケソコホウボウ (鮮時；側面)，KPM-NI 56583、標準体長152.8 mm、瀬能 宏撮影。



Fig. 2. Lateral view of *Pterygotrigla cajorarori*, KPM-NI 56583, 152.8 mm SL, in alcohol. Photo by Yato.

図2. バケソコホウボウ（アルコール液浸標本；側面），KPM-NI 56583, 標準体長 152.8 mm, 矢頭卓児撮影．



Fig. 3. Inner surface of pectoral fin of *Pterygotrigla cajorarori*, KPM-NI 56583, 152.8 mm SL, in fresh condition. Photo by Senou.

図3. バケソコホウボウの胸鰭内面（鮮時），KPM-NI 56583, 標準体長 152.8 mm, 瀬能 宏撮影．

尾柄長 14.6 (15.9) ; 尾柄高 6.2 (5.4) ; 第1背鰭基底長 17.4 (19.9) ; 第2背鰭基底長 23.8 (24.0) ; 臀鰭基底長 27.4 (29.1) ; 胸鰭長 32.7 (31.9) ; 最長胸鰭遊離軟条長 26.4 (23.1) ; 腹鰭長 23.0 (20.2)。

頭各部測定値のHLに対する割合(%) : 頭高 56.0 (57.3) ; 頭幅 49.0 (49.8) ; 吻長 48.5 (49.0) ; 眼窩長 25.7 (24.0) ; 両眼間隔 33.0 (31.7) ; 上顎長 35.3 (34.4) ; 下顎長 43.0 (38.1)。

頭部はやや大きく、吻突起は背腹方向に扁平で（骨化過剰により膨らんで）幅広く、先端は2尖頭である。吻はやや長い。鋤骨歯がある。両顎歯は絨毛状で歯帯を形成する。口蓋骨に歯はない。上顎後端は眼窩前縁下よりかなり前方に位置する。眼はやや小さく、小さな上後頭骨棘がある（上後頭骨棘はない）。後頭骨棘と上膊棘は強大で、その後端はそれぞれ第1背鰭第3棘起部下に、



Fig. 4. Lateral view of *Pterygotrigla cajorarori*, KPM-NI 58680, 231.2 mm SL, in alcohol. Photo by Yato.

図4. バケソコホウボウ（アルコール液浸標本；側面），KPM-NI 58680, 標準体長 231.2 mm, 矢頭卓児撮影．

Table 1. Meristic and morphometric characters of *Pterygotrigla cajorarori*表 1. バケソコホウボウ *Pterygotrigla cajorarori* の計数値および計測値

	NMMB-P 27506	NMMB-P 30781	BSKU 39887	BSKU 105065	BSKU 125343	KPM-NI 58680	KPM-NI 56583
Counts							
1st Dorsal fin spines	8	7	8	7+1*	8	8	7
2nd Dorsal fin rays	11	11	11	12	11	11	11
Anal fin rays	12	12	12	12	12	12	12
Pectoral fin rays	15	15	15	15	15	15	15
Pelvic fin rays	1,5	1,5	1,5	1,5	1,5	1,5	1,5
Caudal fin rays (branched)	5+4	5+4	5+4	5+4	5+4	5+4	5+4
L.L.Scales	56	53	56	57	55	57	57
Bony plates	10	10	10	10	10	10	9
Gill-rakers	2+5	-	1+6	-	0+6	1+5	1+5
Vertebræ with urostyle	-	-	10+17	11+17	10+17	10+17	10+17
Measurements (mm)							
Total length	178.0	326.0	244.5	298.0	293.8	277.0	187.0
Standard length	145.0	275.0	197.3	246.0	247.0	231.2	152.8
% of Standard length							
Length to 1st dorsal fin insertion	45.1	42.2	42.7	41.5	41.1	41.7	43.6
Length to 2nd dorsal fin insertion	64.6	60.7	63.2	61.0	62.3	62.4	62.0
Length to pectoral fin base	39.9	34.9	38.1	33.8	34.3	35.8	37.3
Length to pelvic fin base	33.4	29.6	32.2	29.1	28.4	30.4	31.3
Length to anal fin insertion	58.8	55.6	59.7	56.5	59.6	57.0	59.4
Body depth in front of 1st dorsal	24.8	21.6	25.2	21.7	24.8	23.6	25.7
Body width at cleithral base	18.3	19.1	20.3	18.3	19.5	18.0	19.0
Caudal peduncle length	15.4	16.7	14.3	17.4	16.0	15.9	14.6
depth	5.9	5.7	5.9	5.6	5.7	5.4	6.2
1st Dorsal fin base length	19.6	17.0	18.7	19.4	20.2	19.9	17.4
2nd Dorsal fin base length	21.9	22.8	22.3	24.1	23.2	24.0	23.8
Anal fin base length	26.3	27.1	27.5	26.7	26.2	29.1	27.4
Head length	39.9	36.5	39.0	36.5	35.7	37.0	38.2
Length of 1st detached pectoral fin ray	29.4	22.8	28.1	25.6	25.1	23.1	26.4
Length of 2nd detached pectoral fin ray	25.9	19.5	26.6	23.3	22.6	20.4	22.1
Length of 3rd detached pectoral fin ray	-	14.8	19.6	18.5	17.8	16.2	19.2
Pectoral fin length	35.5	31.7	36.2	29.5	31.9	31.9	32.7
Pelvic fin length	24.5	20.9	24.0	20.9	20.9	20.2	23.0
Length of 1st spine of first dorsal fin	10.4	7.5	8.7	6.4	6.8	-	11.8
Length of 2nd spine of first dorsal fin	14.6	14.9	16.1	15.1	13.2	-	17.1
Length of 3rd spine of first dorsal fin	14.8	16.5	18.1	17.2	15.7	16.1	16.7
Length of 4th spine of first dorsal fin	13.2	-	15.8	15.1	12.8	12.8	11.2
% of Head length							
Head depth at middle of orbit	55.4	53.8	54.9	53.5	56.9	57.3	56.0
Head width at preopercle	45.8	56.0	52.5	51.3	59.3	49.8	49.0
Snout length	48.0	51.1	46.2	50.1	49.7	49.0	48.5
Height of suborbital stay	26.8	29.2	27.6	30.2	27.9	28.5	25.7
Upper jaw length	34.9	31.3	35.8	35.1	35.9	34.4	35.3
Lower jaw length	40.2	40.1	40.4	37.7	41.0	38.1	43.0
Orbit diameter	27.5	23.7	27.6	24.2	25.5	24.0	25.7
Interorbital width	31.6	30.7	30.4	30.8	32.1	31.7	33.0
Opercular spine length	21.4	22.7	21.8	22.2	20.6	22.7	21.4

* indicate with 1 more fixed spine

第4棘（第5棘）起部下に達する。主鰓蓋骨棘は短く、眼窩径長より短い。前鰓蓋骨棘は小さくて、2本（1本）ある。背鰭第2棘と第3棘には骨化過剰がみられ、肥厚する。胸鰭はやや短く、その後端は臀鰭第4鰭条起部上に達する。腹鰭の後端は最長胸鰭遊離軟条の後端を越えない。体表鱗は卵形で後縁は鋭く尖る。項部と胸部には鱗がやや密にある。側線鱗は楕円形で鱗上に複数の小顆粒状突起を備える。

色彩：KPM-NI 56583の生鮮時（Fig. 1）では、

頭部背面と側面は薄い赤色で、腹面は白い。体上半部の地色は薄い赤色で、両背鰭基底部と尾柄部で不明瞭な赤色域が鞍状に広がる。さらに頭部から尾柄にかけての背面に不規則な黄色円斑が散在する。体下半部と腹部は白色。第1背鰭は薄い赤色で、第1-5棘の鰭膜の上半部は暗赤色、黒色斑はない。第2背鰭は上半分が暗赤色で下半分は無色、第2-4鰭条の鰭膜下部にそれぞれ1小黒色斑がある。臀鰭は白色。尾鰭は淡い桃色で、上縁と後縁が僅かに黒い。胸鰭内

面は無色の第9–12 鰭条間と後縁を除いて濃淡のあるくすんだ黒色で、その内部に顕著な黒色斑や白色斑はない。腹鰭は桃色がかった白色。

アルコール液浸標本 (Fig. 2) では、赤色が退色して頭部は黄土色、体上半部は薄い黄土色で両背鰭基底部分と尾柄部で不明瞭な暗色域が鞍状に広がる。体下半部は白色、第1 背鰭の第1–5 棘の鰭膜の上半部は黒色。第2 背鰭は上半分が黒色で、下半分は無色で第2–4 鰭条の鰭膜下部にそれぞれ1 小黒色斑がある。臀鰭は白色。尾鰭は白色で、上下縁と後縁が黒い。胸鰭内面は白色の第9–12 鰭条間と後縁を除いて濃淡のある黒色。腹鰭は白色。

分 布

インド洋東部、オーストラリア東岸、フィリピン東岸、南シナ海、東シナ海 (Richards & Yato, 2012; Yato, 2019) 土佐湾、甲浦沖 (矢頭ほか, 2020)、遠州灘、駿河湾 (本研究)。

比較標本

バケソコホウボウ 5 個体 : BSKU 39887, 197.3 mm SL、高知県甲浦沖、BSKU 105065, 246.0 mm SL、高知県御豊瀬魚市場、BSKU 125343, 247.0 mm SL、高知県御豊瀬魚市場、NMMB-P27506, 145.0 mm SL、台湾屏東縣東港魚市場、NMMB-P30781, 275.0 mm SL、台湾屏東縣東港魚市場。



Fig. 5. Lateral view of *Pterygotrigla cajorarori*, NMMB-P27506, 145.0 mm SL, in fresh condition. Photo by Koeda.

図 5. バケソコホウボウ (鮮時; 側面), NMMB-P27506, 標準体長 145.0 mm, 小枝圭太撮影.



Fig. 6. Dorsal view of *Pterygotrigla cajorarori*, BSKU 125343, 247.0 mm SL, in fresh condition. Photo by Mizowaki.

図 6. バケソコホウボウ (鮮時; 背面), BSKU 125343, 標準体長 247.0 mm, 溝脇一樹撮影.

考 察

今回採集された2標本は、吻突起が背腹方向に扁平で幅広く (KPM-NI 56583)、もしくは骨化過剰により膨らんで幅広く (KPM-NI 58680)、その先端が2尖頭であること、遊離軟条を含む胸鰭鰭条数が15であること、項部と胸部に鱗がやや密にあること、第1背鰭に骨化過剰を起こした棘があることにより、Richards & Yato (2012) と矢頭ほか (2020) の示した *Pterygotrigla cajorarori* バケソコハウボウに一致したため、本種に同定された。

遠州灘から得られた標本 (KPM-NI 56583) はこれまでに確認された本種の標本 (Richards & Yato, 2012; Yato, 2019; 矢頭ほか, 2020) の中では小型で (152.8 mm SL)、北西太平洋産では台湾から報告された標本 (NMMB-P 27506, 145.0 mm SL, Yato, 2019) の次に体長が小さい。矢頭ほか (2020) は 181 mm SL 以上の個体では吻突起がすべて肥厚するが、163 mm SL の個体では吻突起に骨化過剰がみられないとしており、上の2標本も骨化過剰による肥厚はみられず、扁平である。本種の吻突起における骨化過剰は 163 mm SL 以下の個体では起こらず、その後の成長に伴って起こることがより明確になった。一方、背鰭第2棘と第3棘における骨化過剰は KPM-NI 56583 や NMMB-P27506 の小型個体でもみられ、本種を特徴づける形質である。

生鮮時の KPM-NI 56583 では頭部から尾柄にかけての背面に不規則な黄色円斑が散在する。同様な斑紋は南シナ海産の NMMB-P27506 (Fig. 5) と土佐湾産の BSKU 125343 (247.0 mm SL, Fig. 6) でもみられる。この斑紋は液浸標本では消えてしまうが、生鮮時でもこのような斑紋がない個体も多い (Yato, 2019; 矢頭ほか, 2020)。この黄色円斑の有無が個体差によるのか、性差などによるのかはわからない。さらに、KPM-NI 56583 では第2背鰭の第2鰭条と第3鰭条間の鰭膜下部と第3鰭条と第4鰭条間の鰭膜下部にそれぞれ1小黒色斑がある (Fig. 1)。これまでに報告されたバケソコハウボウには全く記載されておらず、また、著者らが直接確認した標本にもみられず (Richards & Yato, 2012; 山田・柳下, 2013; Yato, 2019; 矢頭ほか, 2020)、本標本だけにみられることから、遠州灘での更なる採集が必要と考えられる。

日本での本種の採集は1984年に高知県甲浦沖で捕獲された1個体が最初で、その後の採集記録が無いが、高知市御畳瀬魚市場で2011年と2018年にそれぞれ1個体 (矢頭ほか, 2020)、そして2019年と2020年に1個体ずつ (本研究での報告) が採集されている。わずかではあるが近年の捕獲

個体数が増加しており、本種の北方への分布域の拡大は海水温の上昇に伴うものではないかと考えられる。これまでに報告された本種の北限分布は高知県高知市の御畳瀬魚市場で採集された高知県甲浦沖産の1個体であった (Richards & Yato, 2012; 矢頭ほか, 2020)。駿河湾から採集された KPM-NI 58680 はこれまでに報告された本種の北限記録を更新する。

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矢頭卓児・中山直英・遠藤広光, 2020. ホウボウ科魚類

Pterygotrigla cajorarori Richards and Yato, 2012 バケソ

コホウボウの生鮮時の色彩と骨化過剰の個体変異.

魚類学雑誌, **67**(1): 129–135.

摘 要

矢頭卓児・手良村知功・江藤 暁・瀬能 宏, 2021. 静岡県沖から得られたホウボウ科魚類バケソコホウボウの形態変異. 神奈川県立博物館研究報告 (自然科学), (50): 21–27. [Yato, T., A. Teramura, A. Eto & H. Senou, 2021. Variation in external morphology and coloration of *Pterygotrigla cajorarori* (Triglidae) from the coast off Shizuoka Prefecture, Japan. *Bull. Kanagawa Pref. Mus. (Nat. Sci)*, (50): 31–37.]

静岡県の遠州灘と駿河湾で2個体のバケソコホウボウが採集された。遠州灘で採集された個体は標準体長 152.8 mm の小型個体で、これまでに報告されている小型個体と同様に吻突起に骨化過剰がみられなかった。また、頭部から尾柄にかけての背面に不規則な黄色円斑が散在し、第2背鰭の第2鰭条と第3鰭条間の鰭膜下部と第3鰭条と第4鰭条間の鰭膜下部にそれぞれ1小黒色斑があるなど、色斑に特徴的なものがみられた。本種はこれまで高知県沖からのみ知られていたが、この2年は静岡県沖でも採集されている。本種の分布域の北上は海水温の上昇に伴うものと推測される。駿河湾は本種の北限記録である。

原著論文

小笠原諸島父島から採集されたクチボソボラ *Neomyxus leuciscus* 稚魚とその生物地理学的考察Juvenile of *Neomyxus leuciscus* (Mugilidae) from the Waters around Chichi-jima Island, Ogasawara Islands, with Biogeographical Notes田中翔大¹⁾・斉藤洪成²⁾・瀬能 宏³⁾Shota TANAKA¹⁾, Hironari SAITO²⁾ & Hiroshi SENOU³⁾

Abstract. Three specimens of *Neomyxus leuciscus* (Mugilidae) were collected from the waters around Chichi-jima Island, the Ogasawara Islands. One specimen (38.35 mm SL) provided new knowledge concerning the species' initial morphological features and changes that occur from juvenile to adult: snout becomes relatively longer and teeth increase in number and size with growth. It is considered that these changes reflect the food habits as the species adapts to being a herbivore. Additionally, one specimen (135.25 mm SL) examined in this study suggests that mature individuals may exist in the waters around Chichi-jima Island. These specimens are biogeographically important in indicating that this species is reproducing albeit to a small degree in the waters around Chichi-jima Island.

Key words: Acute-jawed mullet, Bonin Islands, Central Pacific, morphological change, tricuspid teeth

はじめに

ボラ科魚類 Mugilidae は日本近海から 8 属 13 種が知られており (瀬能, 2013)、そのうちのクチボソボラ属 *Neomyxus* Steindachner, 1878 はクチボソボラ *Neomyxus leuciscus* (Günther, 1871) 1 種のみを含む単型属である (Thomson, 1997)。本種は中部太平洋の島嶼域を中心に分布する沿岸性魚類であり (瀬能, 2013; Thomson, 1997)、ハワイでは水産資源として重要である一方 (Gosline & Brock, 1960)、日本国内からの記録は散発的である。

Bryan & Herre (1903) は南鳥島より得られた全長 55.0 mm の本種標本を *Chaenomugil nauticus* として日本から初めて報告した。その後、Zama & Yasuda (1979) は小笠原諸島父島より得られた体長 66.4 mm の標本を *Neomyxus leuciscus* として報告するとともに、和名クチボソボラを提唱した。その後も父島からの記録が続き、瀬能 (1997) のほか、吉郷 (2002) により体長 47.1 mm の個体が報告されたほか、吉郷 (2004) は南大東島において成魚の群れを目視観察した。

今回、小笠原諸島父島において体長 38.35-

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135.25 mm の 3 個体のクチボソボラが得られた。これらの標本は父島における本種の出現状況を考察するうえで重要であると考えられた。さらに、体長 38.35 mm の標本により、本種稚魚の形態についての新知見が得られた。そこで本研究では、クチボソボラの稚魚の形態および成長に伴う形態変化を記載するとともに、小笠原諸島における本種の出現状況および生息場について考察する。

方 法

体各部の名称および計数・計測は Senou *et al.* (1987) に従った。標本の採集は小笠原諸島父島大村湾で手網を用いて行った。計測はノギスを用いて 0.05 mm の精度でおこなった。標準体長 (standard length) は SL と表記した。色の名称は主に財団法人日本色彩研究所 (1995) に従った。本稿で使用した標本は 10 % ホルマリンで固定し、70 % エタノールに置換した後、神奈川県立生命の星・地球博物館の魚類資料 (KPM-NI) として登録した。なお、同館における魚類の標本番号は電子台帳上においてゼロが付加された 7 桁の

数字が便宜的に使われているが、ここでは標本番号として本質的な有効数字で表した。また、本稿で用いた比較標本は京都大学総合研究博物館 (FAKU)、琉球大学理学部海洋自然科学科 (URM) に所蔵されている。

結 果

クチボソボラ

Neomyxus leuciscus (Günther, 1871)

(Figs. 1–A, B, 2–A, B & 3)

調査標本

KPM-NI 50547: 135.25 mm SL, 小笠原諸島父島大村湾, 2018 年 12 月 28 日, 手網, 田中翔大 採集;
KPM-NI 50548: 38.35 mm SL, 小笠原諸島父島大村湾, 2018 年 12 月 30 日, 手網, 田中翔大 採集;
KPM-NI 60181: 78.95 mm SL, 小笠原諸島父島大村湾, 2019 年 12 月 23 日, 手網, 斉藤洪成 採集.

比較標本

FAKU 101001: 191.2 mm SL, ウェーク島, 1963 年

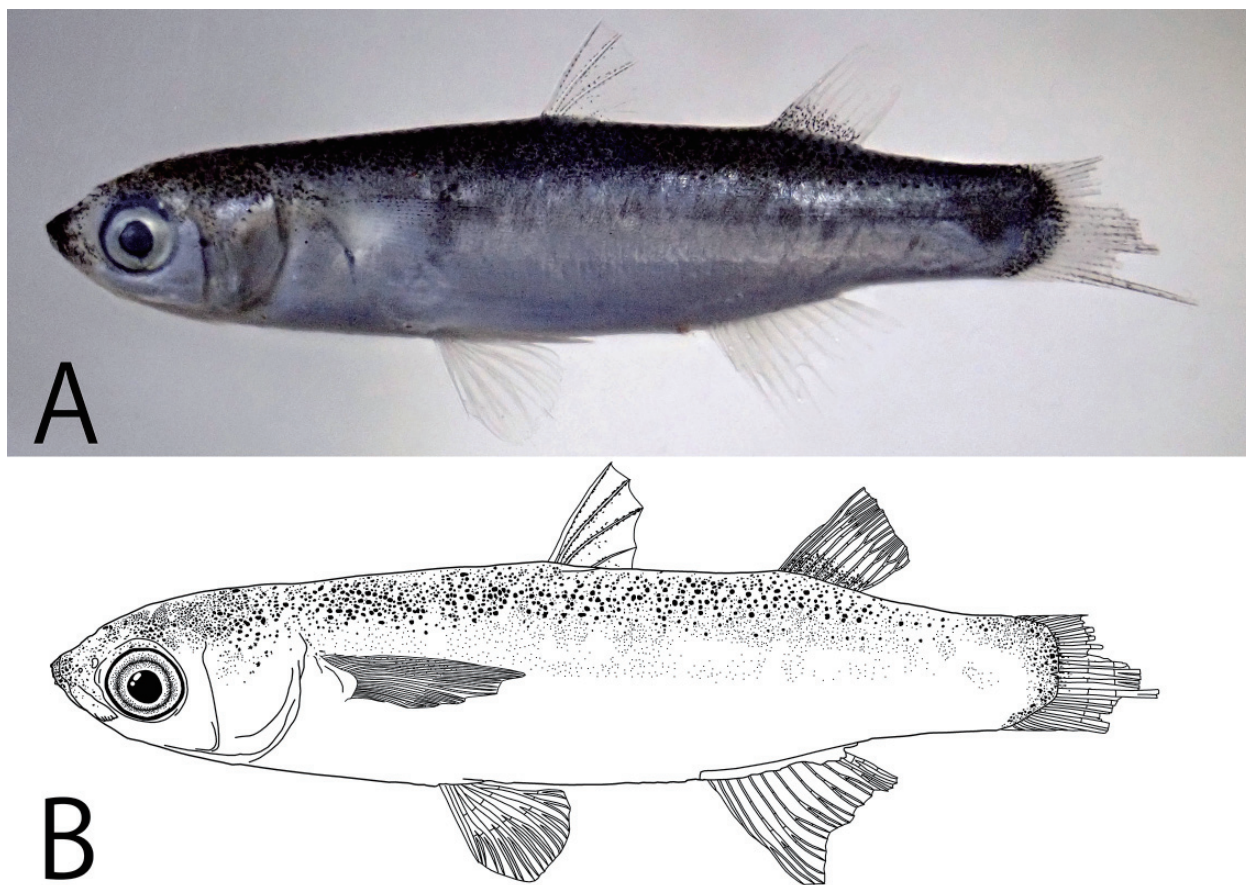


Fig. 1. *Neomyxus leuciscus*, preserved specimen, KPM-NI 50548, 38.35 mm SL. A: photographed (KPM-NR 182276 A) by S. Tanaka; B: drawn by S. Tanaka.

図 1. クチボソボラ *Neomyxus leuciscus*, KPM-NI 50548, 38.35 mm SL. A: 田中翔大 撮影 (KPM-NR 182276 A) ; B: 田中翔大 スケッチ.



Fig. 2. *Neomyxus leuciscus*, preserved specimens. A: KPM-NI 60181, 78.95 mm SL, photographed (KPM-NR 201243 A) by S. Tanaka; B: KPM-NI 50547, 135.25 mm SL, photographed (KPM-NR 182275 A) by S. Tanaka.

図 2. クチボソボラ *Neomyxus leuciscus*, 固定標本, A: KPM-NI 60181, 78.95 mm SL. 田中翔大 撮影 (KPM-NR 201243 A) ; B: KPM-NI 50547, 135.25 mm SL. 田中翔大 撮影 (KPM-NR 182275 A) .

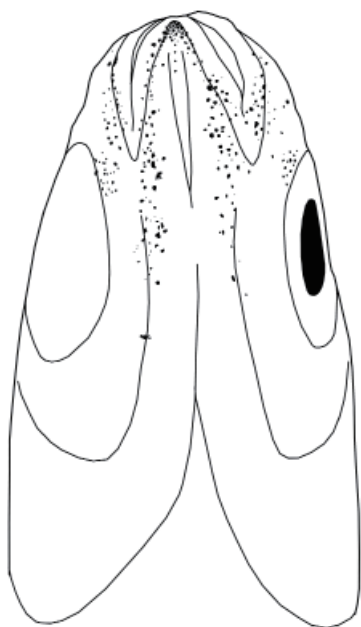


Fig. 3. Melanophore pattern on the ventral surface of the head of *Neomyxus leuciscus*, KPM-NI 50548, 38.35 mm SL. Drawn by S. Tanaka.

図 3. クチボソボラ *Neomyxus leuciscus* 頭部腹面の黒色素胞配列, KPM-NI 50548, 38.35 mm SL. 田中翔大スケッチ.

2-3 月 ; URM-P 15894: 226.3 mm SL, ビキニ環礁, 1985 年 12 月 20 日.

記 載

計数・計測値を Table 1 に示す。78.95–135.25 mm SL では、体は細長い楕円形で、尾柄部は側扁するが、頭部から腹部にかけては丸みを帯びる。体高は第 1 背鰭基部で最大となり、後方にかけて緩やかに低くなる。体腹縁の輪郭は腹部において膨らむ。頭部は三角形で、額の輪郭は直線的。吻端および下顎前端はよく尖る。吻は長く、吻長は眼径より長い。両眼間隔域は広くやや凸状。涙骨下縁は直線状で滑らか。涙骨後縁は鋸歯状。口は端位。主上顎骨後端は後鼻腔の直下に位置し、下方に曲がらずまっすぐで、閉口時に口角部に付着し、涙骨に覆われ外部に露出しない。下唇前縁は下方に向かう。上、下唇は肥厚するが、突起や隆起はない。上顎下縁および下顎上縁に、2-3 列に不規則に並ぶ櫛状歯を備える。歯は細長く内向きに湾曲し、先端で三尖頭となる。両顎間の結合組織には、小型の三尖頭の歯が一行に並ぶ。脂鱗は未発達。鱗は円鱗で、吻を除いた頭部と体全体を

Table 1. Counts and measurements, expressed as percentages of standard length (SL), of *Neomyxus leuciscus*表 1. クチボソボラ *Neomyxus leuciscus* の計数・計測値

	Chichi-Jima Island, Ogasawara Islands, Japan			Wake Island, America	Bikini Atoll, America
	KPM-NI 50548	KPM-NI 60181	KPM-NI 50547	FAKU 101001	URM-P 15894
Standard length (mm)	38.35	78.95	135.25	191.2	226.3
Counts					
Spinous dorsal-fin rays	4	4	4	4	4
Second dorsal-fin rays	10	10	10	10	10
Pectoral-fin rays	16	16	16	15	16
Pelvic-fin spines	1	1	1	1	1
Pelvic-fin rays	5	5	5	5	5
Anal-fin spines	2	2	2	2	2
Anal-fin rays	11	11	10	10	10
Branched caudal-fin rays	6+6	6+6	6+6	6+6	6+6
Lateral scale series	46	46	47	47	48
Transverse scale rows	13	14	13	12	13
Cheek scale rows	4	4	4	4	4
Measurements (% SL)					
Total length	112.4 (damaged)	121.6	125.8	126.8	122.7
Fork length	110.4	119.9	117.5	117.4	115.5
Pre-first dorsal-fin length	51.4	51.1	51.3	55.3	51.7
Pre-second dorsal-fin length	74.3	74.4	73.8	77.6	75.1
Post-first dorsal-fin length	51.9	51.2	50.1	50.8	49.3
Pre-pectoral-fin length	27.9	28.5	27.5	27.2	24.7
Pre-pelvic-fin length	40.3	40.4	40.4	40.5	40.7
Pre-anal-fin length	66.9	68.8	70.7	69.8	73.4
Pre-anus length	64.4	66.1	67.9	65.6	70.7
Caudal-peduncle length	23.3	19.6	20.4	21.2	18.6
Distance between 1st and 2nd dorsal-fins	22.7	23.0	23.0	24.6	23.2
Head length	24.5	27.9	26.0	26.0	23.9
Snout length	7.0	9.3	9.1	9.1	9.1
Post-orbital length	10.8	11.0	10.5	12.0	10.7
Eye diameter	8.2	7.0	7.1	7.0	6.1
Interorbital width	9.0	11.2	11.5	11.0	10.3
Thickness at pectoral-fins	13.7	16.3	15.7	17.1	16.0
Thickness at first dorsal-fin	10.4	13.6	13.5	15.1	15.5
Thickness at second dorsal-fin	7.4	9.8	8.8	11.1	10.6
Distance between anterior and posterior nostrils	1.7	1.4	1.5	1.4	1.4
Width of mouth	4.4	5.2	5.5	5.5	4.6
Thickness of upper lip	1.0	2.1	1.8	2.2	1.6
Lower-jaw length	5.2	6.8	6.5	7.2	6.5
Angle of lower-jaw (°)	50.3	44.5	50.4	44.9	41.9
Depth at mouth corner	8.9	7.7	7.2	9.0	8.2
Depth at eye	14.5	12.8	13.6	13.4	13.0
Depth at pectoral-fin	19.4	20.3	20.0	19.8	19.8
Depth at first dorsal-fin	22.2	23.7	24.0	22.7	26.0
Depth at anal-fin	20.5	20.4	22.7	20.0	20.9
Caudal-peduncle depth	10.8	11.1	11.8	10.6	11.2
Pectoral-fin length	21.9	20.3	20.6	21.2	19.7
Pectoral-fin base length	6.4	5.8	14.0	5.8	6.2
Axillary scale length	6.6	5.0	6.1	6.6	5.3
First dorsal-fin spine length	12.3	12.3	11.6	14.2	12.0
Second dorsal-fin spine length	12.3	11.5	12.0	12.4	11.9
Third dorsal-fin spine length	10.7	9.7	11.0	6.0 (damaged)	9.5 (damaged)
Fourth dorsal-fin spine length	6.1	5.4	7.0	6.8	5.5
First dorsal-fin base length	5.2	4.8	5.4	6.1	4.5
Dorsal obbasal scale length	7.0	6.2	7.8	7.5	6.8
Second dorsal-fin height	13.7	14.2	14.9	15.5	14.1
Second dorsal-fin base length	9.9	10.4	9.9	9.8	8.2
Pelvic-fin length	16.2	16.1	15.7	15.9	14.5
Pelvic obbasal scale length	5.1	3.7	5.9	4.8	4.8
Interpelvic flange length	9.1	6.9	10.5	8.5	8.3
Anal-fin height	16.9	16.1	15.1	16.9	15.1
Anal-fin base length	14.5	13.5	14.2	13.2	11.7

覆い、胸鰭外表面、腹鰭内表面、第1背鰭、第2背鰭、臀鰭、尾鰭の基底付近にも小さな鱗が存在する。ほとんどの体側鱗は単一の伸長した感覚溝を持つ。第1背鰭起部は吻端より尾鰭基部に近位する。第2背鰭起部は臀鰭基底中央部の直上に位置する。胸鰭はやや上位で、基部は腹鰭起部直上より前方に位置する。胸鰭後端は第一背鰭起部直下に達しない。尾鰭は二叉型。

38.35 mm SL では、体は細長く側扁し、頭部から腹部にかけてはやや丸みをおびる。体高は第1背鰭基部で最大となり、後方にかけて緩やかに低

くなる。体腹縁の輪郭は腹部でやや膨らむが直線的。頭部は三角形で、額の輪郭は丸みを帯びる。吻端および下顎前端はあまり尖らない。吻は成魚ほど長くなく、吻長は眼径より短い。両眼間隔域は狭くやや凸状。涙骨下縁は直線状で滑らか。涙骨後縁は鋸歯状。口は端位。主上顎骨後端は後鼻腔の直下に位置し、下方に曲がらずまっすぐで、閉口時に口角部に付着し、涙骨に覆われ外部に露出しない。下唇前縁は下方に向かわない。上、下唇は肥厚するが、突起や隆起はない。上顎下縁および下顎上縁に、1-2列に不規則に並ぶ櫛状歯を

備える。歯は太短く内向きに湾曲し、先端で三尖頭となる。歯の数は少なく、その間隔は疎である。両顎間の結合組織に歯はない。脂脰は未発達。鱗は円鱗で、吻を除いた頭部と体全体を覆い、胸鰭外表面、腹鰭内表面、第2背鰭、臀鰭、尾鰭の基底付近にも小さな鱗が存在するが、第1背鰭の基底付近には存在しない。ほとんどの体側鱗は単一の伸長した感覚溝を持つ。第1背鰭起部は吻端より尾鰭基部に近位する。第2背鰭起部は臀鰭基底中央部よりやや前方に位置する。胸鰭は中位で、基部は腹鰭起部直上より前方に位置する。胸鰭後端は第1背鰭起部直下に達しない。尾鰭は二叉型。

鮮時の体色: 78.95–135.25 mm SL では、体背縁、上唇は青みのグレイ。体側は明るいグレイでグアニン色素に覆われるが、胸鰭基底上部はさえた黄色に覆われる。胸鰭の各鰭条は透明で、鰭膜に黒斑が散在し、上部にかけて密になる。第1背鰭の各鰭条は透明で、鰭膜には微小な黒斑が散在する。第2背鰭の各鰭条は透明で、鰭膜には基底から鰭の中間にかけて黒斑が散在する。腹鰭および臀鰭は透明であるが、各鰭条周辺にわずかに黒斑が散在する。尾鰭は明るいグレイで、先端は黒く縁どられる。

38.35 mm SL では、体側は明るいグレイでグアニン色素に覆われる。黒色素胞は体背縁、吻部、尾鰭基底に多数存在する。頭部腹面にも黒色素胞が見られ (Fig. 3)、眼の前下方、口裂付近に散在するほか、峡部の左右両側に列状に並び、頤部には多くが密集する。その他に、第1背鰭鰭膜上に鰭条を挟み対になって黒色素胞が散在するほか、第2背鰭の基部から中央部にかけて、胸鰭上部、尾鰭基部に黒色素胞が存在する。

70% エタノール保存時の体色: 78.95–135.25 mm SL ではグアニン色素が消失し体は薄いベージュとなる。胸鰭基底の黄色斑は消失する。その他は鮮時の体色と同様。

38.35 mm SL ではグアニン色素が消失することを除き、鮮時の体色と同様。

分 布

本種は日本南部・ハワイ島からトゥブアイ島・デュシー島にかけての中部太平洋に分布しており (瀬能, 2013; Harrison & Senou, 1997)、マリアナ諸島からも知られている (Donaldson *et al.*, 1994)。日本国内からは小笠原諸島父島 (Zama & Yasuda, 1979; 吉郷, 2002; 瀬能, 1997)、南鳥島 (Bryan & Herre; 1903) で記録されている。また、小笠原諸島父島産の個体の標本写真 (KPM-NR 703) がある他、南大東島で目視観察されている (吉郷, 2004)。

考 察

本研究により得られた標本は、上下両唇は肥厚し、突起や隆起がなく、三尖頭の櫛状歯が存在すること、主上顎骨後端は涙骨に覆われ外部に露出しないこと、円鱗を持つこと、縦列鱗数が46–47であること、第2背鰭が10軟条であること、臀鰭が2棘10–11軟条であることからクチボソボラと同定された (瀬能, 2013; Harrison & Senou, 1997; Thomson, 1997; Ghasemzadeh, 2015)。なお、本種と近縁な *Chaenomugil proboscideus* (Günther, 1861) とは、クチボソボラは円鱗である (vs. 櫛鱗である)、櫛状歯の先端が三尖頭である (vs. 二尖頭である) ことから区別できる (Thomson, 1997)。

38.35 mm SL の標本は、他の標本と比較して吻長が短い、体幅が小さく体が側扁する、額の輪郭が丸みを帯びる、下唇前縁は下方に向かわない、体腹縁の輪郭が直線的、第2背鰭起部は臀鰭基底中央部よりやや前方に位置する、胸鰭は中位である、胸鰭基部に黄色斑が現れない、両顎の歯列が少ない、両顎間の結合組織に歯がない、歯の形状は太短いといった形態的特徴が見られた。以上のような形態的差異により、38.35 mm SL の個体は稚魚期であると考えられた。また、頭部腹面の黒色素胞配列はボラ科稚魚の同定形質として古くから用いられており (Koutrakis, 2015)、クチボソボラにおいては頤部に黒色素胞が密集すること、峡部の左右両側に列状に黒色素胞が並ぶことが特徴的で (Fig. 3)、他種との識別形質として有効であると考えられる。

吉郷 (2002) が報告した 47.1 mm SL の個体は、38.35 mm SL の個体と比べて吻長が長く、頭部背縁は直線的となり、体型はより細長くなる。その後成長に従い、吻長、体幅はさらに増大し、体腹縁の輪郭は膨らむようになる。歯の有無や歯列数、形状について、比較標本である 191.2 mm SL (FAKU 101001)、および 226.3 mm SL (URM-P 15894) の個体は歯列数が3–4列とより密になり、歯はより細長くなるため、歯数は成長に伴って増加し、形状は伸長することが分かった。クチボソボラに近縁な *Chaenomugil proboscideus* は、櫛状歯を用いて岩盤上の藻類を削り取り、摂餌することが知られている (Harrison, 1995)。クチボソボラも同様の摂餌様式をとると考えられ、成長に伴って櫛状歯が発達し、岩盤状の藻類を摂餌するのに適した口部形態へと変化させることが予想される。

小笠原諸島父島における本研究を含めたクチボソボラの出現サイズは38.35–135.25 mm SL であり、小型個体に限られる (Table 2)。これらの

Table 2. Standard length of *Neomyxus leuciscus* from Chichi-Jima Island, Ogasawara Islands表 2. 小笠原諸島父島より得られたクチボソボラ *Neomyxus leuciscus* の体長

	KPM-NI 50548	吉郷 (2002)	Zama & Yasuda (1979)	瀬能 (1997)	KPM-NR 703	KPM-NI 60181	KPM-NI 50547
SL (mm)	38.35	47.1	66.4	80.3	84.6	78.95	135.25

標本は河口域あるいは底質が砂地の海岸で採集されているが、上述した通り大型個体は岩盤上の藻類食に適した口部形態を示すため、食性の変化に伴って岩礁海岸へと生息地を移行させると考えられる。そのため、岩礁海岸においてより大型個体の存在が確認される可能性があり、さらなる調査が期待される。クチボソボラの成熟サイズについて調べられた研究は無いが、Schemmel *et al.* (2019) は、ハワイでのクチボソボラの成熟齢、成熟サイズについて、同所に出現するモンナシボラ *Moolgarda engeli* (Bleeker, 1858) に近似する可能性が高いと考えた。モンナシボラは 208 日齢、尾又長 140 mm で成熟を開始することが知られている (Schemmel *et al.*, 2019)。出現海域の違いを考慮すべきではあるが、この見解により本研究で父島より得られた 135.25 mm SL の個体が成熟サイズに達し、本島でクチボソボラが再生産を行っている可能性が示唆された。さらに、本研究で稚魚期の個体が得られたことにより、初期生活史における本島への加入が示され、再生産が行われている可能性はより高められた。その一方で、本島でのクチボソボラの記録は少なく (分布の項参照)、Randall *et al.* (1997) は小笠原諸島沿岸性魚類のチェックリストにおいて、本種を稀種として扱っている。本島での出現サイズが総じて小さいことも考慮すると (Table 2)、クチボソボラが本島で再生産を行っている可能性は考えられるもののその規模は小さく、出現は偶発的要素が大きいのと考えるのが妥当である。吉郷 (2002) は小笠原諸島の陸水性動物相から、本島への分散移入の経路は主に亜熱帯反流と黒潮反流に起因すると考えたが、島周辺の定常流について詳細な研究はなく (稲葉, 2004)、クチボソボラがどの海域から来遊してきたかについて考察を行うには情報が不足している。Trape *et al.* (2009) は、ボラ科魚類の沿岸域への加入は親魚の産卵成功、卵仔稚の輸送に関わる海流などの物理的要因、初期生残率の複合的要因によって決まるとしたが、クチボソボラの生態については不明な点が多く (Schemmel *et al.*, 2019)、小笠原諸島父島への本種の加入機構について明らかにするためにはさらなる物理学的、生物学的な知見の蓄積が必要である。

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摘 要

田中翔大・斉藤洪成・瀬能 宏, 2021. 小笠原諸島父島から採集されたクチボソボラ *Neomyxus leuciscus* 稚魚とその生物地理学的考察. 神奈川県立博物館研究報告 (自然科学), (50): 39–45. [Tanaka, S., H. Saito & H. Senou, 2021. Juvenile of *Neomyxus leuciscus* (Mugilidae) from the waters around Chichi-Jima Island, Ogasawara Islands, with biogeographical notes. Bull. Kanagawa Pref. Mus. (Nat. Sci), (50): 39–45.]

小笠原諸島父島より 3 個体 (38.35–135.25 mm SL) のクチボソボラ *Neomyxus leuciscus* の標本が得られた。このうちの 1 個体 (38.35 mm SL) は稚魚期にあり、本種の初期形態についての新知見が得られたため、その形態や体色ならびに成長に伴う形態変化の記載を行った。さらに、体長 135.25 mm の個体により、小笠原諸島父島に成熟個体が存在する可能性が示唆された。本島におけるクチボソボラの記録は限られており、今回サイズの異なる複数の標本が得られたことは、本種の生物地理学的特性を考察するうえで重要であると考えられた。

原著論文

八重山諸島西表島から得られた日本初記録のコクハンカワウツボ (新称)
とその生息状況First Record of the Moray Eel, *Gymnothorax polyuranodon* (Pisces: Muraenidae)
from Iriomote Island, Yaeyama Islands, Japan with Notes on its Habitat波戸岡清峰¹⁾・瀬能 宏²⁾・矢野幾維³⁾・鈴木寿之¹⁾Kiyotaka HATOOKA¹⁾, Hiroshi SENOU²⁾, Korechika YANO³⁾ & Toshiyuki SUZUKI¹⁾

Abstract. A single specimen of the moray eel identified as *Gymnothorax polyuranodon* (Bleeker, 1853) recently collected from the freshwater area of a river in Iriomote Island, Yaeyama Islands, is the first record of the species from Japan. The specimen was characterized as follows: total vertebrae 147 (predorsal 10, preanal 72); body with irregular black specks; vertical fins low; jaw teeth in two or three irregular rows; anus posterior to mid-body; preanal length 54.2 % of total length, head length 9.3 %, trunk 44 %; body depth 4.1 at gill opening, 4.9 at mid-anus; predorsal length 83.1 % of head length, upper-jaw length 25.8 %, lower-jaw length 22.7 %, snout length 10.7 %, eye diameter 4.9 %, interorbital width 9.1 %; dorsal-fin height 29.7 % of body depth at anus. A new standard Japanese name “Kokuhan-kawautsubo” is proposed for the species. This seemingly rare occurrence of the species is considered to be natural dispersal; while an established population is unlikely, it is necessary to monitor its occurrence from a conservation perspective, with reference to previous cases of fishes inhabiting similar environments.

Key words: catadromous, conservation, endangered, freshwater, Ryukyu Islands

緒 言

ウツボ科魚類は、そのほとんどが浅海岩礁域や珊瑚礁域（水深 500 m までの砂底や泥底で得られる

場合もある）で見られるが、小数ながら沿岸汽水域や河川で見られる種もある（Böhlke *et al.*, 1999）。今回、八重山諸島西表島のユチン川で *Gymnothorax polyuranodon* (Bleeker, 1853) と同定される、河川を主な生息場所とするウツボ属 *Gymnothorax* の一種が 1 個体採集された。本標本は日本からの本種の初記録であり、新標準和名を提唱するとともに詳細な記載を行った。

方 法

計数・計測は基本的に Böhlke (1989) に従ったが、計測位置については一部補足した。100 mm 以内の計測についてはノギスにより 0.1 mm 単位で、100 mm 以上については大型の定規により 1 mm 単位で計測した。

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本報告に用いた標本は神奈川県立生命の星・地球博物館の魚類資料 (KPM-NI)、画像は同館の魚類写真資料データベース (KPM-NR) に登録、保管されている。なお、同館の資料番号はコンピュータ上では便宜上ゼロを付加した7桁の数字で表されるが、ここでは資料番号として本質的な有効数字で表記した。

標本: KPM-NI (神奈川県立生命の星・地球博物館資料) 58778、922 mm TL、沖縄県竹富町字高那 (24°22'47.26"N, 123°53'7.43"E)、標高 9 m、八

重山諸島、西表島、ユチン川 (河口から 600 m)、水深 0.5 m、2020 年 6 月 4 日、タモ網、矢野幾維採集。

画像: KPM-NR 201183A-F (= KPM-NI 58778)、鮮時、瀬能 宏撮影; KPM-NR 201183G-O (= KPM-NI 58778)、軟 X 線写真、瀬能 宏撮影; KPM-NR 201183P, Q (= KPM-NI 58778)、生態、撮影地点は標本の採集地点と同じ、2020 年 5 月 31 日、矢野幾維撮影; KPM-NR 201183R (= KPM-NI 58778)、生態、撮影地点は標本の採集地点と同じ、2020 年 6 月 4 日、矢野幾維撮影。

記 載

コクハンカワウツボ (新称)

Gymnothorax polyuranodon (Bleeker, 1853)

(Figs. 1–5; Table 1)

Table 1. Counts and measurements of *Gymnothorax polyuranodon*

表 1. コクハンカワウツボ *Gymnothorax polyuranodon* の計数値および計測値

	KPM-NI 58778
Total length (TL)	922
Counts	
Vertebrates	
Total vertebrate	147
Predorsal vertebrate	10
Preanal vertebrate	72
Abnominal vertebrate	80
Caudal vertebrate	67
Head pores	
Supraorbital pores	3
Infraorbital pores	4*
Mandibular pores	5
Branchial pores	1
Measurements	
As % of TL	
Preanal length	54.2 %
Tail length	45.8 %
Trunk length	44.1 %
Head length	9.3 %
Predorsal length	7.8 %
Postorbital length	8.2 %
Body depth at gill Opening	4.1 %
Body width at gill Opening	1.4 %
Body depth at mid-anus	4.9 %
Body width at mid-anus	2.0 %
Body depth at mid-tail	4.1 %
Body width at mid-tail	1.3 %
Dorsal height at mid-anus	1.5 %
Dorsal height at mid-trunk	1.5 %
Dorsal height at mid-tail	1.6 %
Anal height at mid-tail	1.1 %
As % of head length	
Predorsal length	83.1 %
Snout length	10.7 %
Eye diameter	4.9 %
Upper jaw length	25.8 %
Lower jaw length	22.7 %
Suborbital length	3.0 %
Infraorbital length	9.1 %
Gill opening length	7.6 %

* On right side, 2 abnormal pores observed between 3rd and 4th normal pores.

Muraena polyuranodon Bleeker, 1853: 75 (type locality, Ceram, Indonesia); Bleeker, 1854: 248; Günther, 1870: 114.

Polyuranodon kuhlii Kaup, 1856: 65 (replacement name for *Muraena polyuranodon*).

Gymnothorax polyuranodon: Bleeker, 1865: 89, pl. 174, fig. 2, name only (plate 174 separately published in 1864; date of publication by Kottelat, 2013a); Smith, 2012: 24.

Gymnothorax (Muraena) polyuranodon: Weber & de Beaufort, 1916: 369.

Uropterygius fijiensis Fowler & Bean, 1923: 9 (type locality, Lebukeya, Fiji Islands).

計数形質と計測形質の値は Table 1 に示した。魚体は延長し、側偏する。背鰭は低く、しかも鰭を被う皮が厚いため、目立たない。背鰭起部は鰓孔より僅か前方にある。臀鰭は低く、その起部は肛門の直後にある。吻は鈍い。鰓孔は体側のほぼ中央に位置し、その開孔部は眼径より大きい (鰓孔長は眼径の約 1.5 倍)。肛門は魚体の中央より後方にある。

前鼻孔は管状で短く、吻端にある。後鼻孔は眼の前縁の背方にあり、孔の周囲は小さな突起状の皮弁で縁取られる。頭部側線管開孔部は小さいが明瞭 (Fig. 2)。眼上管の開孔数は 3 で、そのうちの最前端のものは前鼻孔の前下方にあり小さい。第 2 番目のものは前鼻孔の位置にあつて側方からは見えない。第 3 番目のものは吻の背方中央より前よりにある。眼下管の開孔数は 4。第 4 番目は眼の後縁より後方にある。なお、右側の眼下管の第 3 番目と 4 番目の開口部の間には変異と思われる 2 つの開口部がある (眼の後縁下部とそのやや後方に位置し、第 3 番目と 4 番目開口部の並びより背方にある)。下顎管の開孔数は



Fig. 1. *Gymnothorax polyuranodon*, fresh specimen, KPM-NI 58778, 922 mm total length, Yuchin River (600 m from the mouth of river, depth 0.5 m), Iriomote Island, Yaeyama Islands, 24°22'47.26"N, 123°53'7.43"E, Alt. 9 m, 4 June 2020, collected by K. Yano. Photo by H. Senou.

図 1. コクハンカワウツボ. KPM-NI 58778, 全長 922 mm, 瀬能 宏撮影.



Fig. 2. Head of *Gymnothorax polyuranodon*, KPM-NI 58778. Arrows indicate lateral-line pores and origin of dorsal fin; white line, gill opening. Photo by H. Senou.

図 2. コクハンカワウツボの頭部. KPM-NI 58778. 黒小円は側線管開口部, 白線は鰓孔. 矢印は側線管開口部の位置, および, 背鰭起部の位置を示す. 瀬能 宏撮影.

5で、最前端のものは非常に小さい。第5番目のものは口裂後端下方にある。口裂後端と鰓孔のほぼ中間、背方に、鰓部側線管開口部が1つある。

下顎が僅かに短いものの、上下両顎はほぼ等しく口は完全に閉じられる。歯は、ほとんどが細長く鋭いが、頑丈なものではない (Fig. 3)。前上顎

骨板の中央部には他より大きな歯が10本見られるが、歯列はなさない。周辺部には16本の中央部より小さな不揃いの歯が並ぶ。歯の数については、抜け落ちているものは含めていない (以後同様)。鋤骨部には1列に並ぶ10本の小さな歯がある。主上顎骨歯はほぼ2列。内側のもの (右側



Fig. 3. Dentition of *Gymnothorax polyuranodon*, KPM-NI 58778. Drawn by K. Hatooka.

図3. コクハンカワウツボの両顎歯. KPM-NI 58778. 波戸岡清峰作画.

は8本、左側は6本)は、外側のものより大きい、前上顎骨板中央部のものよりは小さい。外側のものの大きさは不揃い(右側は15本、左側は20本)。下顎歯はほぼ2列であるが、前方は3列。内側のものは外側のものより大きい、前上顎骨板中央部のものよりは小さい。外側のものの大きさは不揃い。左側は全体で42本、前方内側の7本が目立つ。右側は全体で41本、前方内側のもの3本が目立つ。

体全体に不定形な黒斑がある。口裂後端から鰓孔にかけての頭部の黒斑は前後につながり縦縞状(前方で約7本)を呈する。生時、地色は基本的に黄色、固定後は白色になる。眼の周辺に小さな黒色斑紋がある。上顎縁辺部、下顎には目立った斑紋は無く、口腔内は白色 (Fig. 5)。

分 布

八重山諸島西表島(本報告)。海外では、台湾から、フィリピン、インドネシア、パプアニューギニア、オーストラリア北東部、ニューカレドニアを経てフィジーに至る熱帯亜熱帯の西太平洋域(Allen *et al.*, 2002, 2006; Bleeker, 1853, 1854; Böhlke *et al.*, 1999; Böhlke & McCosker, 2001; Ebner *et al.*, 2011; Fricke *et al.*, 2011, 2014, 2019; Fowler & Bean, 1923; Herre, 1923, 1924; Ho *et al.*, 2015; Miesen *et al.*, 2016; Kottelat *et al.*, 1993; Kottelat 2013b; Paxton *et*



Fig. 4. *Gymnothorax polyuranodon*, KPM-NI 58778. Depth 1.5 m. Photo (KPM-NR 201183P) by K. Yano, 31 May 2020.

図4. コクハンカワウツボ, KPM-NI 58778. 水深 1.5 m, 2020 年 5 月 31 日, 矢野維幾撮影 (KPM-NR 201183P).



Fig. 5. *Gymnothorax polyuranodon* (right, KPM-NI 58778) and *Anguilla marmorata*. Depth 0.5 m. Photo (KPM-NR 201183R) by K. Yano, 4 June 2020,

図5. コクハンカワウツボ(右, KPM-NI 58778)とオオウナギ. 水深 0.5 m. 2020 年 6 月 4 日, 矢野維幾撮影 (KPM-NR 201183R).

al., 1989; Tsukamoto *et al.*, 2014 など) 及びインド洋のスリランカ (Pethiyagoda, 1991)。

生息状況

西表島のユチン川の河口から約 600 m 上流、感潮域最上端から約 50 m、水深 0.5 m の純淡水域で確認され採集された。中流域の大きな淵の淀みにある岩の隙間に、ウナギ科 Anguillidae のオオウナギ *Anguilla marmorata* Quoy & Gaimard, 1824 と共に見られた (Fig. 5)。なお、Ebner *et al.* (2011) はオーストラリア北東部のクイーンズランドの湿潤熱帯地域 (Australian Wet Tropics) から得られた本種の採集調査記録から、本種の幼魚や成魚は淡水域ないし塩分の濃度が 0.5 % 以下の汽水域に棲息するとしている。また、Tsukamoto *et al.* (2014) は南太平洋フィジー諸島の一河川 (Navua River, Viti Levu Island, Fiji) の河口から 13.5 km の地点で採集された 4 個体の本種標本における耳石のストロンチウム/カルシ

ウム比から、本種は淡水域ないし汽水域に生息する降河回遊型の海産のウナギ類である可能性があるとしている。本邦には、河川汽水域を主な生息場所とするウツボ科魚類としては本種の他に、ナミダカワウツボ *Echidna rhodochilus* Bleeker, 1863 やコゲウツボ *Uropterygius concolor* Rüppell, 1838 が分布する(波戸岡ほか, 1992; 波戸岡, 2013)。

考 察

今回の標本は、体に不揃いの黒色斑紋があり、頭部の斑紋は縦縞を形成すること、背鰭起部は鰓孔より僅か前方(頭部後方)にあること、肛門は体の中央より後方にあること、歯は鋭いものの小さく、歯列数が多いこと、垂直鰭が低く目立たないことなどから *Gymnothorax polyuranodon* (Bleeker, 1853) に同定された (Bleeker, 1853; Böhlke & Smith, 2002)。なお、Fricke *et al.* (2020) は Kottelat (2011) を参照し、本種の原記載論文を Bleeker (1854) としているが、本報では、原記載論文および公表年については Kottelat (2013b, p. 42) に従った。これによれば公表年は 1853 年となる。目立たない垂直鰭については、Böhlke & McCosker (2001) で、垂直鰭のないことが特徴のキカイウツボ属 *Uropterygius* の種として誤同定されることがあると記述されているように、本種の大きな特徴となっている。*Uropterygius fijiensis* を Smith (1994) 及び Böhlke & Smith (2002) に従ってシノニムリストにあげたが、*Uropterygius fijiensis* の原記載では(垂直)鰭はないと記述されている。

全長については、Ebner *et al.* (2011) の報告によれば最大で 1500 mm とのことである。この報告では 36 件の観察例(実測によるものは 15 件で 76–830 mm)があげられているが、601–700 mm が最も多かった。今回の個体(922 mm)は本種としてはやや大型のものと思われる。

標準和名については、標本 KPM-NI 58778 に基づき、体の黒色斑紋、採集場所にちなみ、コクハシカワウツボを提唱する。

ウナギ目魚類の初期生活史については不明な点が多いが、本邦における出現はその多くが南方外洋域からの仔稚魚の分散によるものと考えられている(沖山, 2014)。今回の西表島における本種の出現は、共著者らによる 1970 年代からの継続的な調査にもかかわらずこれまで記録されていないことや、確認個体が成魚と考えられる 1 個体のみであることから偶発的なものと考えられる。しかしながら、本種と同様な棲息域や分散様式をもつテッポウウオ科 *Toxotidae* のテッポウウオ *Toxotes jaculatrix* (Pallas, 1767) は、1980 年にはじめて西表島で確認された後、1997 年以後は毎年確認されるようになり、最終的には同島

に定着した(鈴木ほか, 2002)。同様な事例はヨウジウオ科 *Syngnathidae* のタニヨウジ *Microphis retzii* (Bleeker, 1856) でも知られている(加藤ほか, 2020)。また、本種は国際自然保護連合のレッドリストでは Least Concern に選定されているが (Mailautoka *et al.*, 2019)、本邦において西表島を主生息地とするテッポウウオやタニヨウジ、ウツボ科の別属で河川汽水域に棲息するナミダカワウツボやコゲウツボはいずれも絶滅危惧 IA 類に選定されている(環境省, 2020)。従って、保全生物学的観点から本種の動態を注視していく必要があるだろう。

なお、本種は観賞魚として流通しており、今回の西表島における出現が飼育個体の導入によるものである可能性を完全には否定できないが、過去に同島から新産種として記録されてきた多くの魚類と同様、導入を強く示唆する証拠がない限りは在来個体と見なしておくことが妥当である。

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摘 要

波戸岡清峰・瀬能 宏・矢野幾維・鈴木寿之, 2021. 八重山諸島西表島から得られた日本初記録のコクハンカワウツボ (新称) とその生息状況. 神奈川県立博物館研究報告 (自然科学), (50): 47-53. [Hatoaka, K., H. Senou, K. Yano & T. Suzuki, 2021. First record of the moray eel, *Gymnothorax polyuranodon* (Pisces: Muraenidae) from Iriomote Island, Yaeyama Islands, Japan with notes on its habitat. Bull. Kanagawa Pref. Mus. (Nat. Sci), (50): 47-53.]

八重山諸島西表島のユチン川の淡水域 から *Gymnothorax polyuranodon* (Bleeker, 1853) と同定される本邦初記録のウツボ科魚類の一種が採集され、コクハンカワウツボという新標準和名を付し、標本の詳細な記載を行った。今回の出現は偶発的なものと思われるが、今後、保全生物学的観点から本種の動態を注視していく必要がある。

Original Article

Taxonomic and Zoogeographic Study of the Japanese Phygadeuontinae (Hymenoptera, Ichneumonidae), with Descriptions of 17 New Species

Kyohei WATANABE¹⁾

Abstract. Phygadeuontinae (Hymenoptera, Ichneumonidae) is one of the poorly studied subfamilies in Japan. In this study, I study 28 genera and 61 species of Japanese Phygadeuontinae taxonomically and zoogeographically. Seven genera, *Diaglyptidea* Viereck, 1913, *Micraris* Townes, 1970, *Surculus* Townes, 1970, *Bentyra* Cameron, 1905, *Isadelphus* Förster, 1869, *Megacara* Townes, 1970, and *Tropistes* Gravenhorst, 1829, are newly recorded from Japan. *Micraris* and *Surculus* are also newly recorded from the Palearctic region. The following 17 new species are described: *Acrolyta japonica* sp. nov.; *Micraris ryukyuensis* sp. nov.; *Surculus japonicus* sp. nov.; *Bentyra ryukyuana* sp. nov.; *Paraphylax elegans* sp. nov.; *Pa. politus* sp. nov.; *Pa. transstriatus* sp. nov.; *Pa. yakushimensis* sp. nov.; *Pa. yambarensis* sp. nov.; *Hemiteles japonicus* sp. nov.; *H. kuro* sp. nov.; *H. maculipterus* sp. nov.; *H. yamatonis* sp. nov.; *Isadelphus nigrus* sp. nov.; *Lochetica japonica* sp. nov.; *Tropistes shimizui* sp. nov.; *Uchidella toichii* sp. nov. The following nine species are newly recorded from Japan: *Acr. flavicoxis* Sheng & Sun, 2014; *Acr. rufocincta* (Gravenhorst, 1829); *Diaglyptidea conformis* (Gmelin, 1790); *Bathythrix margaretae* Sawoniewicz, 1980; *Ba. thomsoni* (Kerrich, 1942); *Dichrogaster nitida* Sheng & Sun, 2014; *Megacara similis* Sheng, 1999; *Orthizema semanotae* Sheng & Sun, 2014; *Mesoleptus laevigatus* (Gravenhorst, 1829). *Bathythrix narangae* Uchida, 1930 is newly synonymized under *Ba. kuwanae* Viereck, 1912 (**syn. nov.**). *Ethelurgus politus* Townes, 1983 is newly synonymized under *E. episyrphicola* Kusigemati, 1983 (**syn. nov.**). *Ethelurgus sodalis fuscipes* Townes, 1983 is newly synonymized under *E. kumatai* Kusigemati, 1983 (**syn. nov.**). Furthermore, the taxonomic status of *E. kumatai* changed as a subspecies of *E. sodalis* (Taschenberg, 1865) (**comb. nov.**). Some new distribution records and a key to species of the 11 genera are also provided.

Key words: distribution, Eastern Palearctic region, new record, parasitoid wasps, taxonomy

Introduction

The subfamily Phygadeuontinae Förster, 1869 is a large-sized subfamily of the family Ichneumonidae, consisting of more than 120 genera and 1900 species in the world (Yu *et al.*, 2016). This subfamily has been previously treated as a tribe of the subfamily Cryptinae Kirby, 1837 (e.g., Yu *et al.*, 2016), while Santos (2017) treated this tribe as a separate subfamily. The phylogenetic relationships among this subfamily are still poorly understood in the present time. Members of this

subfamily have relatively smaller body size than those of other subfamilies and exhibit sex-related dimorphism. They are idiobiont parasitoids, but the strategy and host preference are highly varied.

Townes (1970) provided a preliminary key to the identification of genera, but this has since been updated via only a few studies (e.g., Townes, 1983; Horstmann, 1978, 1992; Jussila, 1979). Consequently, the taxonomic study of this subfamily is poorly developed even in Europe and North America. Therefore, the identification of higher taxa is relatively more difficult than in other subfamilies.

In Japan, 34 genera and 103 species of this subfamily have been recorded. This subfamily is a poorly studied group and additional records after the first record are not available for many species. Recently I had the opportunities to examine collections in both domestic and foreign museums and found many additional records and some undescribed species. In this study, I provide

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taxonomic and zoogeographic data for the Japanese Phygadeuontinae. Some re-descriptions of Japanese species (e.g., species described by Dr. Toichi Uchida (1898–1974)) and keys to species of some genera are also provided.

Materials and methods

In this study, the dried specimens deposited in the following collections were examined:

AEIC, American Entomological Institute, Logan, Utah, USA.

GSFPM, General Station of Forest Pest Management, State Forestry Administration, Shenyang, China.

KPM-NK, Insect collection, Kanagawa Prefectural Museum of Natural History, Odawara, Kanagawa, Japan.

KU, Entomological Laboratory, Faculty of Agriculture, Kyushu University, Ito, Fukuoka, Japan.

MNHAH, Museum of Nature and Human Activities, Sanda, Hyogo, Japan.

NHMUK, Natural History Museum, London, UK.

SEHU, Systematic Entomology, Hokkaido University, Sapporo, Japan.

TARI, Taiwan Agricultural Research Institute Council of Agriculture, Executive Yuan, Taichung, Taiwan.

TMNH, Toyohashi Museum of Natural History, Toyohashi, Aichi, Japan.

ZSM, Zoologische Staatssammlung München, Germany.

A stereomicroscope (Nikon SMZ800) was used for the observation. The photographs (Figs 1–61) were taken using the OLYMPUS TG-4 digital camera joined with the stereomicroscope. The digital images including line drawings (Figs 62–66) were edited using the Adobe Photoshop® CC. Morphological terminology mainly follows Broad *et al.* (2018). Eady (1968) is also referred to for the descriptions of microsculpture. In the description of propodeal areas, the following terms are used: anterior part (area externa and area basalis); median part (area dentipara and area superomedia); posterior part (area postero-externa and area petiolaris). In the description, the following abbreviations are used: holotype (HT), segment of antennal flagellum (FL), diameter of lateral ocellus (OD), ocello-ocular line (OOL), postocellar line (POL), segment of tarsus (TS), and metasomal tergite (T). The following abbreviations are used for material data: female (F), male (M), Malaise trap (MsT), light trap (LT), and yellow pan trap (YPT). For the new species and newly recorded species from Japan, I propose the standard Japanese names (SJN). The symbol “*” in the distribution indicates a new record.

All genera were identified by Townes (1970, 1983), except for the genus *Acrolyta* Förster, 1869, identified by Schwarz & Shaw (2000); *Mastrus* Förster, 1869 and its related genera, identified by Horstmann (1978); *Orthizema* Förster, 1869, identified by Schwarz & Shaw (2011). In this study, I treat the subtribes of Gelini sensu Townes (1970) and Horstmann (1992) as the genus-group because the monophyly of these groups is still debated and there is little reliable evidence.

Results and discussions

In the following taxonomic section, I studied 28 genera and 61 species of Japanese Phygadeuontinae including 17 new species, nine newly recorded species, and three synonyms. Seven genera, *Diaglyptidea* Viereck, 1913, *Micraris* Townes, 1970, *Surculus* Townes, 1970, *Bentyra* Cameron, 1905, *Isadelphus* Förster, 1869, *Megacara* Townes, 1970, and *Tropistes* Gravenhorst, 1829, were newly recorded from Japan. *Micraris* and *Surculus* are also reported for the first time from the Palearctic region.

Taxonomy

Subfamily Phygadeuontinae Förster, 1869

All subtribes sensu Townes (1970) and Horstmann (1992) were found in Japan. Among these, while *Cremnodina* Townes (1970) has not been recorded in Japan, I identified a single specimen from Japan. The taxonomic treatment of this group requires additional specimens and comparison with European species.

Acrolyta genus group

(subtribe Acrolytina sensu Townes (1970))

Three genera, *Acrolyta*, *Diatora* Förster, 1869, and *Lysibia* Förster, 1869, have been recorded from Japan. In addition, I found *Diaglyptidea*, *Encrateola* Förster, 1869, *Micraris*, *Eudelus* Förster, 1869, and an unidentified genus from Japan. In this study, I newly record two of them, *Diaglyptidea* and *Micraris*, from Japan and review *Acrolyta* and *Lysibia*. The identification of genera see Townes (1970) and Schwarz & Shaw (2000).

Genus *Acrolyta* Förster, 1869

Acrolyta Förster, 1869: 174. Type: *Acrolyta empretiae* Ashmead, 1896 (= *Ischnoceros nigricapitatus* Cook & Davis, 1891). Designated by Viereck (1914).

Rhadinocera Förster, 1869: 177. Type: *Hemiteles* (*Rhadinocera*) *algonquinus* Viereck, 1917 (= *Ischnoceros nigricapitatus* Cook & Davis, 1891). Included by Viereck (1922).

Mosia Seyrig, 1952: 69. Type: *Mosia crassicornis* Seyrig, 1952. Original designation.

Parhemiteles Seyrig, 1952: 82. Type: *Parhemiteles flaviger* Seyrig, 1952. Original designation.

Five species, *Acr. albiscapus* (Ashmead, 1906), *Acr. aporiae* (Okamoto, 1923), *Acr. discrepa* Momoi, 1970, *Acr. excisa* Momoi, 1970, and *Acr. spola* Momoi, 1970, have been recorded from Japan. Among them, *Acr. albiscapus* is treated as status (Yu *et al.*, 2016). I found at least 13 species of this genus from Japan. Two of them, *Acr. flavicoxis* Sheng & Sun, 2014 and *Acr. rufocincta* (Gravenhorst, 1829), are newly recorded from Japan here. In addition, one new species and at least five unidentified species are also recognized. In this study, I record five described species including the newly recorded species with some distributional data and describe a new species, *Acr. japonica* sp. nov. below.

Schwarz & Shaw (2000) revised the generic concepts of this genus and of *Eudelus* Förster, 1869. I re-examined the generic position of all Japanese species based on it and concluded their character statuses are accorded with the *Acrolyta*. No identification key to Japanese species has been provided except for the key to the Ryukyu species according to Momoi (1970), thus I provide a preliminary key to the Japanese species below.

Preliminary key to Japanese species of the genus

Acrolyta (♀)

(female of *Acr. albiscapus* is unknown)

1. Metasomal tergites at least partly (usually T II and T III entirely) reddish brown to reddish yellow (Figs 5A, C). Clypeus with (Fig. 62G) or without a pair of distinct teeth anteromedially. 2
- . Metasomal tergites black except that the posterior margins usually tinged with reddish brown to reddish yellow (e.g., Figs 2C, 3C, 6C). Clypeus without a pair of distinct teeth anteromedially (Fig. 62F). 3
2. Clypeus with a pair of distinct teeth anteromedially (Fig. 62G). T II striated and the interspace of striae smooth. *Acr. rufocincta* (Gravenhorst, 1829)
- . Clypeus without a pair of distinct teeth anteromedially. T II reticulate rugose except for smooth posterior margin.

- *Acr. sp. A*
3. Anterior margin of clypeus distinctly entirely rounded. 4
- . Median part of anterior margin of clypeus truncate, subtruncate (Fig. 62F) or slightly concave. 5
4. Posterior half of T II and T III largely smooth, without striae (Fig. 1C). Face matt. Hind coxa blackish brown (Fig. 1A). *Acr. aporiae* (Okamoto, 1923)
- . Above combination of character states lacking. *Acr. spp.* (including at least 2 spp.)
5. Hind coxa black. Hind femur usually darkened basally. *Acr. spp.* (including at least 2 spp.)
- . Hind coxa yellowish brown or reddish brown (e.g., Figs 2A, 4A), or if largely tinged with blackish brown, clypeus with dense setae and hind femur nearly entirely yellow. 6
6. T II without striae. T III covered with sparse and fine punctures, without dense punctures and striae. Mesoscutum largely polished. Median part of flagellum slightly wider than other parts, its maximum width less than 2.0 times as long as maximum depth of FL I in lateral view. Ovipositor sheath 0.9 times as long as hind tibia. *Acr. discrepa* Momoi, 1970
- . T II covered with dense punctures and/or striae (e.g., Figs 2C, 3E, 4C, 6C). T III sometimes covered with dense punctures and/or striae. Mesoscutum largely matt (e.g., Figs 2C, 4C, 6C). Other character states various. 7
7. T II and T III covered with longitudinal striae except for smooth areas (Fig. 4C). *Acr. japonica* sp. nov.
- . At least T III without longitudinal striae. 8
8. T II and T III polished and punctate, with some longitudinal striae on basal part of T II (Fig. 3E). Antenna robust and strongly widened except for basal part (Figs 3A, C). FL III 2.0 times as long as maximum depth in lateral view (Fig. 62O). *Acr. flavicoxis* Sheng & Sun, 2014
- . T II and T III covered with dense punctures or minute irregular rugae except for smooth areas, without longitudinal striae (Figs 2C, 6C). Antenna slender. FL III longer than 4.0 times as long as maximum depth in lateral view. 9
9. Propodeum moderately long, evenly convexly

descending, its dorsal face much longer than the hind face (Fig. 2A). Pterostigma light brown (Fig. 2A).

..... *Acr. excisa* Momoi, 1970

- . Propodeum short, abruptly, strongly declivous behind, its dorsal face much shorter than the hind face (Fig. 6A). Pterostigma dark brown (Figs 6A, D).

..... *Acr. spola* Momoi, 1970

***Acrolyta aporiae* (Okamoto, 1921)**

(SJN: Tatehida-mame-togari-himebachi)

(Figs 1A–D)

Brachycyrtus aporiae Okamoto, 1923: 64.

Hemiteles aporiae Uchida, 1930: 343.

Description. Female (n=2). Body length 3.3–3.4 mm. Body covered with silver setae.

Head. Clypeus 1.9 times as wide as maximum length, its anterior margin rounded, without distinct teeth anteromedially. Face granulate (Fig. 1B). MSL 1.1 times as long as BWM. Malar space polished and coriaceous. Frons and anterior part of vertex matt except for smooth area above antennal sockets. Posterior part of vertex and gena polished, with fine punctures. OOL almost as long as POL. Occipital carina complete, joined with hypostomal carina near mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible flat. Antenna with 20 flagellomeres, median and subapical part strongly widened, the most widened part ca. 2.0 times as long as maximum depth of FL I in lateral view. FL I, FL II, and FL III distinctly longer than other segments. FL III 3.0 times

as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum largely smooth dorsally, rugulose ventrally, with indistinct epomia. Mesoscutum matt and subpolished, with distinct notaulus. Scutellum polished, punctate. Mesopleuron smooth, with some longitudinal striae ventrally. Metapleuron finely and sparsely punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete. Area basalis distinct. Area superomedia distinct or partly indistinct laterally. Anterior part of propodeum finely and sparsely punctate. Median and posterior parts of propodeum covered with shallow, longitudinal, oblique and irregular rugae. Length of fore wing 3.2 mm. Areolet absent (Fig. 1D). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted behind the middle (Fig. 1D). Hind femur 4.3 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.7: 0.3: 0.4. Tarsal claws simple.

Metasoma. T I 1.5–1.6 times as long as maximum width, longitudinally striated. Median dorsal carina of T I present except for posterior part absent. Dorsolateral carina of T I complete. T II covered with longitudinal striae except for smooth area on posterior 0.5 (Fig. 1C). T III to T V sparsely punctate except for posterior smooth areas. Ovipositor sheath 0.73 times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth.

Coloration (Figs 1A–D). Body (excluding wings and legs) black to blackish brown. Ventral parts of scape and pedicel and base of FL I yellowish brown to reddish brown. Mandible yellow except for darkened apex. Palpi, postero-dorsal corner of pronotum, and tegula yellow. Posterior

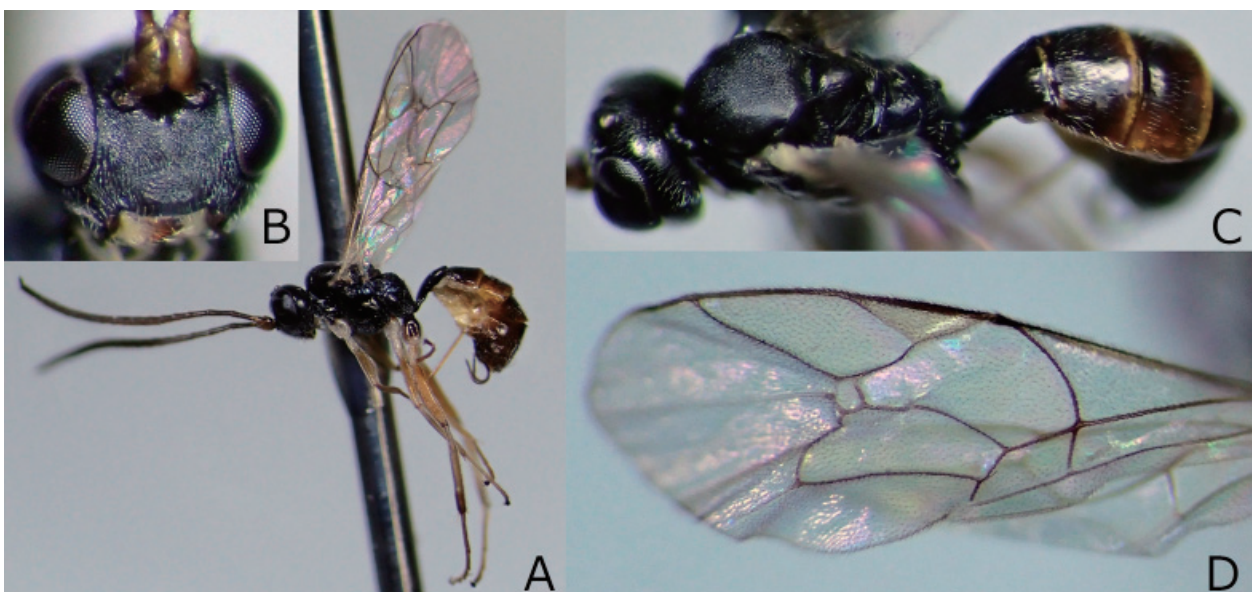


Fig. 1. *Acrolyta aporiae* (Okamoto, 1921), KPM-NK 54955, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorso-lateral view; D, wings.

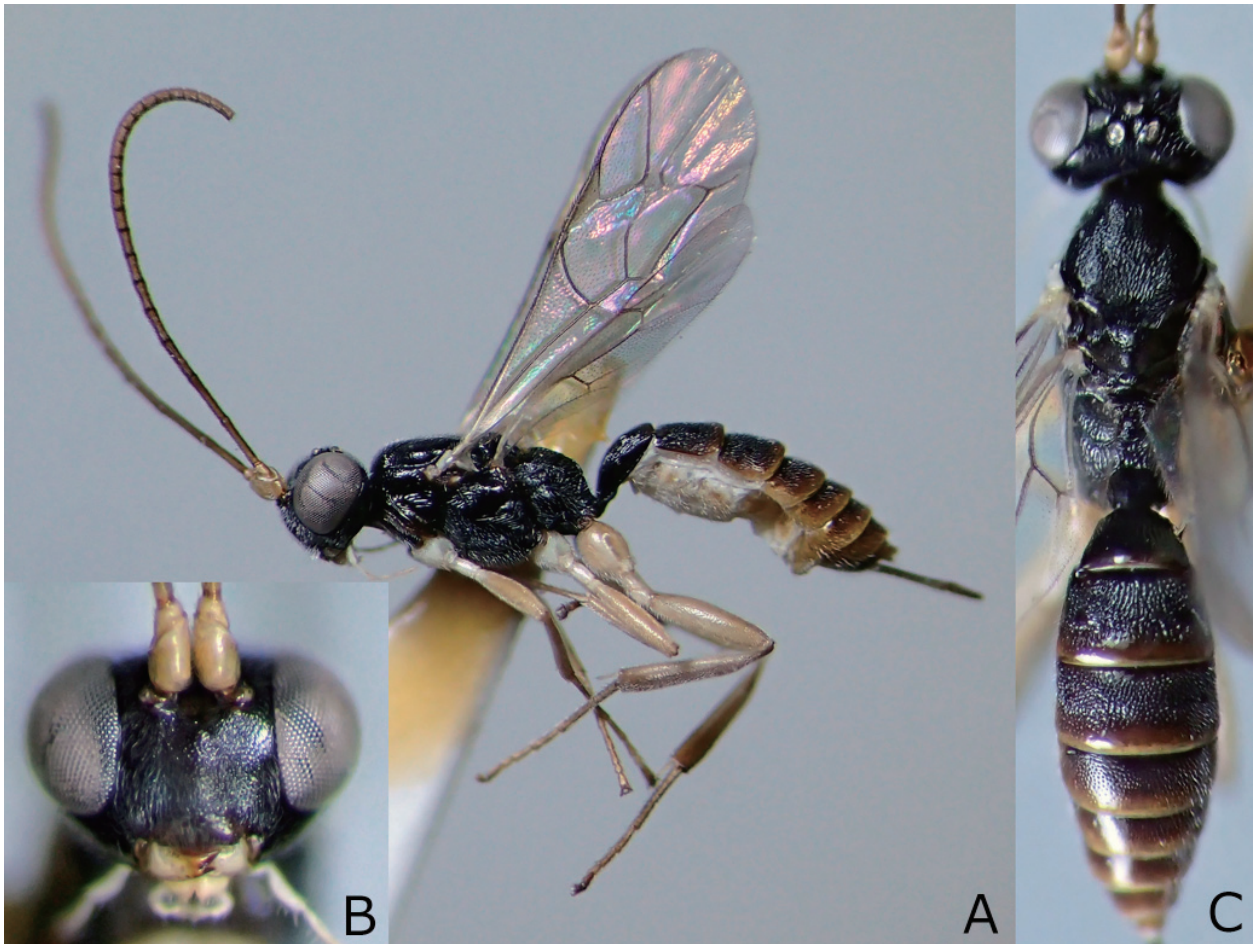


Fig. 2. *Acrolyta excisa* Momoi, 1970, KPM-NK 81881, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

margin of metasomal tergites (it of T II to T IV wider than other tergites) reddish brown. Metasomal tergites more or less tinged with reddish brown. Membranous part of metasomal sternites and ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown to brown. Legs reddish brown to yellowish brown. Fore and mid coxae, trochanters, and trochantelli yellow. Base of hind coxa, base and apical parts of hind tibia, and TS V more or less tinged with blackish brown.

Male. Not studied in this study.

Materials examined. JAPAN: SEHU, F (lectotype), Hokkaido, “Sapporo, H. Okamoto” (em. from *Aporia crataegi*); KPM-NK 54995, F, Hokkaido, Horokanai Town, Moshiri, Uryu, 11–17. VII. 2012, K. Watanabe leg. (MsT).

Distribution. Japan (Hokkaido).

Bionomics. Host record: *Aporia crataegi adherbal* Fruhstorfer, 1910 (Lepidoptera, Pieridae) (Okamoto, 1923).

Remarks. According to Yu *et al.* (2016), this species was described in 1921, but the actual description year is 1923.

Acrolyta excisa Momoi, 1970

(SJN: Munenaga-mame-togari-himebachi)

(Figs 2A–C)

Acrolyta excisa Momoi, 1970: 345.

Description. See Momoi (1970).

Materials examined. JAPAN: MNHAH, F (holotype), Amamioshima Is., 24. V. 1965, H. Takada leg.; KPM-NK 81884, F, Kagoshima Pref., Tokunoshima Is., Kedoku, 20. V. 2008, K. Watanabe leg.; KPM-NK 81878, F, ditto, 21. V. 2008; KPM-NK 81880, F, Kagoshima Pref., Tokunoshima Is., Tete, Mt. Amagi-dake, 27. III. 2011, K. Watanabe leg.; KPM-NK 81883, F, Okinawa Pref., Okinawajima Is., Nago City, Mt. Nagodake, 18. V. 2006, K. Watanabe leg.; KPM-NK 81885, F, Okinawa Pref., Okinawajima Is., Kunigami Vil., Yona, 22. V. 2007, K. Watanabe leg.; KPM-NK 81879, M, Okinawa Pref., Iriomotejima Is., Komi, Airagawa-rindo, 14. V. 2008, K. Watanabe leg.; KPM-NK 81881, 81882, 2 F, Okinawa Pref., Yonagunijima Is., Mt. Kuburadake, 25. VI. 2013, M. Ito leg.

Distribution. Japan (Amamioshima Is., Tokunoshima

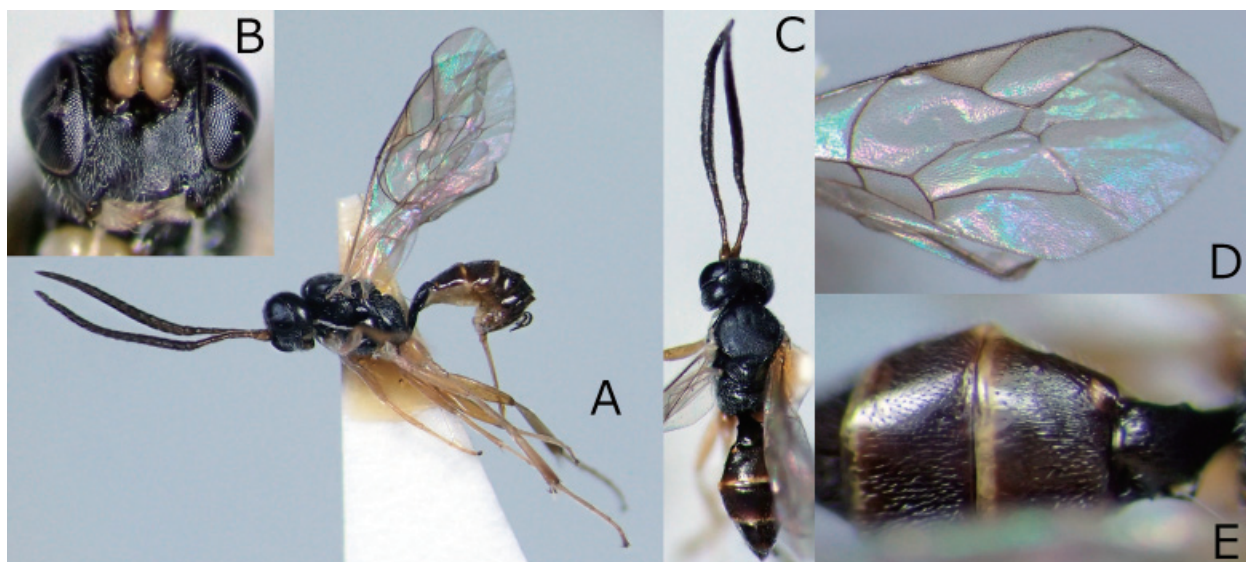


Fig. 3. *Acrolyta flavicoxis* Sheng & Sun, 2014, KPM-NK 81732, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, T I to T III, dorsal view.

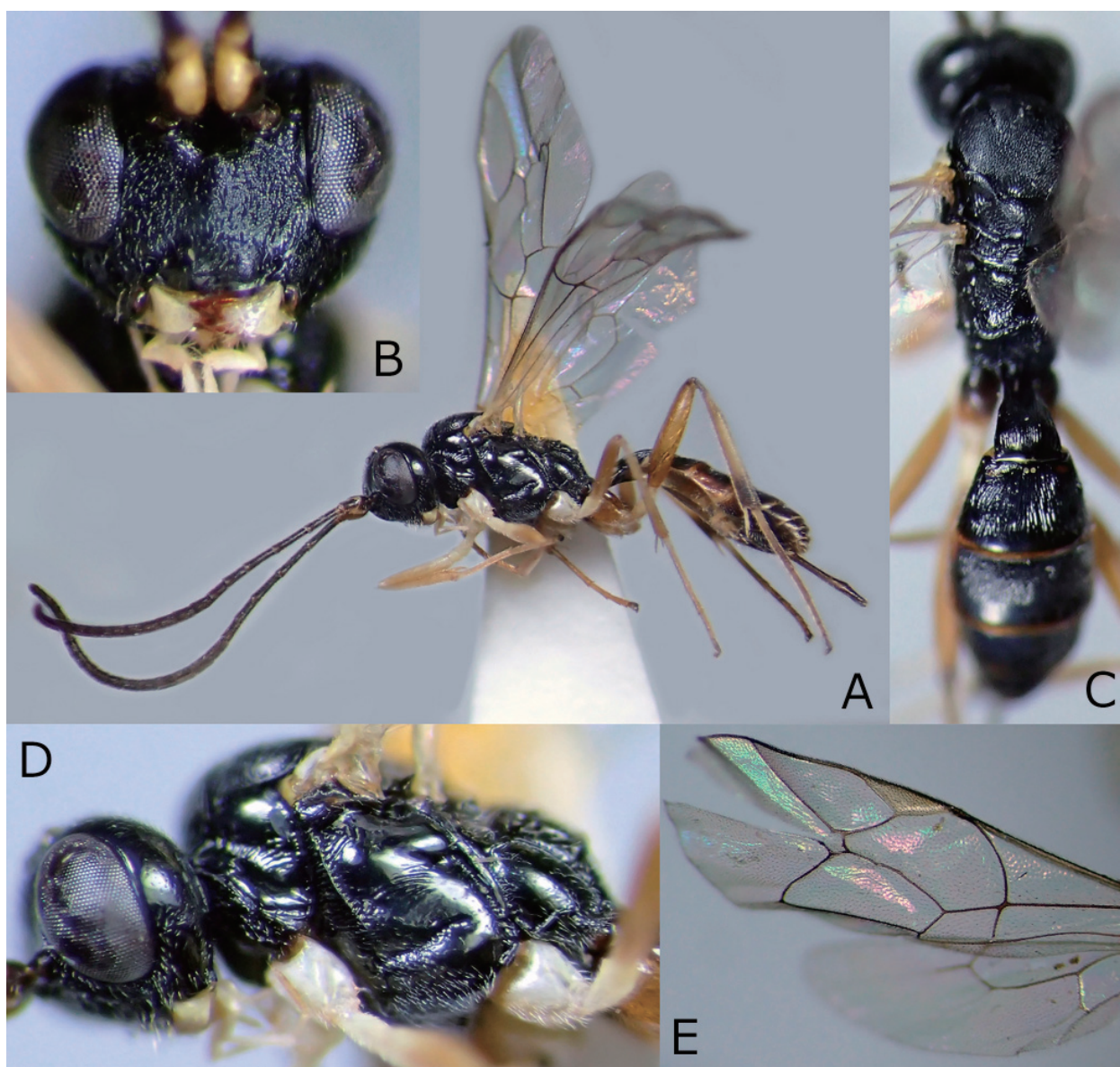


Fig. 4. *Acrolyta japonica* **sp. nov.**, KPM-NK 54996 (A, B, D, holotype) and 55004 (C, E, paratype), females — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, head and mesosoma, lateral view; E, wings.

Is.*, Okinawajima Is., Ishigakijima Is., Iriomotejima Is., and Yonagunijima Is.*).

Bionomics. Unknown.

Acrolyta flavicoxis Sheng & Sun, 2014

(New SJN: Higebuto-mame-togari-himebachi)

(Figs 3A–D, 62O)

Acrolyta flavicoxis Sheng & Sun, 2014: 133.

Description. See Sheng & Sun (2014).

Material examined. JAPAN: KPM-NK 81732, F, Hokkaido., Horokanai Town, Moshiri, Uryu, 11–17. VII. 2012, K. Watanabe leg. (MsT).

Distribution. Japan* (Hokkaido) and China.

Bionomics. Unknown.

Remarks. This is the first record of this species from Japan.

Acrolyta japonica sp. nov.

(New SJN: Tatesuji-mame-togari-himebachi)

(Figs 4A–E, 62F, N, 63A, 65A, 66A)

Etymology. The specific name is from Japan.

Type series. **Holotype:** KPM-NK 54996, F, JAPAN, Hokkaido, Horokanai Town, Moshiri, Uryu, 16. VII. 2012, M. Ito leg. **Paratypes:** JAPAN, KPM-NK 54998–54500, 3 F, same data of holotype; KPM-NK 54997, F, ditto, 16. VII. 2012; KPM-NK 54501, 54502, 2 F, ditto, 17. VII. 2012, K. Watanabe leg.; KPM-NK 54503, Niigata Pref., Sado Is., Sado City, Kanaisinbo, Hakuundai to Mt. Myokenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 54504, F, Yamanashi Pref., Koushu City, Sagashio, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 54505, F, Yamanashi Pref., Koushu City, Kaminikkawa-toge, 8. VI. 2009, T. Kidokoro leg.

Description. Female (n=10). Body length 3.5–4.7 (HT: 4.2) mm. Body covered with silver setae.

Head. Clypeus 2.0–2.1 (HT: 2.0) times as wide as maximum length, its anterior margin subtruncate, without distinct teeth anteromedially. Face granulate (Fig. 4B). MSL 0.9–1.0 (HT: 1.0) times as long as BWM. Malar space polished except for coriaceous anterior part. Frons and anterior part of vertex matt except for smooth area above antennal sockets. Posterior part of vertex and gena polished, with fine and sparse punctures. OOL almost as long as POL. Occipital carina complete, joined with hypostomal carina near mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible weakly convex. Antenna with 21–24 (HT: 24)

flagellomeres, median and subapical parts slightly widened (Fig. 4A), the most widened part ca. 2.0 times as long as maximum depth of FL I in lateral view. FL I, FL II, and FL III distinctly longer than other segments (Fig. 62N). FL III 3.8–4.0 (HT: 3.8) times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum largely smooth, with epomia (Fig. 4D). Mesoscutum matt and subpolished, with distinct notaulus (Fig. 4C). Scutellum polished, punctate (Fig. 4C). Mesopleuron smooth, with some longitudinal striae ventrally (Fig. 4D). Metapleuron punctate except for median smooth area, with a complete juxtacoxal carina (Fig. 4D). Anterior and posterior transverse carinae of propodeum complete (Fig. 65A). Area basalis distinct (Fig. 65A). Area superomedia distinct or indistinct laterally (Fig. 65A). Anterior part of propodeum finely and sparsely punctate. Median and posterior parts of propodeum covered with longitudinal, oblique and irregular rugae. Length of fore wing 3.4–4.6 (HT: 3.7) mm. Areolet absent (Fig. 4E). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted behind the middle (Fig. 4E). Hind femur 4.7–5.1 (HT: 5.1) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.95–1.0 (HT: 1.0): 0.7: 0.3: 0.4–0.5 (HT: 0.45). Tarsal claws simple.

Metasoma. T I 1.7–1.8 (HT: 1.7) times as long as maximum width, longitudinally striated (Fig. 4C). Median dorsal carina of T I present except for posterior part absent. Dorsolateral carina of T I complete. T II and T III covered with longitudinal striae except for smooth areas (Fig. 4C). T IV and T V sparsely punctate except for posterior smooth areas. Ovipositor sheath 0.63–0.70 (HT: 0.68) times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth (Fig. 66A).

Coloration (Figs 4A–E). Body (excluding wings and legs) black to blackish brown. Ventral parts of scape and pedicel, and base of FL I reddish brown. Mandible yellow except for darkened apex. Palpi, postero-dorsal corner of pronotum, and tegula yellow. Posterior margin of metasomal tergites (it of T II to T IV wider than other tergites), lateral parts of T II to T IV, and thyridium reddish brown. Membranous part of metasomal sternites and ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown to brown. Legs reddish brown to yellowish brown. Fore and mid coxae, trochanters, and trochantelli yellow. Base of hind coxa, base and apical parts of hind tibia, and apical part of hind tarsus more or less tinged with blackish brown.

Male. Unknown.

Distribution. Japan (Hokkaido, Honshu, and Sado Is.).

Bionomics. Unknown.

Remarks. This species resembles *Acr. marginata* (Bridgman, 1883) in the body structures, but it can be distinguished by the FL III 3.8–4.0 times as long as maximum width (4.4–4.6 in *Acr. marginata*).

Acrolyta rufocincta (Gravenhorst, 1829)
(New SJN: Kimura-mame-togari-himebachi)
(Figs 5A–D, 62G)

Hemiteles rufocinctus Gravenhorst, 1829: 811.

Hemiteles distinctus Bridgman, 1883: 151.

Hemiteles capreolus Thomson, 1884: 970.

Hemiteles 4-maculatus Lange, 1911: 542.

Hemiteles monodon obscurata Kiss von Zilah, 1924: 74.

Hemiteles unifasciatus Kiss von Zilah, 1924: 74.

Description based on Japanese materials. Female (n=12). Body length 3.7–5.1 mm. Body covered with silver setae.

Head. Clypeus 1.7–1.8 times as wide as maximum length, its anterior margin rounded, with a pair of distinct teeth anteromedially (Fig. 62G). Face granulate (Fig. 5B). MSL 0.95–1.0 times as long as BWM. Malar space smooth except for coriaceous anterior part. Frons, vertex, and gena largely smooth, with fine and sparse punctures. OOL distinctly longer than POL. Occipital carina complete, joined with hypostomal carina near mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible weakly convex. Antenna with 24–26 flagellomeres, median and subapical parts slightly widened (Fig. 5A), the most widened part ca. 2.0 times as long as maximum depth of FL I in lateral view. FL I, FL II, and FL III distinctly longer than other segments. FL III 3.4–3.6 times as long as maximum depth in lateral view.

Mesosoma. Pronotum with smooth areas on collar and dorsal part, without epomia. Mesoscutum matt (Fig. 5C) and subpolished except for longitudinally striated posterior part, with distinct notaulus. Scutellum polished, punctate. Mesopleuron with longitudinal striae. Metapleuron punctate and granulate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete. Area basalis distinct. Area superomedia indistinct. Anterior part of propodeum finely and sparsely punctate. Median and posterior parts of propodeum covered with longitudinal, oblique and irregular rugae. Length of fore wing 3.2–3.8 mm. Areolet absent (Fig. 5D). Vein 2m-cu of fore wing with two bullae (Fig. 5D). Nervellus inclivous, intercepted behind the middle (Fig. 5D). Hind femur 5.2 times as long as maximum depth in

lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.2: 0.4. Tarsal claws simple.

Metasoma. T I 1.9–2.0 times as long as maximum width, longitudinally striated. Median dorsal carina of T I present except for posterior part absent. Dorsolateral carina of T I complete. T II covered with longitudinal striae except for posterior smooth areas (Fig. 5C). T III, T IV, and T V sparsely punctate except for posterior smooth areas. Ovipositor sheath 0.53–0.58 times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth.

Coloration (Figs 5A–D). Body (excluding wings and legs) black to blackish brown. Basal part of antenna reddish brown. Mandible partly tinged dark yellowish brown. Metasomal tergites partly tinged with reddish brown to reddish yellow, usually T II and T III completely reddish. Membranous part of metasomal sternites and ovipositor reddish brown. Wings hyaline. Veins and pterostigma blackish brown to brown. Legs reddish brown to yellowish brown. Apex of hind femur, tibia, and each tarsal segment tinged with black. Hind femur and tibia sometimes largely tinged with blackish brown.

Male. Not studied in this study.

Materials examined. JAPAN: KPM-NK 55008, F, Niigata Pref., Nagaoka City, Suyoshi Town, Mt. Nokogiriyama, 25. V. – 7. VI. 2014, S. Shimizu & R. Shimizu leg. (MsT); KPM-NK 81728, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 5. IV. 2007, K. Watanabe leg.; KPM-NK 55010–55012, 3 F, Kanagawa Pref., Yamakita Town, Nakagawa, 3. IX. 2019 (host coll.), IX. 2019 em., Y. Komura leg.; KPM-NK 55006, 55007, 81727, 3 F, Shizuoka Pref., Honkawane Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg.; KPM-NK 81726, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 21–28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81724, F, Fukui Pref., Imajo Town, Kinometoge, 14. VIII. 1981, H. Kurokawa leg.; KPM-NK 81725, F, Hyogo Pref., Shinonsen Town, Kishida, 12. X. 2012, S. Fujie leg.; KPM-NK 55009, F, Hyogo Pref., Toyooka City, Mesaka, Nasa forest park, 9. X. 2011, S. Fujie leg. GERMANY: ZSM, F, (det Horstmann), Eiderstedt grüne Insel Vorland, 10. VIII. 1964.

Distribution. Japan* (Honshu); widely distributed in Western Palearctic region.

Bionomics. KPM-NK 55010–55012 were emerged from the cocoon of versicolor subgroup of *Meteorus* sp. (Hymenoptera, Braconidae). The all cocoons were parasitized by this species and *Gelis areator* (Panzer, 1804) (Hymenoptera, Ichneumonidae). Outside Japan, some microlepidoptera and braconids have been recorded as the hosts (see Yu *et al.*, 2016).



Fig. 5. *Acrolyta rufocincta* (Gravenhorst, 1829), KPM-NK 55012, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings.



Fig. 6. *Acrolyta spola* Momoi, 1970, KPM-NK 81747, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings.

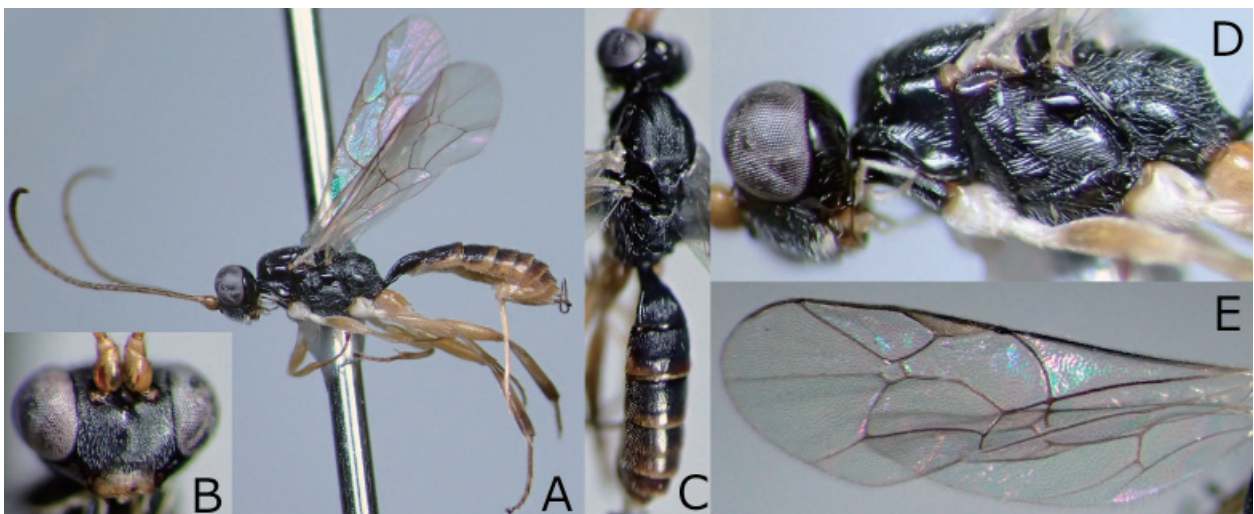


Fig. 7. *Diaglyptidea conformis* (Gmelin, 1790), KPM-NK 81603, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, head and mesosoma, lateral view; E, wings.

Remarks. This is the first record of this species from Japan and Eastern Palearctic region. Schwarz & Shaw (2000) described the clypeus with “a distinct tooth” while all Japanese specimens with a pair of distinct teeth. However other character states of both Japanese and European specimens are almost identical. Thus, I identify the Japanese specimens as this species.

Acrolyta spola Momoi, 1970

(SJN: Munebuto-mame-togari-himebachi)

(Figs 6A–D)

Acrolyta spola Momoi, 1970: 344.

Description. See Momoi (1970).

Material examined. JAPAN: KPM-NK 81747, F, Kagoshima Pref., Yakushima Is., Mt. Aikodake, 29. IV. – 30. V. 2007, T. Yamauchi leg.; MNHAH, F (holotype), Amamioshima Is., Nase, 28. III.

Distribution. Japan (Yakushima Is.*, Amamioshima Is., Okinawajima Is., and Ishigakijima Is.).

Bionomics. Unknown.

Remarks. This is the first record of this species from Yakushima Island.

Genus *Diaglyptidea* Viereck, 1913

Diaglyptidea Viereck, 1913: 371. Type: *Diaglyptidea roepkei* Viereck, 1913. Original designation.

In Palearctic region, two species, *Diag. conformis* (Gmelin, 1790) and *Diag. varipes* Jonaitis, 1981, have been recorded. In this study, I newly record *Diag. conformis* from Japan. This is the first record of this genus from Japan.

Diaglyptidea conformis (Gmelin, 1790)

(New SJN: Fusahige-mame-togari-himebachi)

(Figs 7A–E, 62D, 65B)

Ichneumon conformis Gmelin, 1790: 2720.

Hemiteles secernendus Schmiedeknecht, 1897: 108.

Description based on Japanese materials. Female (n=60). Body length 3.4–4.8 mm. Body covered with silver setae.

Head. Clypeus covered with long and very dense setae, its anterior margin concave and indistinctly visible, obtuse in lateral view (Figs 4D, 62D). Face granulate (Fig. 7B). MSL 1.05–1.25 times as long as BWL. Malar

space smooth with a few setae. Frons, vertex, and gena polished, with fine punctures. OOL almost as long as POL. Occipital carina incomplete dorsally, its lower end joined with hypostomal carina near mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible flat. Antenna with 21–24 flagellomeres, median and subapical parts not distinctly widened. FL III 3.2–3.75 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum largely rugose except for dorsal and ventral smooth areas, with epomia (Fig. 7D). Mesoscutum matt (Fig. 7B) and subpolished, except for irregularly rugose posterior area, with distinct notaulus. Scutellum rugose-punctate anteriorly, punctate posteriorly. Mesopleuron covered with dense longitudinal striae except for smooth speculum (Fig. 7D). Metapleuron largely covered with sparse punctures and short striae, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65B). Area basalis distinct (Fig. 65B). Area superomedia distinct or partly indistinct laterally (Fig. 65B). Anterior part of propodeum finely and sparsely punctate. Median and posterior parts of propodeum covered with longitudinal, oblique and irregular rugae. Length of fore wing 2.9–4.2 mm. Areolet absent (Fig. 7E). Vein 2m-cu of fore wing with two bullae (Fig. 7E). Nervellus inclivous, intercepted behind the middle (Fig. 7E). Hind femur 4.0–4.5 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.8: 0.6: 0.3: 0.5. Tarsal claws simple.

Metasoma. T I 1.4–1.5 times as long as maximum width, longitudinally striated. Median dorsal carina of T I present except for posterior part indistinct to absent. Dorsolateral carina of T I complete. T II punctate anterior 0.7 except for subapical transverse smooth area just in front of a shallow transverse concavity, anterior 0.4 covered with longitudinal striae. T III to T V covered with punctures except for smooth posterior areas. Ovipositor sheath 0.75–0.78 times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth.

Coloration (Figs 7A–E). Body (excluding wings and legs) black to blackish brown. Scape, pedicel, and base of FL I reddish brown to yellowish brown (but dorsal part sometimes darkened). Mandible yellowish brown except for darkened apex. Palpi, postero-dorsal corner of pronotum, and tegula yellow. Posterior and lateral margins of T II to T VII reddish brown. Membranous part of metasomal sternites and ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown to brown. Legs reddish brown to yellowish brown. Trochanters, trochantelli, and fore and mid coxae yellow. Basal and apical parts of hind tibia and TS V more or less tinged

with blackish brown. Dorsal part of hind coxa sometimes weakly tinged with dark brown.

Male (n=14). Similar to female. Body size overlapped with female but usually smaller than female. T I 1.6–1.7 times as long as maximum width.

Materials examined. JAPAN: KPM-NK 81641–81648, 6 F & 2 M, Tokyo, Izuoshima Is., Ohshima Town, Mt. Omaru, 17. VIII. – 5. X. 2012, K. Tsujii leg.; KPM-NK 81598–81640, 32 F & 11 M, Tokyo, Miyakejima Is., Miyake Vil., Tsubota-rindo, 25. VIII. – 22. IX. 2012, K. Tsujii leg. (MsT); KPM-NK 81649, F, Tokyo, Hachijojima Is., Mt. Miharayama, 31. V. 2012, K. Tsujii leg.; KPM-NK 81650, F, Tokyo, Hachijojima Is., Hachijo Town, Mitsune, Mt. Miharayama, 6. X. 2011, K. Tsujii leg.; KPM-NK 81651–81653, 3 F, Tokyo, Mikurajima Is., Mikurajima Vil., Eigasawa, 20. IX. – 25. X. 2012, K. Tsujii leg. (MsT); KPM-NK 81654, F, Tokyo, Mikurajima Is., Mikurajima Vil., Borosawa, 13. V. 2012, K. Tsujii leg.; KPM-NK 81655, F, Tokyo, Mikurajima Is., Mikurajima Vil., 14. V. 2012, K. Tsujii leg. (YPT); KPM-NK 81657, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 6. VIII. 2010, K. Watanabe leg.; KPM-NK 81658, F, ditto, 7. VIII. 2010, K. Watanabe leg.; KPM-NK 81656, F, ditto, 30. VI. 2012, M. Ito leg.; KPM-NK 81659, F, Niigata Pref., Myoukou City, Suginosawa, Myoukou-sasagamine, 9. VII. 2013, S. Shimizu leg.; KPM-NK 81660, M, ditto, 17. IX. 2013; KPM-NK 81662–81663, 2 F, Niigata Pref., Sado Is., Kanaishinbo, Hakuundai-Mt. Myoukenzan, 10. IX. 2010, K. Watanabe leg.; KPM-NK 81664–81666, 3 F, Shizuoka Pref., Honkawane Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg.; KPM-NK 81667–81668, 2 F, Toyama Pref., Nanto City, Togamura-kamimomose, 21–28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81669–81670, 2 F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81671–81672, 2 F, ditto, 16–25. VIII. 2009; KPM-NK 81661, F, Osaka Pref., Takatsuki City, Mishimae, left bank of Yodo river, 27. X. 2012, S. Fujie leg. GERMANY: ZSM, F (det. Horstmann), Göttingen, 16. VIII. 1947.

Distribution. Japan (Honshu, Sado Is., Izuoshima Is., Miyakejima Is., Hachijojima Is., and Mikurajima Is.); widely distributed in Western Palearctic region.

Bionomics. Unknown in Japan. Some microlepidoptera and braconids have been recorded as the hosts (see Yu *et al.*, 2016).

Remarks. This is the first record of this species from Japan and Eastern Palearctic region. This species can be distinguished from *Diag. varipes* by the occipital carina complete (incomplete medially in *Diag. varipes*)

(Jonaitis, 1981).

Genus *Lysibia* Förster, 1869

Lysibia Förster, 1869: 175. Type: *Tryphon nanus* Gravenhorst, 1829. Designated by Perkins (1962).

Pemon Förster, 1869: 174. Type: *Pemon proximum* Perkins, 1962 (= *Haplaspis ceylonensis* Kerrich, 1956). Designated by Perkins (1962).

Stiboscopus Förster, 1869: 182. Type: *Hemiteles mandibularis* Provancher, 1875. Designated by Carlson (1979).

Haplaspis Townes, 1944: 190. Type species: *Hemiteles mandibularis* Provancher, 1875. Original designation.

Two species, *Ly. ceylonensis* (Kerrich, 1956) and *Ly. nana* (Gravenhorst, 1829), have been recorded from Japan. In this study, I record the distributional data of the former below. Key to species including Japanese species is provided by Townes (1983).

Lysibia ceylonensis (Kerrich, 1956) (SJN: Ceylon-mame-togari-himebachi) (Figs 8A–C)

Haplaspis ceylonensis Kerrich, 1956 in Blunck & Kerrich (1956): 555.

Pemon proximum Perkins, 1962: 395.

Materials examined. JAPAN: KPM-NK 55013, F, Niigata Pref., Myoukou City, Suginosawa, Mt. Sasagamine, 13. X. 2013, S. Shimizu leg.; KPM-NK 55014, Niigata Pref., Sado Is., Sado City, Kanaishinbo, Hakuundai to Mt. Myokenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 81729–81731, 3 F, Tokyo, Izuoshima Is., Ohshima Town, Mt. Omaru, 17. VIII. – 5. X. 2012, K. Tsujii leg. (MsT). CHINA: GSFP, F (det. Sheng), Jiangxi, 24. IV. 2011.

Description. See Townes (1983) and Sheng *et al.* (2013).

Distribution. Japan (Hokkaido, Honshu*, Sado Is.*, and Izuoshima Is.*); Taiwan, China, India, Sri Lanka, and Europe.

Bionomics. Unknown.

Remarks. This is the first record of this species from Honshu, Sado Is., and Izuoshima Is.

Genus *Micraris* Townes, 1970

Micraris Townes, 1970: 36. Type: *Micraris collaris* Townes, 1970. Original designation.

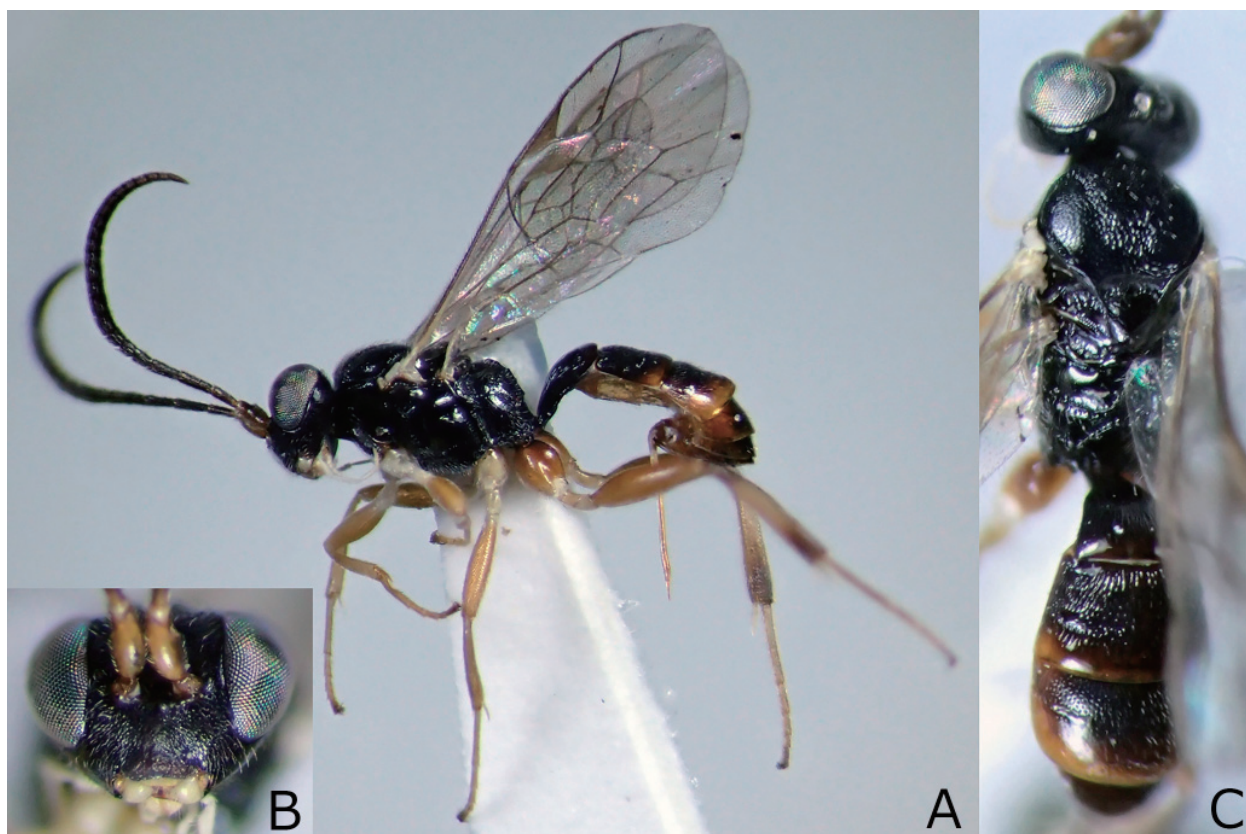


Fig. 8. *Lysibia ceylonensis* (Kerrich, 1956), KPM-NK 55013, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

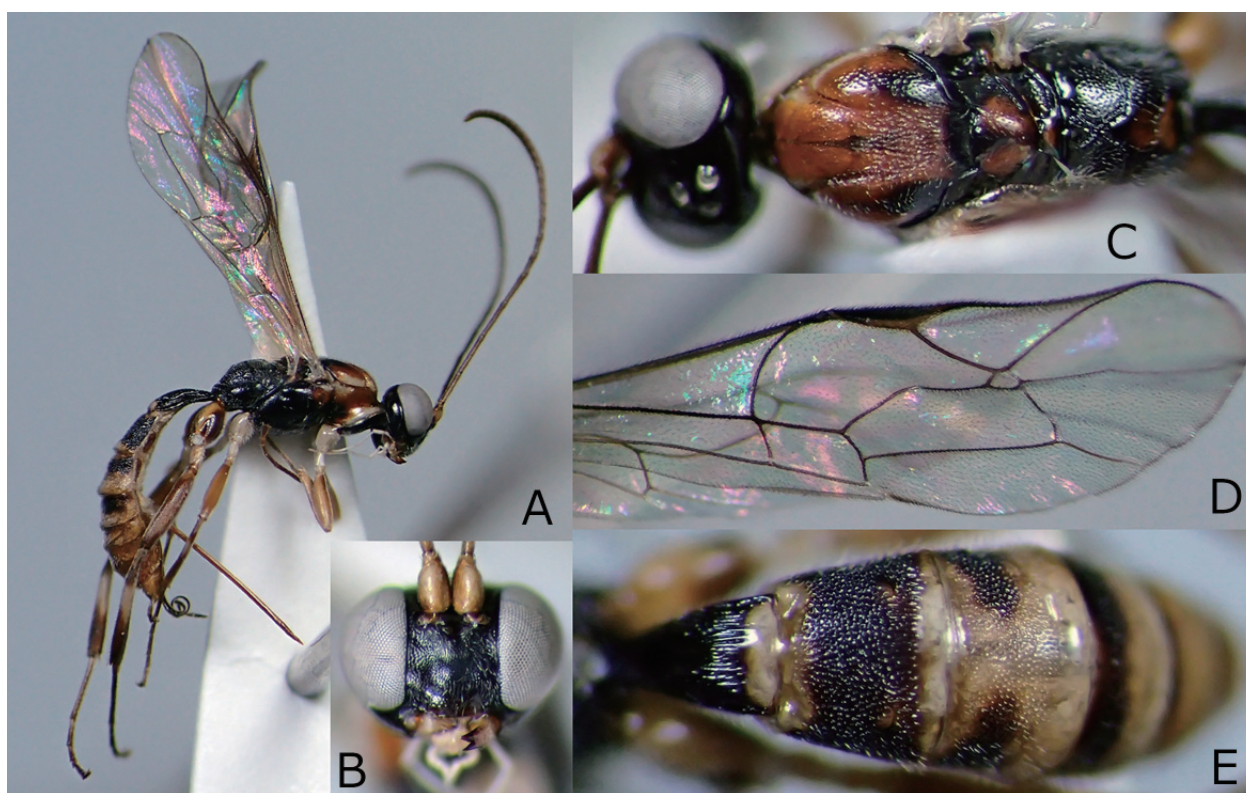


Fig. 9. *Micraris ryukyuensis* **sp. nov.**, KPM-NK 81873, holotype, female — A, lateral habitus; B, head, frontal view; C, head and mesosoma, dorsal view; D, wings; E, metasoma, dorsal view.

Only a type species, *Mi. collaris* Townes, 1970, has been recorded from the Philippines. In this study, I newly record this genus from Japan based on a new species *Mi. ryukyuensis* **sp. nov.** described below. This is also the first record of this genus from Palearctic region.

***Micraris ryukyuensis* sp. nov.**

(New SJN: Ryukyu-mame-togari-himebachi)

(Figs 9A–E, 65C, 66B)

Etymology. The specific name is from Ryukyu Islands, where contains the type locality, Yakushima Islands.

Type series. Holotype: KPM-NK 81873, F, JAPAN, Kagoshima Pref., Yakushima Is., Hanyama, 29. I. – 27. II. 2007, T. Yamauchi *et al.* leg. (MsT).

Description. Female (n=1). Body length 5.7 mm. Body covered with silver setae.

Head. Clypeus 1.8 times as wide as maximum length, its anterior margin subtruncate, narrowly margined. Face polished, punctate (Fig. 9B). MSL 0.5 times as long as BWM. Frons and gena polished, with fine and sparse punctures. Vertex largely smooth. OOL longer than POL. POL shorter than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible flat. Antenna with 25 flagellomeres, subapical part slightly widened. FL III 7.0 times as long as maximum depth in lateral view.

Mesosoma 2.1 times as long as maximum depth in lateral view. Lateral part of pronotum smooth except for punctuated dorso-lateral areas, with short epomia. Mesoscutum polished, punctate except for postero-median rugulose area, with distinct notaulus (Fig. 9C). Punctures on median and lateral lobes of mesoscutum evenly punctate, separated by about 1.5 times as long as diameter of punctures. Scutellum punctate, its lateral margin completely absent. Mesopleuron covered with longitudinal striae medially, punctures dorsally and ventrally except for smooth speculum. Metapleuron punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65C). Area basalis distinct (Fig. 65C). Area superomedia indistinct laterally (Fig. 65C). Anterior part of propodeum punctate (Fig. 9C). Median and posterior parts of propodeum punctate except for median smooth areas. Areolet present (vein 3rs-m weakly developed) (Fig. 9D). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted behind the middle (Fig. 9D). Length of fore wing 4.5 mm. Hind femur 4.3 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.8: 0.6: 0.3: 0.5. Tarsal

claws simple.

Metasoma. T I 1.9 times as long as maximum width, longitudinally striae (Fig. 9E) except for area above spiracle punctate. Median dorsal carina of T I present except for posterior part. Dorsolateral carina of T I complete. T II and T III densely punctate except for posterior smooth area (Fig. 9E), with subapical shallow transverse concavity, with a pair of smooth convexity on the sublateral side of the concavity. T IV and T V covered with dense punctures except for smooth posterior areas. Ovipositor sheath 1.0 times as long as hind tibia. Apex of ovipositor without a nodus and its lower valve expanded dorsally to enclose tip of upper valve, with subvertical teeth (Fig. 66B).

Coloration (Figs 9A–E). Body (excluding wings and legs) black to blackish brown. Ventral parts of scape and pedicel yellowish brown. Ventral surface of flagellum paler than dorsal surface. Mandible yellowish brown except for darkened apex. Palpi, postero-dorsal corner of pronotum, collar, anterior spot of mesoscutum, subtegular ridge, and tegula yellow. Pronotum reddish yellow except for yellow areas and posterior black area. Mesoscutum reddish yellow except for yellow areas and posterior black area. Mesopleuron with reddish yellow area below subtegular ridge. Scutellum reddish yellow except for median black area. Postscutellum reddish yellow. Propodeum with a median reddish yellow spot. Posterior part of T I to T V whitish yellow. Anterior margin of T II to T IV whitish yellow. Whitish yellow area of T III enlarged and joined anterior area with posterior area at median part. T VI to T VIII entirely reddish yellow. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma dark brown. Legs reddish brown to yellowish brown. Trochanters, fore and mid coxae, and trochantelli yellow. Fore and mid tibiae with a white base and a subbasal white band. Dorsal part of hind coxa blackish brown except for dorsal and basal brown areas. Apical part of hind femur, basal and apical parts of hind tibia, and hind tarsus blackish brown. Hind tibia with a subbasal white band.

Male. Unknown.

Distribution. Japan (Yakushima Is.).

Bionomics. Unknown.

Remarks. This species can be distinguished from *Mi. collaris* by the following character states: antero-ventral area of mesopleuron without wrinkles (with wrinkles in *Mi. collaris*); length of fore wing 4.5 mm (3.2–3.8 mm in *Mi. collaris*); pronotum, mesoscutum, and mesopleuron tinged with tricolor by black, red, and yellow (bicolor by black and white or other color in *Mi. collaris*).

***Bathythrix* genus group**
(subtribe Bathytrichina sensu Townes (1970))

Two genera, *Bathythrix* Förster, 1869 and *Retalia* Seyrig, 1952, have been recorded from Japan. In addition, I found *Surculus* from Japan. In this study, I newly record this genus from Japan and review *Bathythrix* and *Retalia*. The Japanese genera can be distinguished by the following key.

Key to Japanese genera of *Bathythrix* genus group

1. Notaulus short, not reaching to center of mesoscutum, its ending abruptly at a weak pit (Fig. 63E). Body relatively small, fore wing shorter than 3.5 mm.
..... *Retalia* Seyrig, 1952
- . Notaulus long, at least reaching to center of mesoscutum, its end without pit (Figs 63D, F). Body relatively large, fore wing usually longer than 3.5 mm.
..... 2
2. Notaulus fading out near center of mesoscutum (Fig. 63F). T I with its spiracle near the basal 0.45 (Fig. 65X). Anterior section of lateral longitudinal carina of propodeum absent (Fig. 64A).
..... *Surculus* Townes, 1970
- . Notaulus ending abruptly far behind center of mesoscutum (Fig. 63D). T I with its spiracle usually beyond the middle. Anterior section of lateral longitudinal carina of propodeum present.
..... *Bathythrix* Förster, 1869

Genus *Bathythrix* Förster, 1869

- Ischnurgops* Förster, 1869: 175. Type: *Cryptus claviger* Taschenberg, 1865. Designated by Viereck (1914).
Steganops Förster, 1869: 175. Type: *Cryptus claviger* Taschenberg, 1865. Designated by Viereck (1914).
Bathythrix Förster, 1869: 176. Type: *Bathythrix meteori* Howard, 1897. Designated by Viereck (1914).
Panargyrops Förster, 1869: 182. Type: *Cryptus claviger* Taschenberg, 1865. Designated by Viereck (1914).
Gausocentrus Förster, 1869: 198. Type: *Gausocentrus gyrini* Ashmead, 1894 (= *Hemiteles gyrinophagus* Cushman, 1930). Designated by Viereck (1914).
Stenoschema Förster, 1869: 220. Nomen nudum.
Leptocryptus Thomson, 1873: 1884. Type: *Cryptus claviger* Taschenberg, 1865. Designated by Viereck (1914).
Agenora Cameron, 1909: 722. Type: *Agenora hirticeps* Cameron, 1909. Monobasic.

Six species, *Ba. claviger* (Taschenberg, 1865), *Ba. kuwanae* Viereck, 1912, *Ba. linearis* (Gravenhorst, 1829), *Ba. narangae* (Uchida, 1930), *Ba. prothorax* Momoi, 1970, and *Ba. sericea* (Provancher, 1875), have been recorded from Japan. In this study, I newly record *Ba. marginatae* Sawoniewicz, 1980 and *Ba. thomsoni* (Kerrich, 1942) from Japan and newly synonymized *Ba. narangae* under *Ba. kuwanae* below. In addition, I record some distributional data of all Japanese species below. Japanese species including unidentified species can be distinguished by the following key.

**Preliminary key to Japanese species
of the genus *Bathythrix* (♀)**
(female of *Ba. prothorax* is unknown)

1. Face strongly narrowed ventrally, eye almost reaching basal part of mandible (Figs 13B, 62B).
..... *Ba. marginatae* Sawoniewicz, 1980
- . Face not strongly narrowed ventrally, eye not reaching basal part of mandible (e.g., Figs 12B, 62A, C).
..... 2
2. Anterior tentorial pit exceptionally large, extending from the margin of clypeus and basal part of mandible to lower eye margin, with long dense setae inside (Figs 15B, 62C). And nervellus not intercepted.
..... 3
- . The combination of above character states lacking.
..... 5
3. Lower part of occipital carina absent near hypostomal carina.
..... *Ba. sp. A*
- . Lower part of occipital carina complete.
..... 4
4. T II and T III covered with longitudinal striae (Fig. 15C).
..... *Ba. thomsoni* (Kerrich, 1942)
- . T II and T III covered with punctures, without longitudinal striae.
..... *Ba. sp. B*
5. Anterior tentorial pit exceptionally large, extending from the margin of clypeus and basal part of mandible to lower eye margin, with long dense setae inside. The margin of the pit invisible.
..... *Ba. sp. D*
- . Anterior tentorial pit not exceptionally large, without long dense setae inside (e.g., Fig. 62A). The margin of the pit at least largely visible (e.g., Fig. 62A).
..... 6
6. T II and T III covered with longitudinal striae.
..... *Ba. spp.*

- . T II and T III covered with punctures, without longitudinal striae.
..... 7
- 7. T II and T III largely red, with black spots (Figs 11A, C). And hind femur and tibia reddish yellow with conspicuous black apex (Fig. 11A).
..... *Ba. kuwanae* Viereck, 1912
(= *Ba. narangae* Uchida, 1930 **syn. nov.**)
- . The combination of character states lacking.
..... 8
- 8. Ovipositor sheath shorter than 1.3 times as long as hind tibia. And/or metasomal tergites with large red area(s).
..... *Ba. spp.*
- . Ovipositor sheath longer than 1.5 times as long as hind tibia (Figs 10A, 12A). And metasomal tergites entirely black (posterior margin sometimes narrowly tinged with reddish brown) (Figs 10C, 12C, 16C).
..... 9
- 9. Hypostomal carina strongly raised behind the base of mandible. Dorsolateral carina of T I absent beyond the spiracle. Hind coxa and femur dark reddish brown to black (Fig. 12A).
..... *Ba. linearis* (Gravenhorst, 1829)
- . Hypostomal carina not raised behind the base of mandible. Dorsolateral carina of T I present or absent beyond the spiracle. Coloration of hind coxa and femur various.
..... 10
- 10. Dorsolateral carina of T I at least present beyond

the spiracle. Coxae and hind femur reddish brown (Fig. 10A).

..... *Ba. claviger* (Taschenberg, 1865)

- . Dorsolateral carina of T I absent beyond the spiracle. Fore and mid coxa whitish yellow. Hind coxa and hind femur dark reddish brown to black (Figs 16A, C).
..... *Ba. sericea* (Provancher, 1875)

Bathythrix claviger (Taschenberg, 1865)
(SJN: Kuro-mame-togari-himebachi)
(Figs 10A–C)

Cryptus claviger Taschenberg, 1865: 76.

Cryptus (Chaeretymma) ater Brischke, 1881: 337.

Bathythrix tibialis Cushman, 1917: 458.

Description. See Sawoniewicz (1980).

Materials examined. JAPAN: KPM-NK 81874, F, Hokkaido, Shintoku town, Tomuraushi, 23. VI. 2017, K. Watanabe leg.; KPM-NK 81876, F, Yamanashi Pref., Hokuto City, Masutomi, Biwakubo-sawa, 24. VI. 2007, K. Watanabe leg.; KPM-NK 81875, F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT). GERMANY: ZSM, M (det. Sawoniewicz), Handorfer Gel., Rendsbg, 8. VII. 1962; ZSM, F (det. Sawoniewicz), Schraudenbach Würzburg, 4. VI. 1968.

Distribution. Japan (Shikotan Is., Hokkaido, and Honshu*); widely distributed in Palearctic region.



Fig. 10. *Bathythrix claviger* (Taschenberg, 1865), KPM-NK 81876, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

Bionomics. Unknown in Japan. Some sawflies and coleopterans have been recorded as the hosts (see Yu *et al.*, 2016).

Remarks. This is the first record of this species from Honshu.

***Bathythrix kuwanae* Viereck, 1912**

(SJN: Kuwana-mame-togari-himebachi)

(Figs 11A–C, 62A, 63D, 65D)

Bathythrix kuwanae Viereck, 1912b: 584.

Bathythrix kuwanae var. *nigrans* Sonan, 1930: 358.

Hemiteles narangae Uchida, 1930: 342. **Syn. nov.**

Description. Female (n=11). Body length 3.4–5.3 mm. Body covered with silver setae.

Head. Clypeus punctate except for smooth anterior part, its anterior margin with a pair of obtuse teeth. Face punctate, covered with long setae, not strongly narrowed ventrally (Figs 11A, 62A). Eye not reaching basal part of mandible. Anterior tentorial pit not exceptionally large, without long dense setae inside (Fig. 62A). The margin of the pit at least largely visible. MSL 0.45–0.5 times as long as BWM. Frons, vertex, and gena polished, finely punctate. OOL: POL: OD = 1.0: 0.6: 0.4–0.5. Occipital carina complete, sinuate ventrally, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible flat. Antenna with 23–25 flagellomeres. FL I 3.95 times as long as maximum depth in lateral view. FL III 3.25 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum largely rugose except for dorsal and ventral smooth areas, with strong epomia. Mesoscutum polished, finely punctate, with long notaulus (Fig. 63D). Scutellum finely punctate. Mesopleuron finely punctate except on speculum and a small area in front of and a little below speculum. Posterior transverse carina of mesosternum complete. Metapleuron largely rugose, its juxtacoxal carina indistinct. Propodeum covered with irregular rugae. Propodeal carinae complete but median section of lateromedian longitudinal carina somewhat indistinct. Area superomedia longer than wide, receiving the lateral section of anterior transverse carina anteriorly (Fig. 65D). Area petiolaris with a median longitudinal carina. Nervellus intercepted slightly posterior to middle. Length of fore wing 3.1–4.3 mm. Hind femur 5.0–5.4 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9–1.0: 0.6: 0.4: 0.5. Tarsal claws simple.

Metasoma. T I 3.0–4.0 times as long as maximum width,

largely smooth. Median dorsal carina of T I present except for posterior part indistinct, largely obtuse. Dorsolateral carina of T I present in front of the spiracle. T II as long as or slightly shorter than maximum wide. T II to T V covered with fine punctures. Ovipositor sheath 0.81–0.93 times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth.

Coloration (Figs 11A–C). Body (excluding wings and legs) black to blackish brown. Basal part of antenna reddish brown to yellowish brown. Mandible reddish brown except for darkened apex. Palpi whitish yellow. Postero-dorsal corner of pronotum and tegula tinged with yellow. A longitudinally oval spot of posterior part of T I reddish brown. T II with large triangular reddish brown area, its width gradually widened posteriorly. Lateral margin of T II to T VII reddish brown. Anterior and posterior parts of T III reddish brown. Both areas enlarged medially and united into a single area. T III reddish brown posteriorly. T IV to T VII reddish brown but sometimes partly darkened. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown to dark brown. Fore and mid legs and hind coxa, trochanter, and trochantellus whitish yellow to yellowish brown. Hind femur and tibia reddish brown except for apex of femur and base and apical parts of tibia blackish brown. Apical part of mid tarsus and hind tarsus blackish brown.

Male (n=3). Similar to female. Flagellum without tyloids. MSL 0.5–0.6 times as long as BWM. T I 3.8–4.3 times as long as maximum width.

Materials examined. JAPAN: TARI, M (holotype of *Ba. kuwanae* var. *nigrans*), Hokkaido, Hakodate, 4. VIII. 1921, T. Shiraki leg.; SEHU, M, “Iwate”, Ogasawara leg.; KPM-NK 81722, M, Tokyo, Akiruno City, Ninomiya, Tamagawa-riverside, 3. V. 2010, K. Watanabe leg.; KPM-NK 81721, F, Kanagawa Pref., Ebina City, Sagami-gawa-Riv., 10. X. 1992, H. Nagase leg.; KPM-NK 81716, F, ditto, 30. IV. 2006, M. Ooishi & R. Watanabe leg.; KPM-NK 81717, F, Kanagawa Pref., Atsugi City, Funako, Tokyo University of Agriculture, 8. X. 2010, T. Mita leg.; KPM-NK 81719, F, Kanagawa Pref., Aikawa Town, Nakatsu, 11. IV. 2014; KPM-NK 81720, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 15. IV. 2007, K. Watanabe leg.; KPM-NK 81718, F, Shizuoka Pref., Ooigawa Town, Shitarou, 13. IX. 2008; TMNH, F, Aichi Pref., Toyohashi City, Iwata Town, Rihyooike, 25. IX. 2018, S. Morishita leg.; TMNH, F, Aichi Pref., Toyohashi City, Suse Town, Kanbata, 23. X. 2018, S. Morishita leg.; KU, F (det. Momoi, as *Ba. kuwanae*), Fukuoka Pref., Futsukaichi, 23. III. 1966, em. from *Naranga* sp., E. Drake leg.; SEHU,

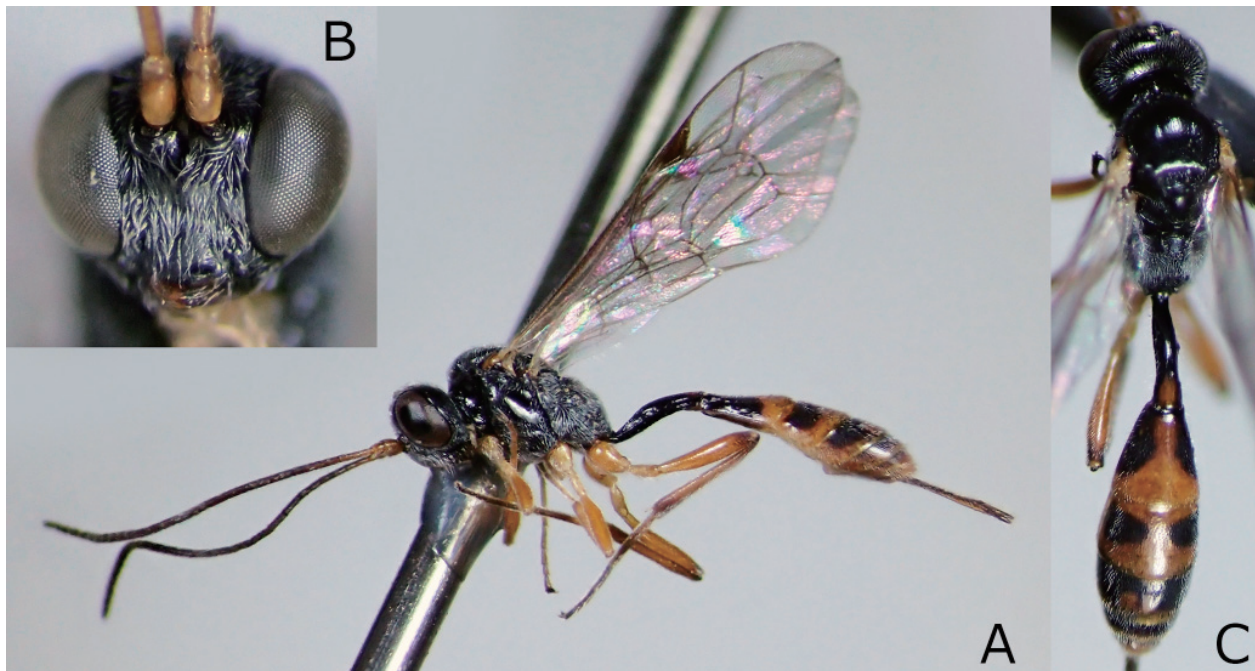


Fig. 11. *Bathythrix kuwanae* Viereck, 1912, KPM-NK 81718 (B) and 81719 (A, C), females from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

F (det. Kusigemati, as *Ba. narangae*), Kagoshima Pref., Kagoshima City, 14. VII. 1963, K. Kusigemati leg.; SEHU, M (det. Kusigemati, as *Ba. narangae*), ditto., 28. XI. 1963, em. from *Casinarina* sp.

Distribution. Japan (Hokkaido, Honshu, and Kyushu), China, Taiwan, and Korea.

Bionomics. Many pests and its parasitoids in paddy field have been recorded as the hosts (see Yu *et al.*, 2016). In Japan, three serious pests, *Hypera postica* Gyllenhal, 1813 (Coleoptera, Curculionidae), *Oulema oryzae* (Kuwayama, 1931) (Coleoptera, Chrysomelidae), and *Naranga aenescens* Moore, 1881 (Lepidoptera, Noctuidae), and a parasitoid, *Casinarina nigripes* (Gravenhorst, 1829) (Hymenoptera, Ichneumonidae), have been recorded as hosts (e.g., Viereck, 1912b; Minamikawa, 1954; Kusigemati, 1976; Togashi, 1974; Yamaguchi *et al.*, 2008).

Remarks. *Bathythrix narangae* (Uchida, 1930) is newly synonymized under this species because no differences of character states between both species are recognizable.

Bathythrix linearis (Gravenhorst, 1829)
(New SJN: Miyama-mame-togari-himebachi)
(Figs 12A–D)

Nematopodius linearis Gravenhorst, 1829: 958.

Leptocryptus heteropus Thomson, 1886: 1040.

Description. See Sawoniewicz (1980).

Materials examined. JAPAN: KPM-NK 81696,

F, Hokkaido, Horokanai Town, Moshiri, Uryu, Butokamabetsu-rindo, 17. VII. 2012, K. Watanabe leg.; KPM-NK 81697, 81702, 81710, F & 2 M, Hokkaido, Horokanai Town, Moshiri, Uryu, 11–17. VII. 2012, K. Watanabe leg.; KPM-NK 81678, F, Tochigi Pref., Nasushiobara City, Shiobara, Oonuma, 6. VI. 2008, 15. VI. 2008, T. Matsumura leg. (MsT); KPM-NK 81703, M, Tochigi Pref., Mogi Town, Ayuta, 19. X. 2011, M. Imaizumi leg.; KPM-NK 81709, M, Ibaraki Pref., Tsukuba City, Oda, Mt. Hokyosan, 18. V. 2014, S. Shimizu leg.; KPM-NK 81711, M, Tokyo, Takao Town, Hikage-sawato Koke-sawa, 3. V. 2007, K. Watanabe leg.; KPM-NK 81690–81693, 3 F & 1 M, Tokyo, Ome City, Mt. Mitake-san, 1. VI. 2008, M. Gunji leg.; KPM-NK 81698, F, Kanagawa Pref., Fujino Town, Mt. Jinba-yama, 7. VI. 2008, K. Watanabe leg.; KPM-NK 81701, F, Kanagawa Pref., Hakone Town, Sengokubara, 15. VI. 1956, R. Ishikawa leg.; KPM-NK 81707, M, Kanagawa Pref., Atsugi City, Nakaogino, 26. IV. 2008, M. Gunji leg.; KPM-NK 81695, 81699, F & M, Yamanashi Pref., Koushu City, Katsunuma Town, Ootaki-fudou, 22. V. 2010, K. Watanabe leg.; KPM-NK 81700, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 13. VI. 2015, K. Watanabe leg.; KPM-NK 81706, M, Nagano Pref., Kawakami Vil., Mt. Azusayama, 14. VI. 2015, K. Watanabe leg.; KPM-NK 81694, M, Niigata Pref., Nagaoka City, Suyoshi Town, Mt. Nokogiri-yama, 6. V. 2014, 25. V. 2014, S. Shimizu & R. Shimizu leg. (MsT); KPM-NK 81705, F, Shizuoka Pref., Shizuoka City, Umegashima, Abe-toge, 15. VI. 2008, K.

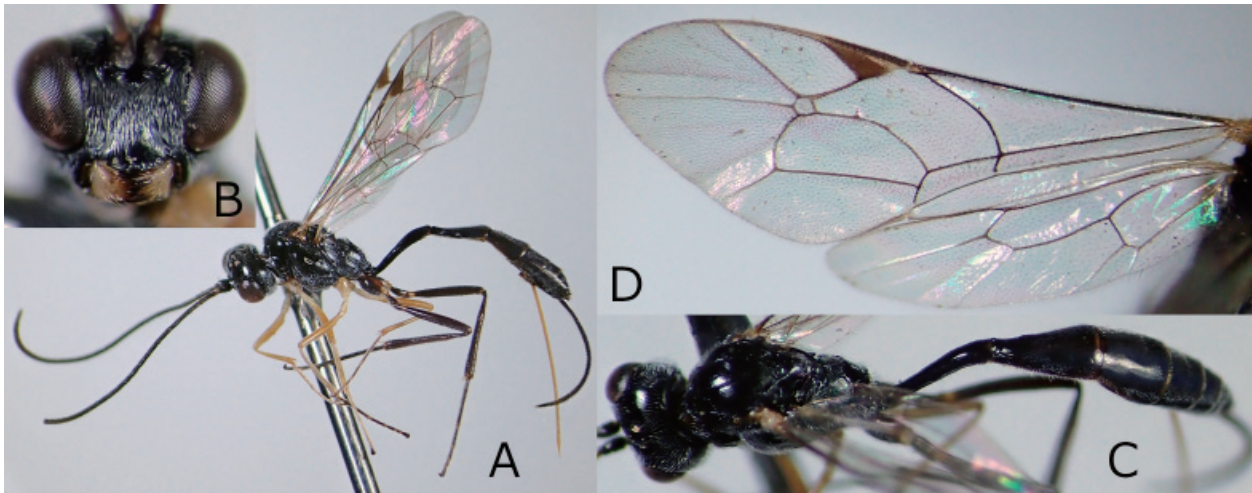


Fig. 12. *Bathythrix linearis* (Gravenhorst, 1829), KPM-NK 81695, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsolateral view; D, wings.

Watanabe leg.; KPM-NK 81712, F, Mt. Tateyama, 17. X. 1974, K. K. & M. W. leg.; KPM-NK 81679, 81681, 2 F, Toyama Pref., Nanto City, Togamura-kamimomose, 18. VIII. 2009, 25. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81680, 81682, 81714, 3 F, ditto, 25. VIII. – 1. IX. 2009; KPM-NK 81683, 81688, F & M, ditto, 1–8. IX. 2009; KPM-NK 81687, F, ditto, 8–15. IX. 2009; KPM-NK 81684–81686, 81715, 4 F, ditto, 15–29. IX. 2009; KPM-NK 81713, F, Toyama Pref., Toyama City, Arimine, Inonedani, 1. IX. 2009, 8. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81689, F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 21. VII. 2009, 28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81704, M, Hyogo Pref., Kami Town, Niiya, 16. VII. 2011, M. Ito leg.; KPM-NK 81708, F, Hyogo Pref., Sayo Town, Funakoshi, 14. V. 2011, S. Fujie leg.

Distribution. Japan (Kunashiri Is., Hokkaido*, and Honshu*); widely distributed in Palearctic region (Yu *et al.*, 2016).

Bionomics. Unknown.

Remarks. This is the first record of this species from Hokkaido and Honshu.

Bathythrix margaretae Sawoniewicz, 1980

(SJN: Yorime-mame-togari-himebachi)

(Figs 13A–C, 62B)

Bathythrix margaretae Sawoniewicz, 1980: 350.

Description. See Sawoniewicz (1980).

Materials examined. JAPAN: KPM-NK 50015, F, Yamanashi Pref., Hokuto City, Kanayamazawa, 3. VIII. 2006, T. Mita leg.; KPM-NK 50016–50018 3 F, Yamanashi Pref., Hokuto City, Masutomi, Biwakubo-sawa, 23–24.

VII. 2007, K. Watanabe leg.

Distribution. Japan* (Honshu), Canada, Finland, Germany, Poland, USA, and UK.

Bionomics. Unknown.

Remarks. This is the first record of this species from Japan.

Bathythrix prothorax Momoi, 1970

(SJN: Kimune-mame-togari-himebachi)

(Figs 14A–D)

Bathythrix prothorax Momoi, 1970: 342.

Description. See Momoi (1970).

Material examined. KPM-NK 81877, M, Okinawa Pref., Ishigakijima Is., Mt. Omoto-dake, 8. V. 2004, T. Mita leg.; MNHAH, M (holotype), Iriomotejima Is., Ushikumori, 11. III. 1964, C. M. Yoshimoto & J. Harrell leg.

Distribution. Japan (Ishigakijima Is.* and Iriomotejima Is.).

Bionomics. Unknown.

Remarks. This is the first record of this species from Ishigakijima Island.

Bathythrix thomsoni (Kerrich, 1942)

(New SJN: Thomson-mame-togari-himebachi)

(Figs 15A–C, 62C)

Thysiotorus thomsoni Kerrich, 1942: 56.

Panargyrops aereus corsicator Aubert, 1961: 171.

Description. See Sawoniewicz (1980).

Materials examined. JAPAN: KPM-NK 81673, F, Niigata Pref., Sado Is., Kanaishinbo, Hakuundai-Mt.

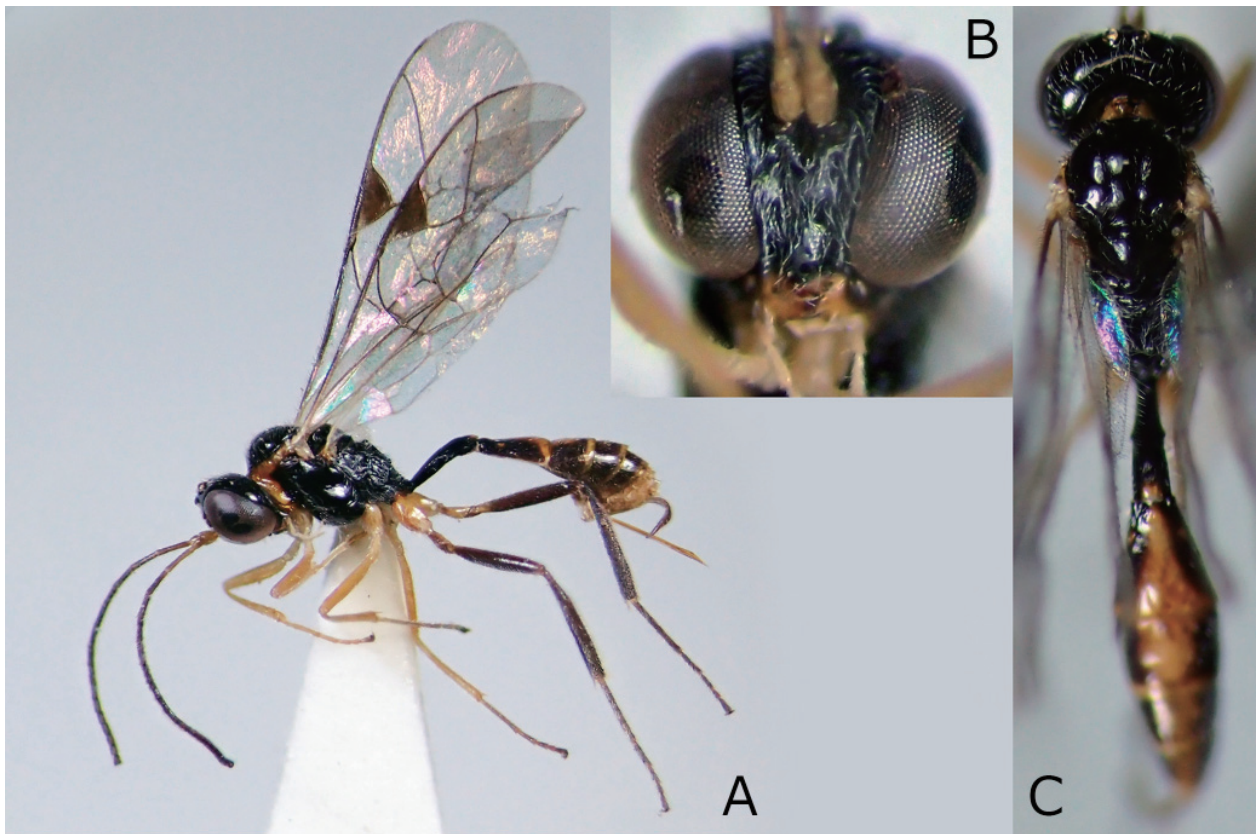


Fig. 13. *Bathythrix margaretae* Sawoniewicz, 1980, KPM-NK 55017, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.



Fig. 14. *Bathythrix prothorax* Momoi, 1970, KPM-NK 81877, male from Japan — A, lateral habitus; B, head, frontal view; C, head and anterior part of mesosoma, lateral view; D, head, mesosoma, and metasoma, dorsal view.

Myoukenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 81674, F, ditto, 10. IX. 2010; KPM-NK 81675, F, Hyogo Pref., Kami Town, Niiya, Mikata kogen, 26. VI. – 18. VII. 2011, S. Fujie leg. (MsT).

Distribution. Japan* (Honshu); widely distributed in Palearctic region.

Bionomics. Unknown in Japan. Various hosts like as microlepidoptera and braconids have been recorded (see Yu *et al.*, 2016).

Remarks. This is the first record of this species from Japan.

Bathythrix sericea (Provancher, 1875)
(New SJN: Hokubei-mame-togari-himebachi)
(Figs 16A–C)

Mesostenus sericeus Provancher, 1875: 264.

Description. See Townes (1983).

Material examined. JAPAN: KPM-NK 55019, F, Nagano Pref., Outaki Vil., M. Ontake-san, Tanohara, 13. VI. 2015, K. Watanabe leg.

Distribution. Japan (Honshu), Canada, and USA.

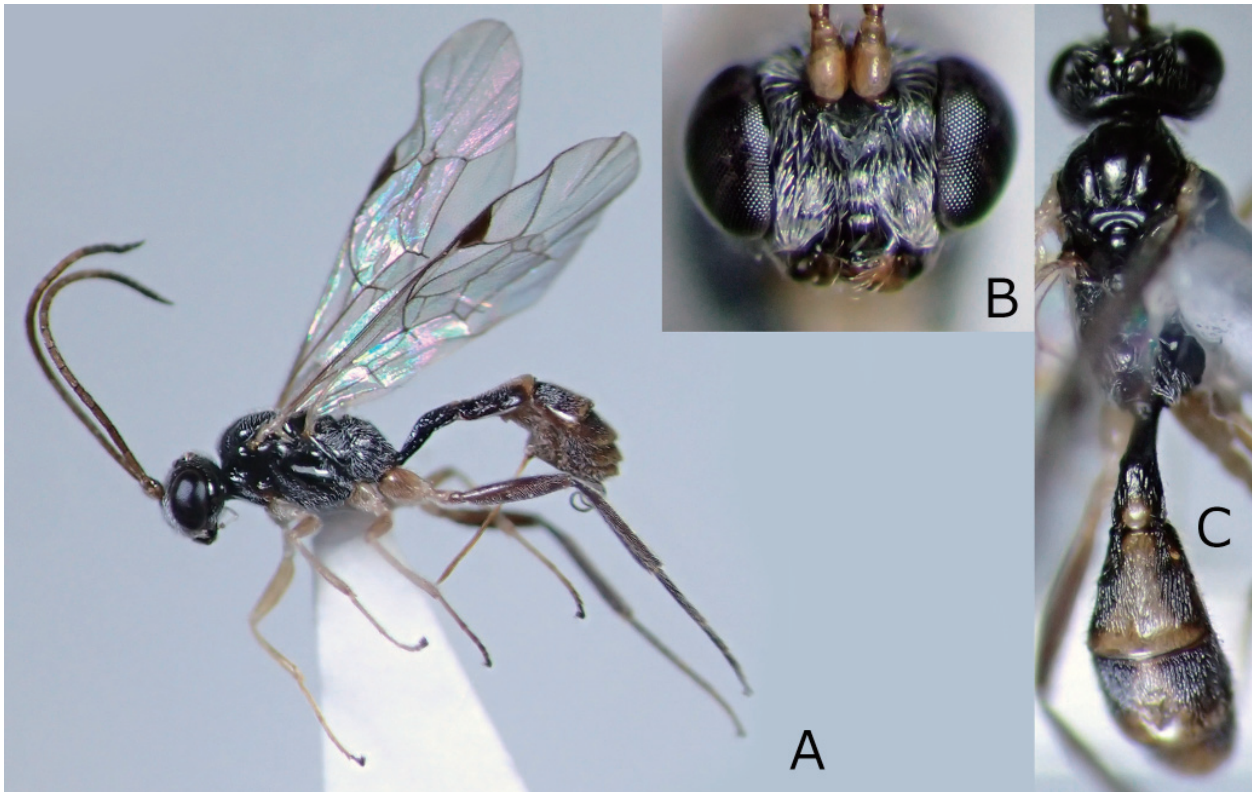


Fig. 15. *Bathythrix thomsoni* (Kerrich, 1942), KPM-NK 81675, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

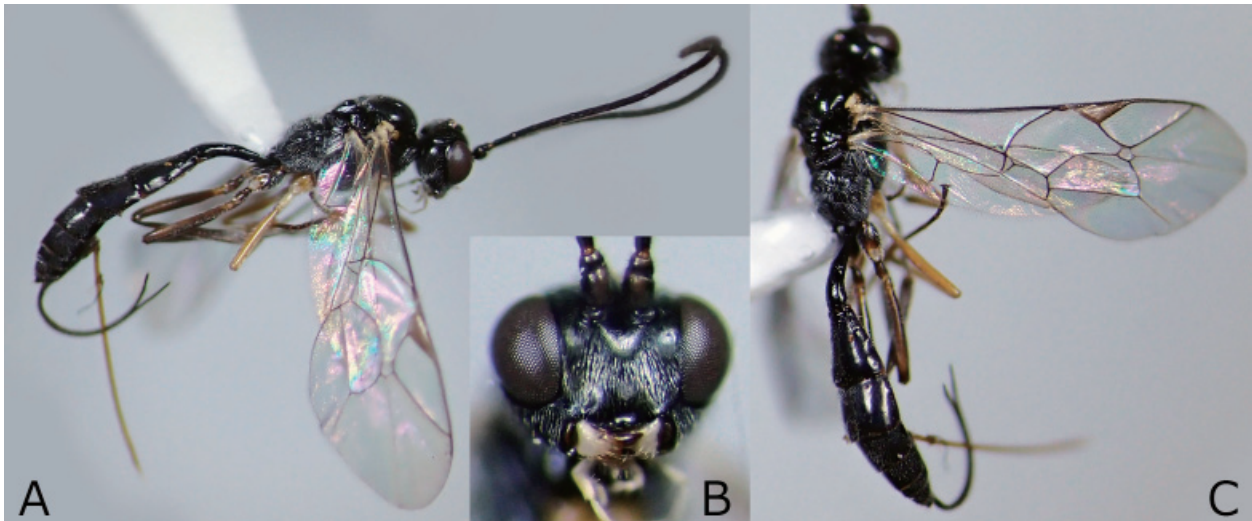


Fig. 16. *Bathythrix sericea* (Provancher, 1875), KPM-NK 55019, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, wings, and metasoma, dorsal view.

Bionomics. Unknown.

distributional data of this species below.

Genus *Retalia* Seyrig, 1952

Retalia japonica Kusigemati, 1985

(SJN: Haraboso-mame-togari-himebachi)

(Figs 17A, B, 63E)

Retalia Seyrig, 1952: 70. Type: *Retalia nitida* Seyrig, 1952. Original designation.

Retalia japonica Kusigemati, 1985: 226.

A single species, *Re. japonica* Kusigemati, 1985, has been recorded from Japan. In this study, I record some

Description. See Kusigemati (1985).

Materials examined. JAPAN: SEHU, F (holotype), Hokkaido, Aizankei, 3. VIII. 1966, K. Kusigemati leg.; KPM-NK 81677, F, Yamagata Pref., Mamurogawa Town, 4. IX. 2009, Y. Matsubara & K. Fukuda leg. (MsT); SEHU, M (paratype), Shizuoka Pref., Mt. Amagi, 31. V. 1959, K. Kamijo leg.; KPM-NK 81676, F, Shizuoka Pref., Izu City, Mt. Amagi-san, 3. VI. 2007, H. Katahira leg.

Distribution. Japan (Hokkaido, Honshu, and Kyushu).

Bionomics. Unknown.

Genus *Surculus* Townes, 1970

Surculus Townes, 1970: 88. Type: *Surculus oculatus* Townes, 1970. Original designation.

This genus contains a single species, *Sur. oculatus* Townes, 1970, from Chile. In this study, I record a new species, *Sur. japonicus* sp. nov., from Japan. This is the first record of this genus from Japan, Palearctic region, and Old World, respectively.

The distribution of Japanese species is extremely far from Chile, while the character states of Japanese species are “completely” accorded with the character states of this genus proposed by Townes (1970). Thus, I conclude that Japanese species is belonging to this genus.

Surculus japonicus sp. nov.

(New SJN: Hosomi-mame-togari-himebachi)

(Figs 18A–G, 62H, 63F, 64A, 65X, 66C)

Etymology. The specific name is from Japan.

Type series. Holotype: KPM-NK 81861, F, JAPAN, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 4. VIII. 2007, K. Watanabe leg. **Paratypes:** JAPAN, KPM-NK 81872, F, Tochigi Pref., Kuriyama Vil., Kinunuma,

1–14. VIII. 2004, H. Makihara leg. (MsT); KPM-NK 81863, F, Nagano Pref., Nagawa Town, Daimon, Utsukushimatsu, 26. VIII. 2011, S. Fujie leg.; KPM-NK 81862, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Tanohara, 8. VIII. 2007, K. Watanabe leg.; KPM-NK 81864, F, Nagano Pref., Ōtaki Vil., Mt. Ontake-san, 13–25. VI. 2015, S. Shimizu leg. (MsT); KPM-NK 81860, 81865, 81866, 3 F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 8–15. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81858, 81859, 81867–81869, 5 F, ditto, 15–22. IX. 2009; KPM-NK 81870, 81871, 2 F, Toyama Pref., Toyama City, Arimine, Inonedani, 15–22. IX. 2009, M. Watanabe *et al.* leg. (MsT).

Description. Female (n=15). Body length 4.6–7.1 (HT: 5.7) mm. Body covered with silver setae.

Head. Clypeus 1.8 times as wide as maximum length, its anterior margin rounded with a median broad subtruncate convexity (Fig. 62H). Face polished, punctate (Fig. 18B). MSL 0.8 times as long as BWM. Frons, gena, and vertex polished, with fine punctures. OOL longer than POL. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible slightly convex. Antenna with 18–19 (HT: 18) flagellomeres, subapical part not widened, all segments longer than wide. FL III 6.0–7.0 (HT: 7.0) times as long as maximum depth in lateral view. Apex of flagellum with some robust setae.

Mesosoma 1.7 times as long as maximum depth in lateral view. Upper side of collar with a median carina that is not much stronger than surrounding carinae. Lateral part of pronotum largely smooth except for some longitudinal striae medially (Fig. 18D). Epomia long and strong (Fig. 18D). Mesoscutum polished, punctate except for postero-median rugulose area (Fig. 18E). Notaulus long, fading our near center of mesoscutum (Figs 18E, 63F). Scutellum punctate, without a lateral longitudinal carina except for base. Mesopleuron smooth except for areas below subtegular ridge and speculum with longitudinal striae (Fig. 18D). The impression that is just below speculum with a pit, which situated in the short horizontal groove that joins mesopleural suture. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron largely punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of



Fig. 17. *Retalia japonica* Kusigemati, 1985, KPM-NK 81677, female from Japan — A, lateral habitus; B, head, frontal view.

propodeum complete (Fig. 64A). Anterior section of lateral longitudinal carina of propodeum absent (Fig. 64A). Area basalis distinct (Fig. 64A). Area superomedia indistinct laterally (Figs 18G, 64A). Anterior part of propodeum punctate. Median and posterior parts of propodeum longitudinally, obliquely, and irregularly rugulose. Propodeum without projections (Figs 18G, 64A). Length of fore wing 4.4–5.6 (HT: 4.9) mm. Areolet absent (Fig. 18F). Vein 2m-cu of fore wing with two bullae (Fig. 18F). Nervellus inclivous, intercepted near the middle (Fig. 18F). Hind femur 4.8–5.3 (HT: 5.3) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9–0.95 (HT: 0.9): 0.6: 0.25–0.3 (HT: 0.3): 0.4–0.5 (HT: 0.4). Tarsal claws simple.

Metasoma. T I slender, 2.35–2.6 (HT: 2.6) times as long as maximum width, largely longitudinally striated except for smooth posterior margin, its sternite ending at far behind of spiracle, its spiracle situated near the basal 0.45. Median dorsal carina of T I present except for posterior part absent. Dorsolateral carina of T I complete. T II to T VI wider than long. T II rugose-punctate anterior 0.75

except for smooth area around thyridium, posterior 0.25 smooth. Laterotergite of T II narrow and separated from T II. T III rugose-punctate except for posterior 0.25 smooth. T IV to T VII covered with fine punctures except for smooth posterior margin. Apex of T VIII protruding and its apex subtruncate. Ovipositor sheath 1.43–1.5 (HT: 1.5) times as long as hind tibia. Ovipositor straight, with a weak nodus and ventral teeth (Fig. 66C).

Coloration (Figs 18A–G). Body (excluding wings and legs) black to blackish brown. Scape, pedicel, and base of FL I reddish brown (but dorsal part of scape usually darkened). Mandible yellowish brown except for darkened apex. Palpi and tegula yellow. Metasomal tergites more or less tinged with reddish brown. T I except for posterior margin and apex of metasoma usually black or darkened. T II sometimes partly darkened medially. Membranous part of metasomal sternites yellowish brown. Sclerotized part of metasomal sternites dark brown. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma brown to blackish brown. Fore and mid legs whitish yellow to yellowish brown. Mid femur, tibia, and tarsus partly

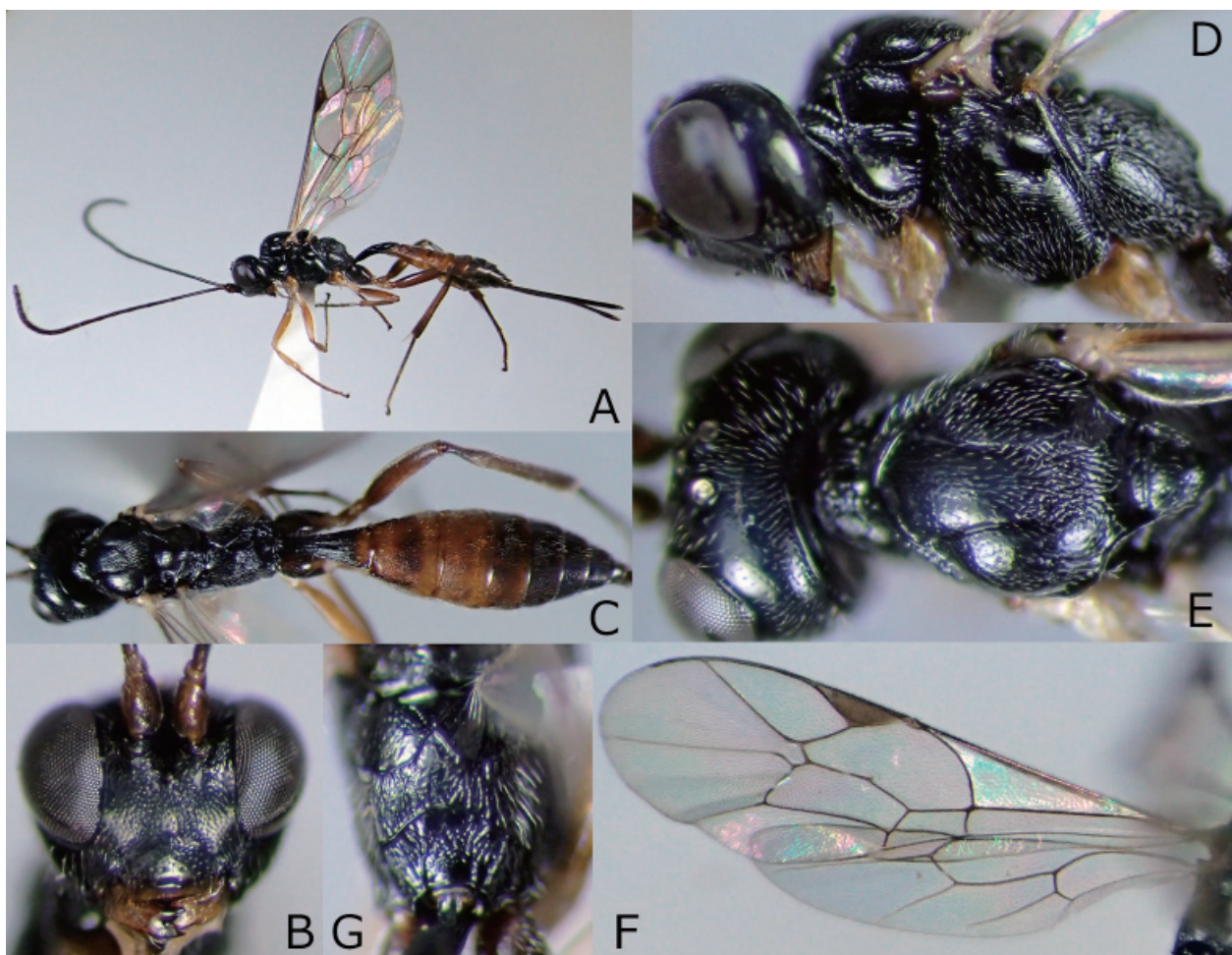


Fig. 18. *Surculus japonicus* sp. nov., KPM-NK 81861, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, head and mesosoma, lateral view; E, head, mesoscutum and scutellum, dorsal view; F, wings; G, propodeum, dorsal view.

tinged with blackish brown. Hind coxa black, sometimes narrowly tinged with yellowish brown. Hind trochanter and trochantellus whitish yellow. Hind femur, tibia, and tarsus reddish brown to dark reddish brown. Base and apical parts of hind tibia and tarsus more or less darkened. Tibial spurs whitish yellow.

Male. Unknown.

Distribution. Japan (Honshu).

Bionomics. Unknown.

Remarks. This species resembles *Sur. oculatus* but it can be distinguished by the nervellus intercepted near the middle (near the posterior end in *Sur. oculatus*), the sternaulus absent in posterior 0.4 of mesopleuron (nearly complete in *Sur. oculatus*), the anterior transverse carina of propodeum complete (absent medially in *Sur. oculatus*), the area basalis of propodeum present (absent in *Sur. oculatus*), and the vein 3rs-m of fore wing absent (present in *Sur. oculatus*).

Chirotica genus group

(subtribe Chiroticina sensu Townes (1970))

Two genera, *Chirotica* Förster, 1869 and *Paraphylax* Förster, 1869, have been recorded from Japan. In addition, I found *Bentyra* from Japan. In this study, I newly record this genus from Japan and review *Chirotica* and *Paraphylax*. The Japanese genera can be distinguished by the following key.

Key to Japanese genera of *Chirotica* genus group

1. Upper tooth of mandible longer than lower tooth. Mesoscutum with a median longitudinal groove on the median lobe in Japanese species (Fig. 63G).
..... *Bentyra* Cameron, 1905
- . Upper tooth of mandible as long as or slightly shorter than lower tooth. Mesoscutum with or without a median longitudinal groove on the median lobe.
..... 2
2. Median part of face relatively strongly convex. Area superomedia longitudinally elongate (Fig. 65F). Vein 2rs-m indistinct or absent (Fig. 20C). Mesoscutum without a median longitudinal groove on the median lobe in Japanese species.
..... *Chirotica* Förster, 1869
- . Median part of face relatively weakly convex or flat. Area superomedia not longitudinally elongate (Figs 65G–J). Vein 2rs-m short but distinct (e.g., Fig. 21C). Mesoscutum with a median longitudinal groove on the median lobe in Japanese species.

..... *Paraphylax* Förster, 1869

Genus *Bentyra* Cameron, 1905

Bentyra Cameron, 1905a: 116. Type: *Bentyra striata* Cameron, 1905. Monobasic.

Lissarcha Cameron, 1912: 95. Type: *Lissarcha flavomaculata* Cameron, 1912 (= *Bentyra striata* Cameron, 1905). Monobasic.

Koshunia Uchida, 1932: 185. Type: *Hemiteles (Koshunia) taiwanellus* Uchida, 1932. Original designation.

This genus contains four species, *Be. striata* Cameron, 1905, *Be. divisa* (Szépligeti, 1908), *Be. taiwanella* (Uchida, 1932), and *Be. testacea* (Szépligeti, 1908). All species are recorded from the Oriental region. In this study, I describe a new species, *Be. ryukyuana* sp. nov., from the Oriental part of Japan below. This is the first record of this genus from Japan.

Bentyra ryukyuana sp. nov.

(New SJN: Kimadara-mame-togari-himebachi)

(Figs 19A–H, 63G, 65E, 66D)

Etymology. The specific name is from the Ryukyu Islands, where is locality of types.

Type series. **Holotype:** KPM-NK 81887, F, JAPAN, Kagoshima Pref., Tokunoshima Is., Tete, Mt. Amagi-dake, 27. III. 2011, K. Watanabe leg. **Paratype:** JAPAN, KPM-NK 81886, F, Okinawa Pref., Ishigakijima Is., Ishigaki City, Mt. Yarabudake, 25. III. 2012, M. Ito leg.

Description. Female (n=2). Body length 4.2–4.9 (HT: 4.9) mm. Body polished, covered with silver setae.

Head. Clypeus 2.0 times as wide as maximum length, sparsely punctate, its anterior margin weakly rounded. Face densely punctate, with a median weak convexity. MSL 1.15–1.2 (HT: 1.2) times as long as BWM. Frons sparsely punctate, with transverse rugae just above antennal sockets, with a median longitudinal groove. Gena punctate. Vertex sparsely punctate anteriorly, punctate posteriorly, with a median longitudinal groove (Fig. 19D). OOL slightly shorter than POL and as long as OD (Fig. 19D). Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base by the length of BWM. Upper tooth of mandible longer than lower tooth. Base of mandible slightly convex. Antenna with 20–21 (HT: 21) flagellomeres. FL I, FL II, and FL III almost equal in length. FL III 6.7–7.0 (HT: 6.7) times as long as maximum depth in lateral view. Apex of flagellum more or less pointed.

Mesosoma 1.75 times as long as maximum depth in lateral view. Upper side of collar with a median carina. Lateral part of pronotum largely smooth dorsally, largely striate ventrally. Epomia short and weak. Mesoscutum largely smooth, with a median longitudinal groove on the median lobe (Figs 19E, 63G). Notaulus long, its posterior ends joined with each other posteriorly (Figs 19E, 63G). Scutellum smooth except for a few punctures, without a lateral longitudinal carina except for base. Postscutellum smooth. Mesopleuron densely punctate except for areas above and below smooth speculum with longitudinal striae. The impression that is just below speculum with an isolate pit. Posterior transverse carina of mesosternum complete. Metapleuron densely punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete. Pleural carina complete. Basal section of lateral longitudinal carina of propodeum absent. Area basalis distinct (Fig. 65E). Area superomedia more or less indistinct laterally (Fig. 65E). Propodeum largely rugose-punctate. Propodeum without projections. Length of fore wing 3.6–4.2 (HT: 4.2) mm. Areolet absent (Fig. 19F). Vein 2m-cu of fore wing with two bullae (Fig. 19F). Nervellus inclivous, intercepted slightly posterior to middle (Fig. 19G). Hind femur 4.9 (HT: 4.9) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.8: 0.6: 0.35: 0.6. Tarsal claws simple.

Metasoma. T I 1.25–1.4 (HT: 1.25) times as long as maximum width, largely longitudinally striated except for smooth posterior margin (Fig. 19H), the interspace of striae punctate. Median dorsal carina of T I indistinct. Dorsolateral carina of T I complete. T II to T VI wider than long. T II and T III densely punctate and longitudinally striated except for smooth posterior area (Fig. 19H). Laterotergite of T II separated from T II. T IV to T VII largely smooth, with fine and sparse punctures. Ovipositor sheath 0.5–0.58 (HT: 0.5) times as long as hind tibia. Ovipositor straight, with a weak nodus and ventral teeth (Fig. 66D).

Coloration (Figs 19A–H). Head yellow. Apex of mandible, dorso-median part of face, area above antennal sockets, and antenna more or less tinged with reddish brown. Oceller area, posterior and median parts of vertex, and postero-dorsal part of gena blackish brown. Mesosoma yellow. Latero-median part of pronotum reddish brown. Propleuron tinged with reddish brown. Mesopleuron with three reddish brown stripes, its posterior part relatively darkened than anteriorly. Scuto-scutellar groove blackish brown to black. Axillae black. Scutellum with a median brown spot. Mesopleuron with reddish brown areas below subtegular ridge and speculum. Metapleuron with blackish

brown margins. Dorsal face of propodeum largely blackish brown to black. Area petiolaris with a median blackish brown to black area. Metasoma blackish brown to black. Posterior margins of T I to T V broadly yellow. Posterior margins of T VI and T VII narrowly yellow. Border of black and yellow areas tinged with reddish brown. Lateral part of T II to VII reddish brown to yellow. Membranous part of metasomal sternites yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown. Legs yellowish brown. Coxae, trochanters, trochantelli, and base of hind tibia whitish yellow except for ventral face of hind coxa reddish brown. Reddish brown areas of pronotum and mesopleuron darkened in paratype.

Male. Unknown.

Distribution. Japan (Tokunoshima Is. and Ishigakijima Is.).

Bionomics. Unknown.

Remarks. This species can be distinguished from other species by the following combination of character states: body length 4.2–4.9 mm (7.0 mm in *Be. striata*); median lobe of mesoscutum with a conspicuous median groove (without a median groove in *Be. testacea*); hind coxa without a black area (with a black area in *Be. striata*); mesosoma and metasoma with conspicuous reddish brown and black areas (almost entirely reddish brown in *Be. taiwanella*); fore wing without a clouded band (with a clouded band in *Be. taiwanella*); head with black area (without black area in *Be. divisa*).

Genus *Chirotica* Förster, 1869

- Chirotica* Förster, 1869: 173. Type: *Hemiteles insignis* Gravenhorst, 1829. Included by Schmiedeknecht (1897).
Allocota Förster, 1869: 173. Type: *Allocota confederatae* Ashmead, 1896. Included by Ashmead (1896).
Spinolia Förster, 1869: 173. Type: *Hemiteles maculipennis* Gravenhorst, 1829. Included by Schmiedeknecht (1897).
Syneches Förster, 1869: 173. Type: *Hemiteles thyridopteryx* Riley, 1869. Included by Ashmead (1900a).
Diaglypta Förster, 1869: 176. Type: *Diaglypta radiata* Ashmead, 1895 (= *Hemiteles pothinus* Marshall, 1892). Included by Ashmead (1895).
Deuterospinolia Dalla Torre, 1902: 678. New name for *Spinolia*.
Aphadnus Cameron, 1907: 26. Type: *Aphadnus rufipes* Cameron, 1907 (= *Hemiteles decoratus* Tosquinet, 1903). Monobasic.
Hymenosyneches Viereck, 1912a: 149. New name for *Syneches*.

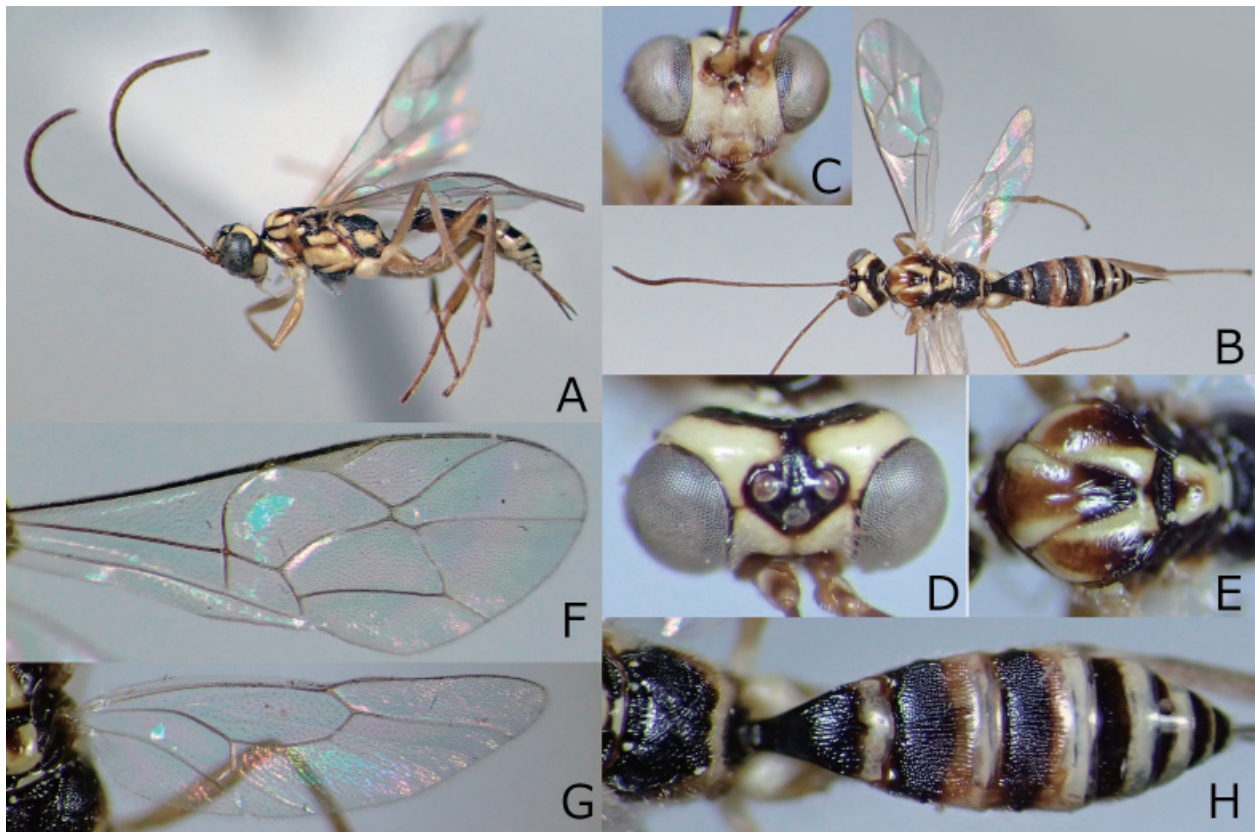


Fig. 19. *Bentyra ryukyuana* sp. nov., KPM-NK 81886 (A, paratype) and 81887 (B-H, holotype), females — A, lateral habitus; B, dorsal habitus; C, head, frontal view; D, head, dorsal view; E, mesoscutum, dorsal view; F, fore wing; G, hind wing; H, propodeum and metasoma, dorsal view.

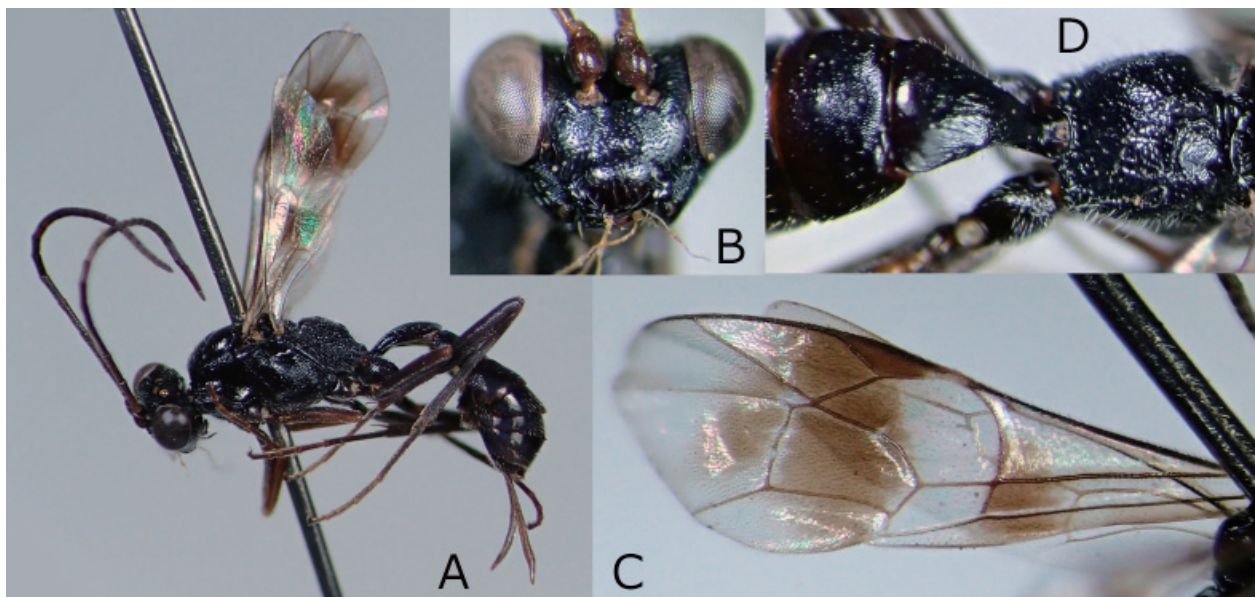


Fig. 20. *Chirotica matsukemushii* (Matsumura, 1926), KPM-NK 81906, female from Japan — A, lateral habitus; B, head, frontal view; C, wings; D, propodeum, T I, and T II, dorsal view.

A single species, *Chi. matsukemushii* (Matsumura, 1926), have been recorded from Japan. In this study, I re-describe this species with some distributional data below.

Chirotica matsukemushii (Matsumura, 1926)
(SJN: Matsukemushi-mame-togari-himebachi)
(Figs 20A–D, 65F)

Mesostenus matsukemushii Matsumura, 1926a: 34.

Mesostenus matsukemushi Matsumura, 1926b: 23.

Description. Female (n=7). Body length 6.7–7.2 mm. Body polished, covered with silver setae.

Head. Clypeus 2.05–2.2 times as wide as maximum length, smooth except for area along dorsal margin

punctate, its anterior margin weakly rounded. Face punctate except for lateral smooth areas, with a median convexity (Fig. 20B). MSL 1.4–1.6 times as long as BW. Frons rugose-punctate, with narrow smooth area just above antennal sockets. Gena and vertex finely punctate. OOL as long as or slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base by the length of BW. Upper tooth of mandible slightly shorter than lower tooth. Base of mandible flat. Antenna with 25–28 flagellomeres. FL I, FL II, and FL III almost equal in length. FL III 5.0 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar without a median carina. Lateral part of pronotum striate and punctate. Epomia absent. Mesoscutum irregularly or obliquely rugose, without a median longitudinal groove on the median lobe. Notaulus short and weak. Scutellum smooth except for a few punctures, with a lateral longitudinal carina except for apex. Postscutellum smooth. Mesopleuron rugose-punctate except for smooth speculum. Posterior transverse carina of mesosternum complete. Metapleuron rugose-punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete except for median section weak or absent. Pleural carina complete. Anterior section of lateral longitudinal carina of propodeum weak and partly indistinct. Lateromedian longitudinal carina complete except for posterior section partly absent. Area superomedia indistinct anteriorly and posteriorly, elongate (Fig. 65F). Propodeum largely covered with shallow rugae. Propodeum without projections. Length of fore wing 4.9–5.1 mm. Areolet absent (Fig. 20C). Vein 2rs-m absent (Fig. 20C). Vein 2m-cu of fore wing with two bullae (Fig. 20C). Nervellus inclivous, intercepted posteriorly. Hind femur 5.2–5.5 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.4: 0.4. Tarsal claws simple.

Metasoma. T I 1.4 times as long as maximum width, largely smooth (Fig. 20D). Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II and T III densely and finely punctate with some longitudinal striae except for smooth area on posterior 0.6. T IV to T VII finely and sparsely punctate. Ovipositor sheath 0.64–0.78 times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth.

Coloration (Figs 20A–D). Body (excluding wings) blackish brown to black. Antenna, apex of mandible, base of hind tibia more or less tinged with reddish brown. FL VII and T VIII paler than other segments. Fore femur, tibia, and tarsus largely reddish brown. Posterior margin of T II

sometimes narrowly tinged with reddish brown. Ovipositor reddish brown. Wings hyaline, with a longitudinal clouded band just behind pterostigma and a small, clouded area subbasally. Veins and pterostigma brown to blackish brown.

Male. Unknown.

Materials examined. JAPAN: SEHU, 2 F (syntypes), Sapporo; KPM-NK 81904, F, Yamanashi Pref., Narusawa Vil., Mt, Fujisan, Fuji-rindo, 27. VI. – 1. VII. 2016, A. Ohwaki leg. (MsT); KPM-NK 81905, F, Fukui Pref., Katsuyama City, Ohara, 19. VI. 1982, T. Murota leg.; KPM-NK 81906, F, Fukui Pref., Izumi Vil., 19. VI. 1981, T. Tano leg.

Distribution. Japan (Hokkaido and Honshu*).

Bionomics. Host record: *Dendrolimus jezoensis* Matsumura, 1917 (= *D. superans* (Butler, 1877)) (Lepidoptera, Lasiocampidae) (Matsumura, 1926a, b).

Remarks. This is the first record of this species from Honshu.

Genus *Paraphylax* Förster, 1869

Strepsimallus Förster, 1869: 176. Type: *Strepsimallus bicintus* Ashmead, 1905. Included by Ashmead (1905).

Paraphylax Förster, 1869: 176. Type: *Paraphylax fasciatipennis* Ashmead, 1904. Included by Ashmead (1904).

Paurophatnus Cameron, 1905b: 342. Type: *Paurophatnus annulipes* Cameron, 1905. Monobasic.

Valoga Cameron, 1911: 178. Type: *Valoga nitidisentis* Cameron, 1911. Monobasic.

Photoptera Viereck, 1913: 380. Type: *Photoptera erythronota* Viereck, 1913. Original designation.

Neotheroscopus Turner, 1927: 559. Type: *Hemiteles* (*Neotheroscopus*) *caffer* Turner, 1927. Original designation.

Tsangamania Seyrig, 1952: 38. Type: *Tsangamania nimbipennis* Seyrig, 1952. Original designation.

Parallocota Seyrig, 1952: 86. Type: *Parallocota monotypa* Seyrig, 1952. Original designation.

Diodontops Seyrig, 1952: 90. Type: *Diodontops cubiceps* Seyrig, 1952. Original designation.

Resosoa Seyrig, 1952: 124. Type: *Resosoa ridens* Seyrig, 1952. Original designation.

Mioplectiscus Benoit, 1955: 339. Type: *Mioplectiscus basilewskyi* Benoit, 1955. Original designation.

Five species, *Pa. agelenae* (Momoi, 1966), *Pa. fumeae* Momoi, 1966, *Pa. saigusai* Momoi, 1966, *Pa. sakabei* Momoi, 1966, and *Pa. subtilis* Momoi, 1966, have been

recorded from Japan. All species except for *Pa. agelenae* are relatively rarely collected in the field investigations. I recognize at least eight additional species from Japan. In this study, I newly describe five of them below. The identification of remaining undetermined species requires additional specimens. In addition, I record some distributional data of *Pa. agelenae*, *Pa. fumeae*, *Pa. sakabei*, and *Pa. subtilis* below. Japanese species including three undetermined species can be distinguished by the following key.

**Preliminary key to Japanese species
of the genus *Paraphylax* (♀)**

1. T II and T III covered with longitudinal striae except for smooth posterior area (e.g., Figs 21D, 22F).
..... 2
- T II covered with punctures and/or striae, or smooth. T III without longitudinal striae (Figs 23D, 24F).
..... 7
2. T I matt or polished, without longitudinal or transverse striae.
..... 3
- T I polished, largely covered with longitudinal or transverse striae.
..... 4
3. T I polished, largely smooth. Collar largely reddish brown. Anterior part of T II black. Dark bands of fore wing obtuse.
..... *Pa. yambarensis* **sp. nov.**
- T I matt except for smooth area on posterior 0.25. Collar black. Anterior part of T II with conspicuous reddish yellow area. Dark bands of fore wing strong.
..... *Pa. elegans* **sp. nov.**
4. Collar, mesoscutum, scutellum, and hind coxa black (Fig. 21A). Hind femur and tibia usually largely blackish brown except for a white base of the latter (Fig. 21A). Posterior margins of T I and T II usually tinged with reddish brown (reddish area of T II rarely expanded) (Fig. 21D).
..... *Pa. agelenae* (Momoi, 1966)
- Collar sometimes with yellow markings. Mesoscutum and scutellum sometimes with red area (Fig. 27C). Hind coxa reddish brown to dark reddish brown (e.g., Fig. 27A). Hind femur and tibia largely reddish brown to yellowish brown except for a white base of the latter (e.g., Fig. 27A).
..... 5
5. Posterior part of T I covered with transverse striae (Fig. 27E). T II entirely reddish brown (Fig. 27C). Scutellum and postscutellum reddish brown (Fig. 27C).
..... *Pa. transstriatus* **sp. nov.**
- Posterior part of T I covered with longitudinal striae. T II partly or entirely reddish brown. Scutellum and postscutellum reddish brown or black.
..... 6
6. Collar with yellow markings. Anterior part of mesoscutum and scutellum partly tinged with reddish brown. Posterior part of T I to T III reddish yellow.
..... *Pa. saigusai* Momoi, 1966
- Mesosoma entirely black. Posterior part of T I to T III reddish yellow and T II and T III usually largely tinged with reddish yellow (Fig. 28G).
..... *Pa. yakushimensis* **sp. nov.**
7. T III almost smooth (Figs 24C, F, 25C).
..... 8
- T III punctate or matt (Fig. 26D).
..... 9
8. Pronotum black (Fig. 25A). T II covered with shallow and dense punctures except for smooth posterior part (Fig. 25C). Dark bands of fore wing weakly developed. Flagellum without a white band (Fig. 25A).
..... *Pa. sakabei* Momoi, 1966
- Pronotum reddish yellow (Fig. 24A). T II almost smooth, without distinct punctures (Figs 24C, F). Dark bands of fore wing strongly developed (Fig. 24E). Flagellum with a white band (Fig. 24A).
..... *Pa. politus* **sp. nov.**
9. Head and mesosoma with large yellowish brown to reddish brown areas (mesopleuron and metapleuron largely tinged with yellowish brown to reddish brown).
..... *Pa. spp.* (including at least 3 spp.)
- Head and mesosoma largely or entirely black.
..... 10
10. Mesopleuron with dense striae. Posterior margins of T I to T III broadly tinged with reddish brown (Fig. 26D).
..... *Pa. subtilis* Momoi, 1966
- Mesopleuron with dense punctures. Posterior margins of T I to T III narrowly tinged with reddish brown.
..... *Pa. fumeae* Momoi, 1966

***Paraphylax agelenae* (Momoi, 1966)**

(SJN: Kogusagumo-suji-togari-himebachi)

(Figs 21A–D)

Strepsimallus agelenae Momoi, 1966a: 55.

Description. See Momoi (1966a).

Materials examined. JAPAN: KPM-NK 81816, F, Kanagawa Pref., Yamakita Town, Kurokura, Yushin, 18.

V. 2016, K. Watanabe leg.; KPM-NK 81818, F, Kanagawa Pref., Yokosuka City, Nobu, 11. V. 1993, I. Kawashima leg.; KPM-NK 81821, F, Kanagawa Pref., Yokosuka City, Mt. Oogusu-yama, 7. V. 2014, K. Watanabe leg.; KPM-NK 81827, F, Kanagawa Pref., Yokosuka City, Mt. Miura-fuji to Mt. Takeyama, 16. V. 2010, K. Watanabe leg.; KPM-NK 81822, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 1. V. 2016, K. Watanabe & H. Utsugi leg.; KPM-NK 81825, F, Kanagawa Pref., Odawara City, Hayakawa, Sarusawa rindo, 2. VI. 2014, K. Watanabe leg.; KPM-NK 81828, 81829, 2 F, Shizuoka Pref., Honkawane Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg.; TMNH, F, Aichi Pref., Toyohashi City, Imura Town, Takayama, 13. V. 2019, S. Morishita leg.; KPM-NK 81813, 81815, 2 F, Toyama Pref., Toyama City, Arimine, Inonedani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81814, F, ditto, 4. VIII. 2009, 11. VIII. 2009; KPM-NK 81826, F, Fukui Pref., Ono City, Minami-rokuroshi, Okuetsu-kogen to Mt. Hoduki, 28. V. 2011, S. Fujie leg.; KPM-NK 81819, 81820, 2 F, Hyogo Pref., Kasai City, Uzurano Town, 29. IV. 2011, S. Fujie leg.; KPM-NK 81830, 81831, 2 F, Hyogo Pref., Awajishima Is., Sumoto City, Yura Town, Yura, 4. V. 2011, S. Fujie leg.; KPM-NK 81823, 81824, 2 F, Kagawa Pref., Takamatsu City, Enza town, Koutougawa River, 5. V. 2011, K. Maeto & K. Watanabe leg.; MNHAH, F (holotype), Miyazaki Pref., Honjo, 29. I. 1957, em. from egg sac of *Agekena opulenta*, K. Yasumatsu leg.; KPM-NK 81817, F, Kagoshima Pref., Kirishimajingu, 10. X. 1980, H. Nagase leg.

Distribution. Japan (Hokkaido, Honshu, Awajishima Is.*, Shikoku*, Kyushu, and Okinawajima Is.).

Bionomics. Host record: egg sac of *Agekena opulenta* (L. Koch, 1878) (Araneae) (Momoi, 1966).

Remarks. This is the first record from Awajishima Is. and Shikoku.

***Paraphylax elegans* sp. nov.**

(New SJN: Ishigaki-suji-togari-himebachi)

(Figs 22A–E, 64B, 66E)

Etymology. The specific name is from the elegant body coloration.

Type series. **Holotype:** KPM-NK 55078, F, JAPAN, Okinawa Pref., Ishigakijima Is., Mt. Omoto-dake, Takeda-rindo, 24. III. 2010, H. Sawada leg.

Description. Female (n=1). Body length 4.5 mm. Body polished, covered with silver setae.

Head. Clypeus 1.9 times as wide as maximum length, its anterior margin rounded. Face densely granulate, with a median weak convexity (Fig. 22B). MSL 1.0 times as

long as BWM. Frons covered with minute transverse striae and dense punctures. Gena and vertex finely and sparsely punctate. OOL as long as POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible flat. Antenna with 21 flagellomeres. FL III 4.4 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar without a median carina. Lateral part of pronotum densely and finely punctate except for a dorsal smooth area. Epomia long (Fig. 22D). Mesoscutum coriaceous, obliquely striae posteriorly, with a shallow median longitudinal groove on the median lobe (Fig. 22D). Notaulus long, its posterior ends joined with each other posteriorly. Scutellum largely smooth, with a lateral longitudinal carina except for base. Mesopleuron longitudinally and minutely striate except for smooth speculum. Posterior transverse carina of mesosternum complete. Metapleuron minutely rugose-punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 64B). Pleural carina complete (Fig. 64B). Lateral longitudinal carina of propodeum present (Fig. 64B). Area basalis distinct (Fig. 64B). Area superomedia present and its lateral margins weak (Fig. 64B). Anterior and median parts of propodeum largely and shallowly punctate. Posterior parts of propodeum largely transversely rugose-punctate. Length of fore wing 3.6 mm. Areolet absent (Fig. 22E). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted slightly behind middle. Hind femur 4.7 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.4: 0.5. Tarsal claws simple.

Metasoma. T I 1.5 times as long as maximum width, densely and finely punctate except for smooth posterior margin. Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II and T III covered with minute longitudinal striae except for smooth posterior area on posterior 0.4 (Fig. 22F), interspace of striae densely punctate. T IV covered with minute longitudinal striae except for smooth posterior area on posterior 0.6. T V to T VII smooth with a few, fine, and sparse punctures. Ovipositor sheath 0.75 times as long as hind tibia. Ovipositor straight, with a pointed nodus and ventral teeth (Fig. 66E).

Coloration (Figs 22A–E). Body (excluding wings and legs) black to blackish brown. Basal part of antenna reddish brown. Mandible yellow except for darkened apex. Palpi yellowish brown. Tegula reddish brown. Posterior part of T I tinged with reddish yellow. Basal 0.6 of T II reddish yellow. Membranous part of metasomal sternites

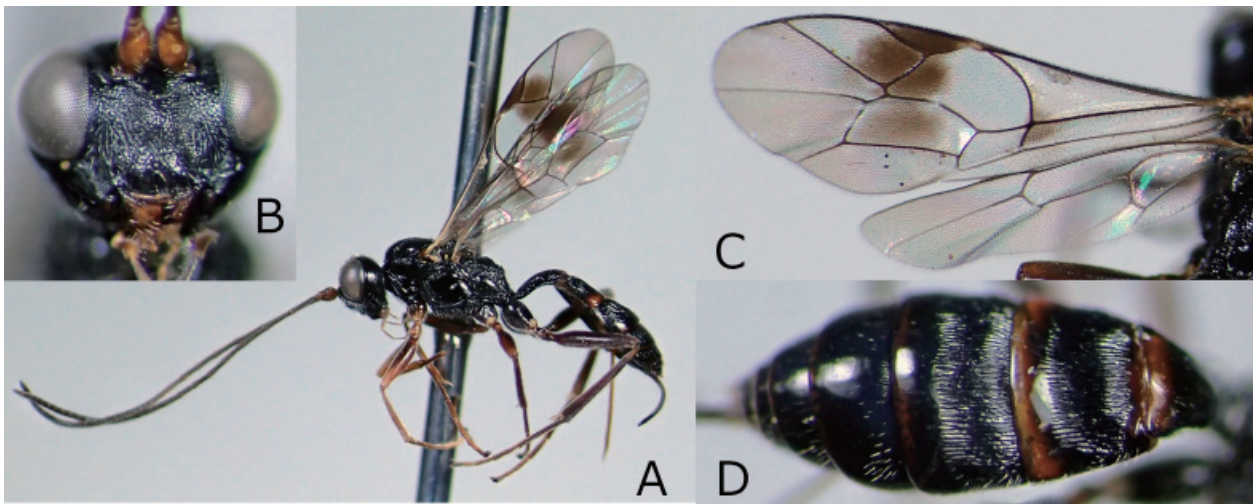


Fig. 21. *Paraphylax agelenae* (Momoi, 1966), KPM-NK 81816, female from Japan — A, lateral habitus; B, head, frontal view; C, metasoma, dorsal view; D, wings.



Fig. 22. *Paraphylax elegans* **sp. nov.**, KPM-NK 55078, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, head, mesoscutum, and scutellum, dorsal view; E, fore wing; F, T II and T III, dorsal view.

whitish yellow. Ovipositor reddish brown. Wings hyaline, with a longitudinal clouded band just behind pterostigma and a small, clouded area subbasally. Veins yellowish brown to blackish brown. Pterostigma blackish brown. Fore and mid legs reddish brown to yellowish brown. Hind coxa, femur, tibia except for base, and tarsus except for base of TS I, blackish brown to black. Hind trochanter and

trochantellus reddish brown. Base of hind tibia and TS I and tibial spurs whitish yellow.

Male. Unknown.

Distribution. Japan (Ishigakijima Is.).

Bionomics. Unknown.

Remarks. This species resembles *Pa. yambarensis* **sp. nov.** in the T I without longitudinal striae but it can be

distinguished by the above key.

***Paraphylax fumeae* Momoi, 1966**
(SJN: Mie-minoga-togari-himebachi)
(Figs 23A–D)

Paraphylax fumeae Momoi, 1966a: 54.

Description. See Momoi (1966a).

Materials examined. JAPAN: MNHAH, F (holotype), Mie Pref., Ohmiya, 15–20. V. 1962, em. from *Fumea* sp., M. Sakabe leg.; KPM-NK 81900, F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 8–15. IX. 2009, M. Watanabe *et al.* leg. (MsT).

Distribution. Japan (Honshu).

Bionomics. Host record: *Psychidae* sp. (Lepidoptera) (Momoi, 1966).

***Paraphylax politus* sp. nov.**
(New SJN: Izu-minoga-togari-himebachi)
(Figs 24A–F, 65G, 66F)

Etymology. The specific name is from the strongly polished mesoscutum and metasomal tergites.

Type series. **Holotype:** KPM-NK 55079, F, JAPAN, Tokyo, Izuoshima Is., Oshima Town, Motomachi, Mt. Omaruyama, Tsubakinomori, 5–31. X. 2012, K. Tsujii leg. (MsT).

Description. Female (n=1). Body length 4.0 mm. Body polished, covered with silver setae.

Head. Clypeus 2.0 times as wide as maximum length, its anterior margin rounded. Face densely punctate, with a median weak convexity (Fig. 24B). MSL 0.6 times as long as BWM. Frons, gena, and vertex finely and sparsely punctate. OOL slightly longer than POL and OD. POL as long as OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible as long as lower tooth. Base of mandible flat. Antenna with 21 flagellomeres. Subapical part of flagellum slightly wider than basal part. FL III 5.0 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar without a median carina. Lateral part of pronotum smooth except for narrowly punctate dorsally and ventrally. Epomia long (Fig. 24D). Mesoscutum smooth, with a few, sparse, and fine punctures and a median longitudinal groove on the median lobe (Fig. 24D). Notaulus long, its posterior ends closed each other (Fig. 24D). Scutellum finely and sparsely punctate, with a lateral longitudinal carina except for apical half. Mesopleuron smooth except for areas

below subtegular ridge and speculum and along sternalus finely and densely punctate. Posterior transverse carina of mesosternum complete. Metapleuron punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65G). Pleural carina complete. Lateral longitudinal carina of propodeum present except for anterior section. Area basalis distinct (Fig. 65G). Area superomedia distinct (Fig. 65G). Propodeum largely smooth, with fine punctures. Length of fore wing 3.2 mm. Areolet absent (Fig. 24E). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted slightly behind middle. Hind femur 4.1 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.55: 0.3: 0.5. Tarsal claws simple.

Metasoma. T I 1.75 times as long as maximum width, smooth. partly coriaceous. Median dorsal carina of T I present except for posterior part. Dorsolateral carina of T I complete. T II to T V smooth (Figs 24C, F). Ovipositor sheath 0.95 times as long as hind tibia. Ovipositor straight, with a weak nodus and ventral teeth (Fig. 66F).

Coloration (Figs 24A–F). Body (excluding wings and legs) black to blackish brown. Basal part of antenna yellowish brown. Apex of FL IV to base of FL XI white dorsally. Mandible yellow except for darkened apex. Clypeus and malar space more or less tinged with reddish brown. Palpi white. Pronotum reddish yellow. Tegula yellow. Subtegular ridge reddish yellow. Mesopleuron tinged with dark reddish brown medially. Metasomal tergites dark brown to blackish brown except for posterior parts of T I and T II yellowish brown. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline, with a longitudinal clouded band just behind pterostigma and a small, clouded area subbasally. Veins yellowish brown to blackish brown. Pterostigma blackish brown. Legs reddish brown. Coxae except for dorsal surface of hind coxa, trochanters, trochantelli except for apical part of hind trochantellus, and tibial spurs whitish yellow. Dorsal surface of hind coxa, hind femur, and hind tibia except for base more or less darkened. Base of hind tibia white.

Male. Unknown.

Distribution. Japan (Izuoshima Is.).

Bionomics. Unknown.

Remarks. This species resembles *Pa. sakabei* Momoi, 1966 in the smooth T III but it can be distinguished by the above key.

***Paraphylax sakabei* Momoi, 1966**
(SJN: Sakabe-minoga-togari-himebachi)
(Figs 25A–C)

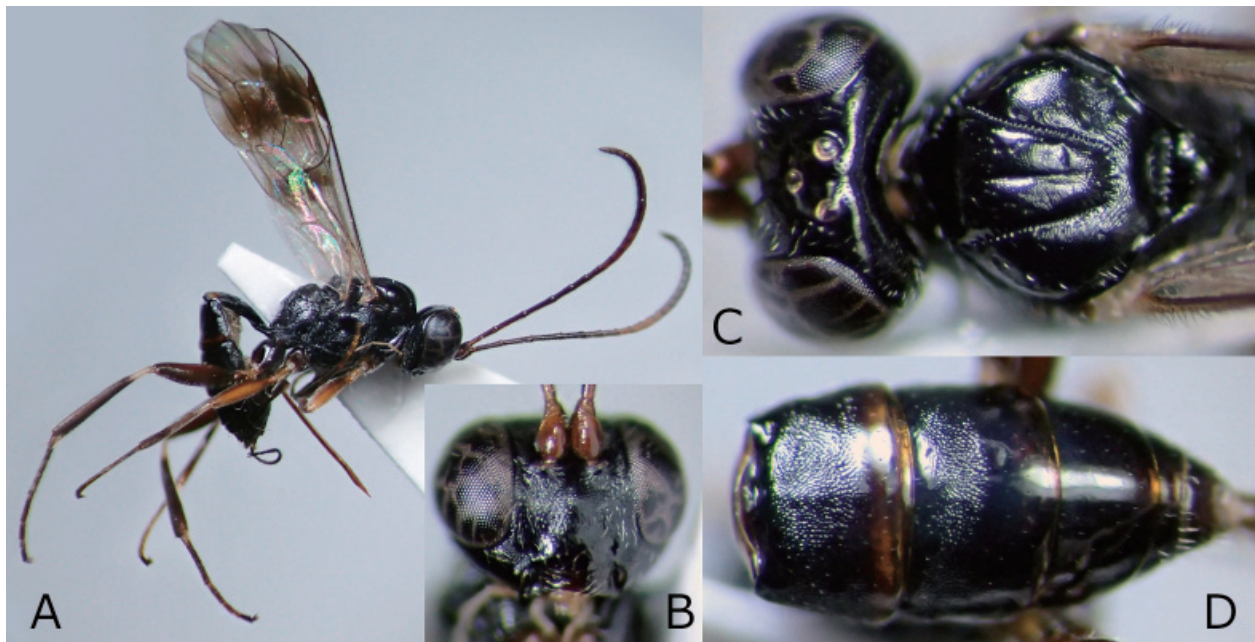


Fig. 23. *Paraphylax fumeae* Momoi, 1966, KPM-NK 81900, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesoscutum, and scutellum, dorsal view; D, T II to T VII, dorsal view.

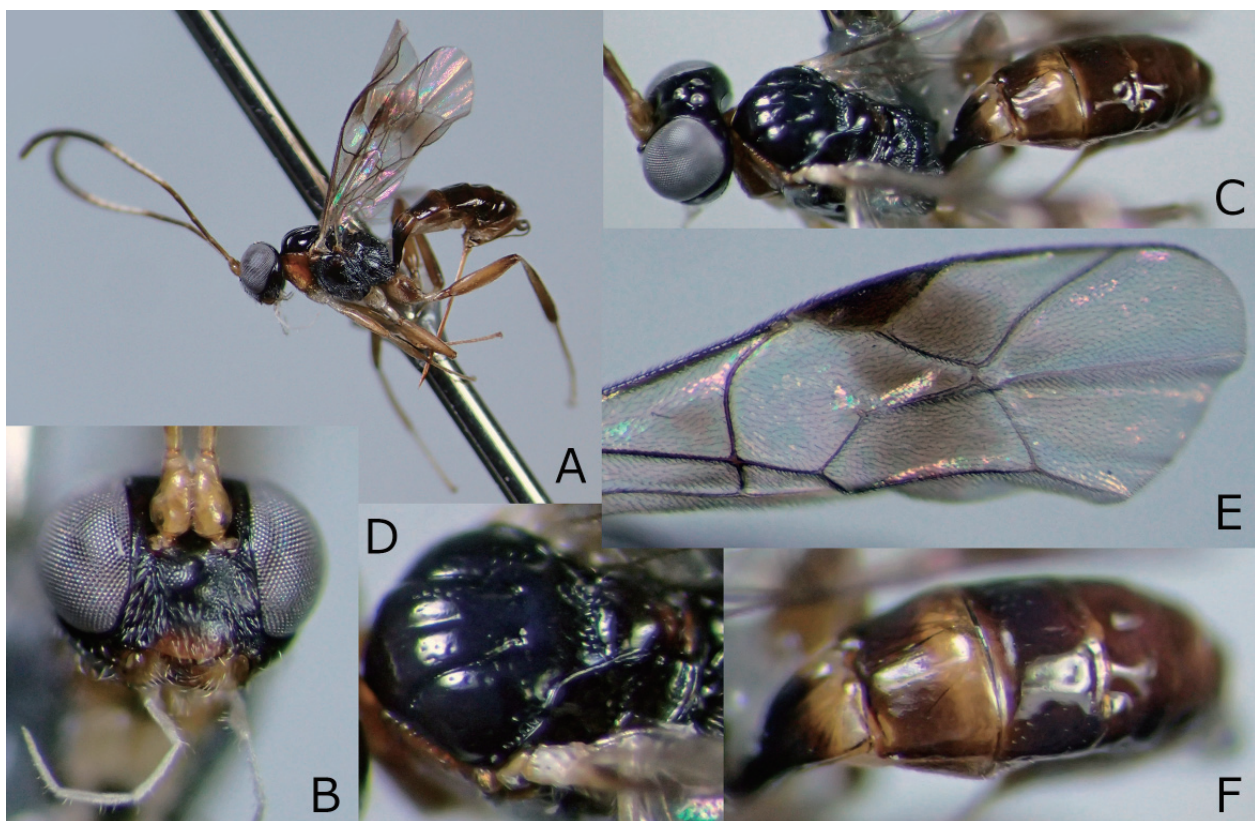


Fig. 24. *Paraphylax politus* sp. nov., KPM-NK 55079, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesoscutum and scutellum, dorsal view; E, fore wing; F, metasoma, dorso-lateral view.

Paraphylax sakabei Momoi, 1966a: 54.

Description. See Momoi (1966a).

Materials examined. JAPAN: MNHAH, F (holotype), Mie Pref., Ohmiya, 15–20. V. 1962, em. from *Fumea* sp.,

M. Sakabe leg.; KPM-NK 81902, 55086, 2 F, Kagoshima Pref., Yakushima Is., Mt. Aikodake, 30. III. – 29. IV. 2007, T. Yamauchi *et al.* leg. (MsT); KPM-NK 55087, F, ditto, 29. IV. – 1. V. 2007; KPM-NK 55088, 55089, 2 F, Kagoshima Pref., Yakushima Is., Kankake, 28. IV. –

1. V. 2007, T. Yamauchi *et al.* leg.; KPM-NK 81903, F, Kagoshima Pref., Yakushima Is., Hanyama, 28. IV. – 1. V. 2007, T. Yamauchi *et al.* leg. (MsT).

Distribution. Japan (Honshu and Yakushima Is.*).

Bionomics. Host record: *Psychidae* sp. (Lepidoptera) (Momoi, 1966).

Remarks. This is the first record of this species from Yakushima Island.

Paraphylax subtilis Momoi, 1966
(SJN: Fukuoka-minoga-togari-himebachi)
(Figs 26A–D)

Paraphylax subtilis Momoi, 1966a: 53.

Description. See Momoi (1966a).

Materials examined. JAPAN: KPM-NK 81901, F, Kagoshima Pref., Ookuchi Town, 4. VII. 2012, Y. Matsubara & K. Fukuda leg. (MsT).

Distribution. Japan (Kyushu and Amamioshima Is.).

Bionomics. Unknown.

Paraphylax transstriatus sp. nov.
(New SJN: Yokosuji-togari-himebachi)
(Figs 27A–E, 65H, 66G)

Etymology. The specific name is from the transverse

striae of T I.

Type series. Holotype: KPM-NK 55080, F, JAPAN, Tokyo, Miyakejima Is., Miyake Vil., Kamitsuki, 22. IX. – 20. X. 2012, K. Tsujii leg. (MsT).

Description. Female (n=1). Body length 4.6 mm. Body polished, covered with silver setae.

Head. Clypeus 2.0 times as wide as maximum length, its anterior margin rounded. Face densely punctate, with a median weak convexity (Fig. 27B). MSL 1.0 times as long as BWM. Frons rugose. Gena and vertex punctate, rugulose on ocellar area and posterior part of vertex. OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible flat. Antenna with 25 flagellomeres. FL III 6.7 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar with a weak median carina. Lateral part of pronotum largely smooth. Epomia short. Mesoscutum coriaceous, with a median longitudinal groove on the median lobe. Notaulus long, its posterior ends joined with each other posteriorly. Area along notaulus transversely striae. Scutellum irregularly rugose anteriorly, smooth posteriorly, with a lateral longitudinal carina except for apex. Mesopleuron longitudinally striate except for smooth speculum. Posterior transverse carina of mesosternum complete. Metapleuron minutely



Fig. 25. *Paraphylax sakabei* Momoi, 1966, KPM-NK 81902, female from Japan — A, lateral habitus; B, head, frontal view; C, metasoma, dorsal view.



Fig. 26. *Paraphylax subtilis* Momoi, 1966, KPM-NK 81901, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesoscutum, and scutellum, dorsal view; D, T II, dorsal view.

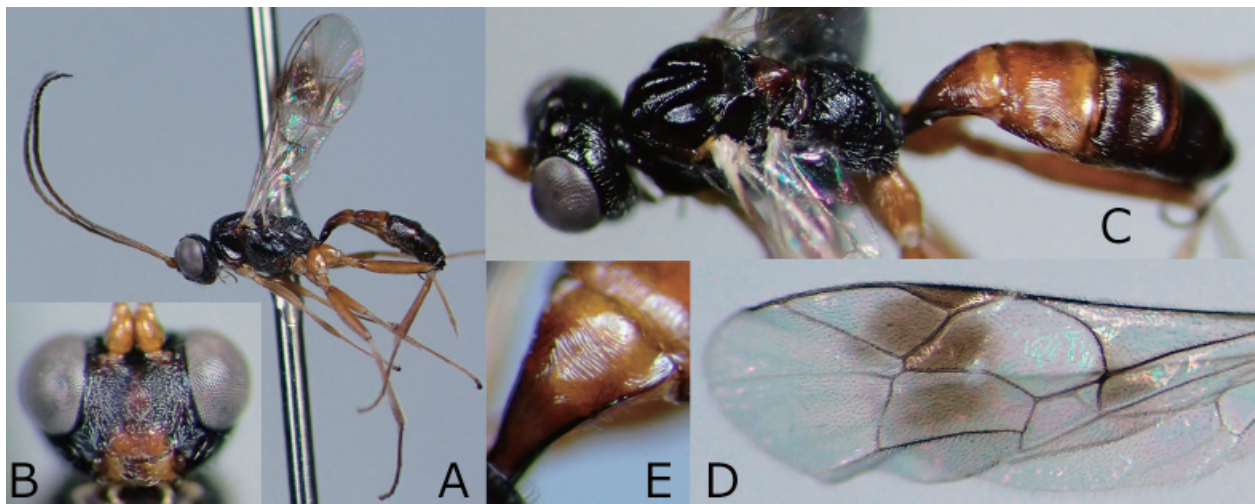


Fig. 27. *Paraphylax transstriatus* sp. nov., KPM-NK 55080, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, T I, dorso-lateral view.

striate anteriorly, finely punctate posteriorly, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65H). Pleural carina complete. Lateral longitudinal carina of propodeum absent. Area basalis distinct (Fig. 65H). Area superomedia indistinct laterally (Fig. 65H). Anterior part of propodeum obliquely rugulose (Fig. 65H). Median part of propodeum longitudinally rugulose (Fig. 65H). Posterior part of propodeum transversely, obliquely, and irregularly rugulose. Length of fore wing 4.0 mm. Areolet absent (Fig. 27D). Vein 2m-cu of fore wing with two bullae (Fig. 27D).

Nervellus inclivous, intercepted slightly behind middle (Fig. 27D). Hind femur 5.4 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.95: 0.7: 0.4: 0.55. Tarsal claws simple.

Metasoma. T I 1.5 times as long as maximum width, longitudinally striate anteriorly, transversely striate posteriorly (Fig. 27E). Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II and T III covered with longitudinal striae except for smooth posterior area on posterior 0.4 (Fig. 27C). T IV to T VII finely and sparsely punctate. Ovipositor sheath 0.78 times as long as hind tibia.

Ovipositor slightly decurved, with a nodus and ventral teeth (Fig. 66G).

Coloration (Figs 27A–E). Body (excluding wings and legs) black to blackish brown. Basal parts of antenna yellowish brown to reddish brown. Median parts of face and clypeus tinged with yellowish brown to reddish brown. Mandible yellow except for darkened apex. Palpi and tegula yellow. Lower part of collar, postero-dorsal corner of pronotum, anterior margin of mesoscutum, scutellum, postscutellum, anterior margin of mesopleuron, speculum, and mesosternum tinged with reddish brown. T I, T II, and posterior margin of T III reddish brown. T III more or less tinged with dark reddish brown. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline, with a longitudinal clouded band just behind pterostigma and a small, clouded area subbasally. Veins yellowish brown to blackish brown. Pterostigma blackish brown. Legs reddish brown to yellowish brown. Base of tibiae white.

Male. Unknown.

Distribution. Japan (Miyakejima Is.).

Bionomics. Unknown.

Remarks. This species resembles *Pa. saigusai* Momoi, 1966 and *Pa. yakushimensis* **sp. nov.** in the body coloration but it can be distinguished by the above key.

***Paraphylax yakushimensis* sp. nov.**

(New SJN: Yakushima-suji-togari-himebachi)

(Figs 28A–G, 65I, 66H)

Etymology. The specific name is from Yakushima Island, where is locality of types.

Type series. Holotype: KPM-NK 55081, F, JAPAN, Kagoshima Pref., Yakushima Is., Mt. Aiko-dake, 2. XI. – 1. XII. 2007, T. Yamauchi leg. (MsT). Paratype: JAPAN, KPM-NK 55082, F, same data of holotype, 25. VIII. – 22. IX. 2007; KPM-NK 55083, F, ditto, 28. IX. – 2. XI. 2007; KPM-NK 55084, F, Kagoshima Pref., Yakushima Is., Hanyama, 25. VIII. – 23. IX. 2006, T. Yamauchi leg. (MsT).

Description. Female (n=4). Body length 4.3–4.8 (HT: 4.8) mm. Body polished, covered with silver setae.

Head. Clypeus 1.9–2.0 (HT: 2.0) times as wide as maximum length, its anterior margin rounded. Face densely punctate, with a median weak convexity (Fig. 28B). MSL 1.0 times as long as BWM. Frons rugose, the rugae largely transverse. Gena punctate. Vertex punctate and largely transversely striate. OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible

slightly longer than lower tooth. Base of mandible flat. Antenna with 24–25 (HT: 24) flagellomeres. FL III 6.7 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar with a weak median carina. Lateral part of pronotum largely rugose except for a smooth area dorsally. Epomia short. Mesoscutum with a median longitudinal groove on the median lobe (Fig. 28D). Notaulus long, its posterior ends joined with each other posteriorly (Fig. 28D). Area along notaulus transversely striate (Fig. 28D). Scutellum smooth except for lateral part partly rugulose, with a lateral longitudinal carina except for apex. Mesopleuron longitudinally striate except for smooth speculum and an anterior small smooth area. Posterior transverse carina of mesosternum complete. Metapleuron punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65I). Pleural carina complete. Lateral longitudinal carina of propodeum absent. Area basalis distinct (Fig. 65I). Area supermedia indistinct laterally (Figs 28E, 65I). Anterior and posterior parts of propodeum transversely, obliquely, and irregularly rugulose. Median part of propodeum longitudinally rugulose (Figs 28E, 65I). Length of fore wing 3.6–3.9 (HT: 3.9) mm. Areolet absent (Fig. 28F). Vein 2m-cu of fore wing with two bullae (Fig. 28F). Nervellus inclivous, intercepted slightly behind middle. Hind femur 5.1–5.2 (HT: 5.2) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9–0.95 (HT: 0.9): 0.65–0.7 (HT: 0.7): 0.3–0.4 (HT: 0.4): 0.4. Tarsal claws simple.

Metasoma. T I 1.7 times as long as maximum width, longitudinally striate except for smooth posterior margin (Figs 28C, G). Median dorsal carina of T I indistinct. Dorsolateral carina of T I complete. T II and T III covered with longitudinal striae except for smooth posterior area on posterior 0.4 (Figs 28C, G). T IV finely and sparsely punctate, with some weak longitudinal striae medially. T V and T VI largely smooth medially. Ovipositor sheath 0.7–0.75 (HT: 0.75) times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth (Fig. 66H).

Coloration (Figs 28A–G). Body (excluding wings and legs) black to blackish brown. Basal parts of antenna yellowish brown to reddish brown. Median parts of face and clypeus tinged with yellowish brown to reddish brown. Mandible yellow except for darkened apex. Palpi and tegula yellowish brown to yellow. Margins of pronotum, mesoscutum, and mesopleuron partly tinged with reddish brown. Scutellum and postscutellum dark reddish brown. T I reddish brown, its lateral sides more or less darkened. T II and T III reddish brown. T IV dark reddish brown anteriorly, reddish brown posteriorly. T

V to T VII dark reddish brown except for reddish brown posterior margin. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline, with a longitudinal clouded band just behind pterostigma and a small, clouded area subbasally. Veins yellowish brown to blackish brown. Pterostigma blackish brown. Legs reddish brown. Base of tibiae white. T I and T IV to T VII sometimes entirely tinged with reddish brown.

Male. Unknown.

Distribution. Japan (Yakushima Is.).

Bionomics. Unknown.

Remarks. This species resembles *Pa. saigusai* Momoi, 1966 in the body coloration but it can be distinguished by the above key.

***Paraphylax yambarensis* sp. nov.**

(New SJN: Okinawa-suji-togari-himebachi)

(Figs 29A–G, 65J, 66I)

Etymology. The specific name is from the local locality name, Yambaru, where is the northern area of Okinawajima Island and type locality of this species.

Type series. **Holotype:** KPM-NK 55085, F, JAPAN, Okinawa Pref., Okinawajima Is., Kunigami Vil., Aha, 21. IV. 2016, K. Watanabe leg.

Description. Female (n=1). Body length 4.2 mm. Body polished, covered with silver setae.

Head. Clypeus 1.9 times as wide as maximum length, its anterior margin rounded. Face densely punctate, with a median slight convexity. MSL 0.9 times as long as BWM. Frons transversely rugose, the interspace of rugae partly punctate. Gena punctate. Vertex punctate, partly rugulose on oceller area and posterior part. OOL shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible flat. Antenna with 23 flagellomeres. FL III 6.7 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar with an indistinct median carina. Lateral part of pronotum largely smooth (Fig. 29E). Epomia short and indistinct. Mesoscutum largely smooth, with a median longitudinal groove on the anterior half of median lobe (Fig. 29D). Notaulus long, its posterior ends closed each other. Area along notaulus partly and narrowly transversely striae. Scutellum largely smooth, without a lateral longitudinal carina except for base. Mesopleuron largely smooth. Posterior transverse carina of mesosternum complete. Metapleuron sparsely and finely punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete (Fig. 65J). Pleural carina complete. Lateral longitudinal carina of propodeum absent. Area basalis distinct (Fig. 65J). Area superomedia indistinct laterally (Fig. 65J). Anterior

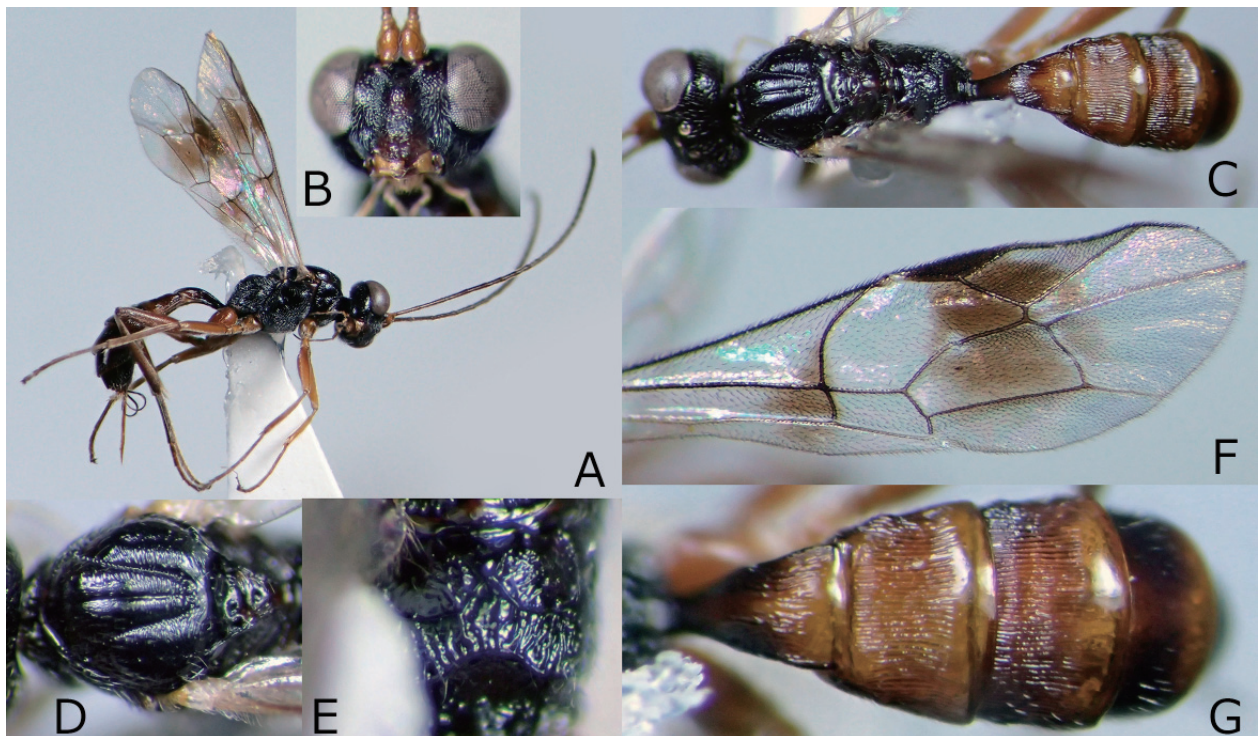


Fig. 28. *Paraphylax yakushimensis* sp. nov., KPM-NK 55081, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesoscutum and scutellum, dorsal view; E, propodeum, dorsal view; F, fore wing; G, metasoma, dorsal view.

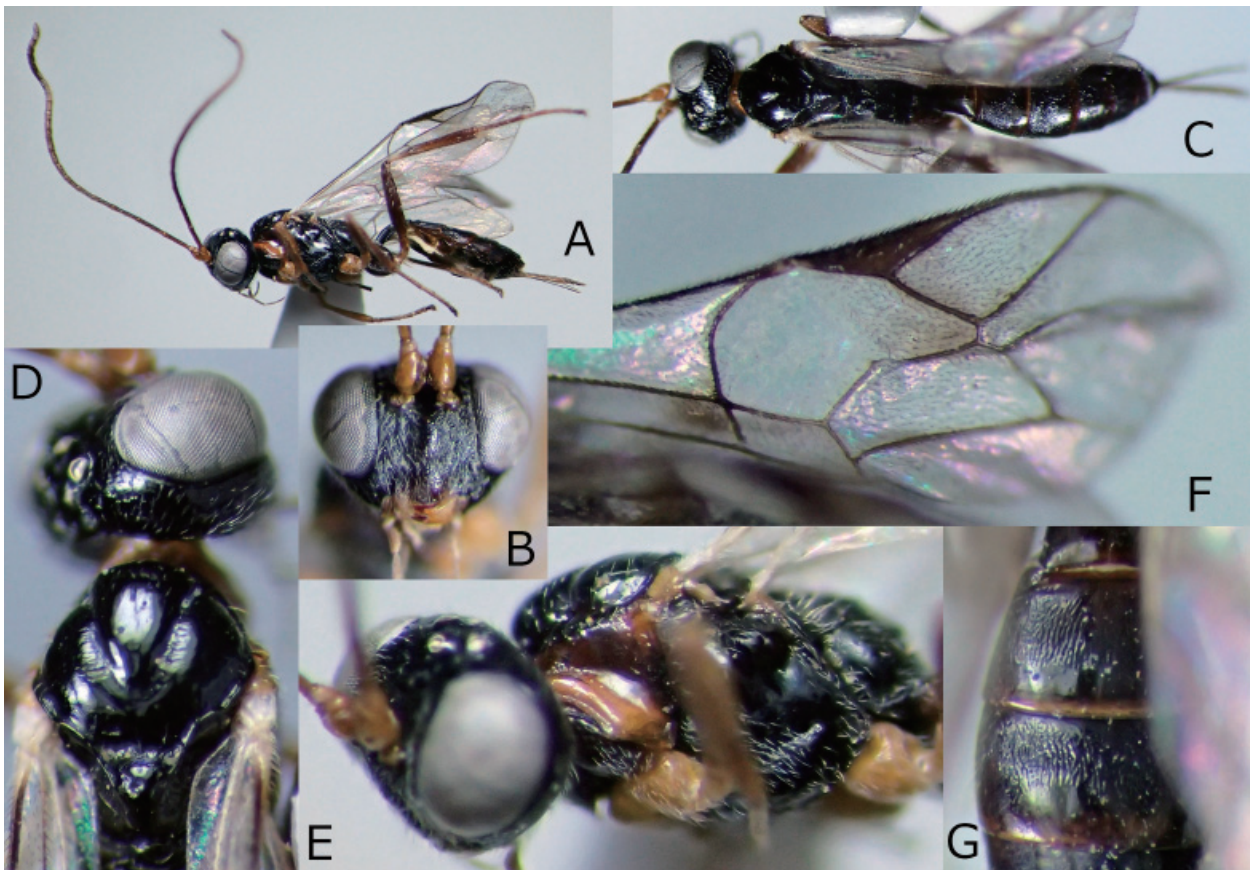


Fig. 29. *Paraphylax yambarensis* sp. nov., KPM-NK 55085, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, head, mesoscutum and scutellum, dorsal view; E, head and mesosoma, lateral view; F, fore wing; G, T II and T III, dorsal view.

part of propodeum largely smooth. Median and posterior parts of propodeum transversely, obliquely, and irregularly rugulose. Length of fore wing 3.6 mm. Areolet absent (Fig. 29F). Vein 2m-cu of fore wing with two bullae. Nervellus inclivous, intercepted slightly behind middle. Hind femur 5.3 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.65: 0.35: 0.5. Tarsal claws simple.

Metasoma. T I 1.7 times as long as maximum width, coriaceous anteriorly, smooth posteriorly. Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II and T III covered with longitudinal striae and fine and dense punctures except for smooth posterior area on posterior 0.4 (Fig. 29G). T IV to T VII finely and sparsely punctate laterally, smooth medially. Ovipositor sheath 0.75 times as long as hind tibia. Ovipositor straight, with a weak nodus and ventral teeth (Fig. 66I).

Coloration (Figs 29A–G). Body (excluding wings and legs) black to blackish brown. Basal parts of antenna yellowish brown to reddish brown. Anterior part of clypeus tinged with reddish brown. Mandible yellow except for darkened apex. Palpi and tegula yellow. Pronotum reddish brown to dark yellowish brown. Posterior margins of T I to T VI narrowly tinged with reddish brown. Membranous part of metasomal sternites whitish yellow. Ovipositor

reddish brown. Wings hyaline, with obtuse clouded areas. Veins yellowish brown to blackish brown. Pterostigma blackish brown. Fore and mid coxae, trochanters, and trochantelli yellowish brown. Fore and mid femora, tibiae, and tarsi reddish brown. Hind coxa, femur, apical part of tibia, and tarsus dark brown to blackish brown. Hind trochanter, trochantellus, and base of tibia whitish yellow to yellowish brown. Tibial spurs whitish yellow.

Male. Unknown.

Distribution. Japan (Okinawajima Is.).

Bionomics. Unknown.

Remarks. This species resembles *Pa. elegans* sp. nov. in the T I without longitudinal striae but it can be distinguished by the above key.

Ethelurgus genus group

(subtribe Ethelurgina sensu Townes (1970))

Two genera, *Ethelurgus* Förster, 1869 and *Rhembobius* Förster, 1869, have been recorded from Japan. In this study, I review both genera. The Japanese genera can be distinguished by the following key.

Key to Japanese genera of *Ethelurgus* genus group

1. Vein 2m-cu vertical (Fig. 32C). Propodeum with strong, projecting apophyses (Figs 32A, D). T II largely smooth except for longitudinally striate basally in Japanese species (Fig. 32D).

..... *Rhembobius* Förster, 1869*

-. Vein 2m-cu inclivous. Propodeum without distinct apophyses (Figs 30A, 31A). T II largely punctate in Japanese species.

..... *Ethelurgus* Förster, 1869**

* This genus is sometimes misidentified with *Pleolophus* Townes, 1962 (Aptesini Smith & Shenfelt, 1955 of Cryptinae) because vein 2m-cu vertical. Users should carefully check the character states of them.

** This genus is sometimes misidentified with *Stibeutes* Förster, 1869 (*Phygadeuon* genus group). Users should carefully check the character states of clypeus, propodeum, and ovipositor.

Genus *Ethelurgus* Förster, 1869

Tolmerus Förster, 1869: 177. Type: *Phygadeuon sodalis* Taschenberg, 1865. Designated by Townes & Townes (1966).

Ethelurgus Förster, 1869: 180. Type: *Hemiteles (Ethelurgus) lonicerae* Viereck, 1917 (= *Hemiteles syrphicola* Ashmead, 1890). Included by Viereck (1917).

Nuneches Förster, 1869: 186. Type: *Phygadeuon sodalis* Taschenberg, 1865. Designated by Perkins (1962).

Platycryptus Kriechbaumer, 1893: 150. Type: *Phygadeuon sodalis* Taschenberg, 1865. Designated by Horstmann (1992).

Zamicrotoridea Viereck, 1917: 340. Type: *Hemiteles (Zamicrotoridea) orbiformis* Viereck, 1917 (= *Hemiteles syrphicola* Ashmead, 1890). Monobasic.

Four species, *E. episyrphicola* Kusigemati, 1983, *E. kumatai* Kusigemati, 1983, *E. sodalis fuscipes* Townes, 1983, and *E. politus* Townes, 1983, have been recorded from Japan. Kusigemati (1983) and Townes (1983) individually revised Japanese species. I compared the types of these species deposited in AEIC and SEHU and conclude that *E. episyrphicola* and *E. politus*, and *E. kumatai* and *E. sodalis fuscipes* are same species, respectively. Townes (1983) was published in December and Kusigemati (1983) was published in March. Thus, I newly synonymize *E. politus* under *E. episyrphicola* and *E. sodalis fuscipes* under *E. kumatai*. In addition, according

to Horstmann (2000), the taxonomic status of *E. kumatai* should be treated as subspecies of *E. sodalis* (Taschenberg, 1865). Thus, I treat that *E. kumatai* is as the subgenus of this species (**comb. nov.**). In addition, I recognize an undetermined species from Japan, while the identification of this species requires more materials. Japanese species can be distinguished by the following key.

Preliminary key to Japanese species of the genus *Ethelurgus* (♀)

1. Mesoscutum polished (Fig. 30C). A smooth area of mesopleuron distinctly larger than speculum (Fig. 30D). Coxae and femora more or less tinged with reddish brown (Fig. 30A).

..... *E. episyrphicola* Kusigemati, 1983
(= *E. politus* Townes, 1983 **syn. nov.**)

-. Mesoscutum matt (Fig. 31C). A smooth area of mesopleuron larger than or as size as speculum (Fig. 31D). Coxae and femora black (Fig. 31A).

..... 2

2. Mesopleuron covered with longitudinal striae except for speculum (Fig. 31D). T II covered with longitudinal striae basally (Fig. 31C).

..... *E. sodalis kumatai* Kusigemati, 1983
(= *E. sodalis fuscipes* Townes, 1983 **syn. nov.**)

-. Mesopleuron punctate and smooth dorsally, longitudinally striae ventrally. T II without longitudinal striae.

..... *E. sp.*

***Ethelurgus episyrphicola* Kusigemati, 1983**
(SJN: Hosohirataabu-togari-himebachi)
(Figs 30A–D)

Ethelurgus episyrphicola Kusigemati, 1983: 110.

Ethelurgus politus Townes, 1983: 135. **Syn. nov.**

Description. See Kusigemati (1983) and Townes (1983).

Materials examined. JAPAN: KPM-NK 81913, F, Hokkaido, Otofuke Town, Kibougaoka-koen, 25. VI. 2017, K. Watanabe leg.; KPM-NK 81915, M, Saitama Pref., Urawa, Tajima, 9. IV. 1999, T. Nambu leg.; KPM-NK 81916, F, Saitama Pref., Yorii town, Mure, 17. V. 2001, T. Nambu leg. (YPT); KPM-NK 81911, F, Tokyo, Izuoshima Is., Ohshima Town, Mt. Omaru, Tsubakinomori, 5–31. X. 2012, K. Tsujii leg. (MsT); KPM-NK 81918, F, Tokyo, Miyakejima Is., Miyake Vil., Tsubota-rindo, 25. VIII. – 22. IX. 2012, K. Tsujii leg. (MsT); KPM-NK 81917, F, Tokyo, Hachijojima Is., Oogakyo, 16–21. V. 2012, K.

Tsujii leg. (MsT); KPM-NK 81919–81921, 3 M, Tokyo, Akiruno City, Ninomiya, Tamagawa-riverside, 3. V. 2010, K. Watanabe leg.; KPM-NK 81914, M, Kanagawa Pref., Yokosuka City, Fukadadai, 11. IV. 1997, I. Kawashima leg.; KPM-NK 81926, F, Kanagawa Pref., Hakone Town, Ochudo, 21. VI. 2010, M. Takakuwa leg.; KPM-NK 81925, M, Yamanashi Pref., Koushu City, Yanagisawa-toge, 5. VIII. 2008, K. Watanabe leg.; TMNH, F, Aichi Pref., Toyohashi City, Imura Town, Takayama, 2. VI. – 6. VI. 2019, S. Morishita leg. (MsT); KPM-NK 81922, M, Toyama Pref., Toyama City, Kamegai, 28. VII. – 4. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81923, F, Fukui Pref., Arashi, 23. IX. 1973, T. Tano leg.; AEIC, F (holotype of *E. politus*), Tokushima Pref., Nishino, 18. VI. 1932, K. Sato leg.; KPM-NK 81912, F, Saga Pref., Tara Town, Mt. Taradake, 20. V. 2011, T. Yamauchi leg.; SEHU, F (holotype of *Et. episyrrhicola*), Kagoshima Pref., Kagoshima City, 18. XII. 1962, em. from *Episyrrhus balteatus*, K. Kusigemati leg.; KPM-NK 81924, F, Kagoshima Pref., Tokunoshima Is., Tete, Mt. Amagi-dake, 27. III. 2011, K. Watanabe leg.

Distribution. Japan (Hokkaido*, Honshu, Izuoshima Is.*, Miyakejima Is.*, Hachijojima Is.*, Shikoku, Kyushu, and Tokunoshima Is.*), China, and India.

Bionomics. Host record: *Episyrrhus balteatus* (De Geer, 1776) (Diptera, Syrphidae) (Kusigemati, 1983).

Remarks. This is the first record of this species from Hokkaido, Izuoshima Is., Miyakejima Is., Hachijojima Is., and Tokunoshima Is.

Ethelurgus sodalis kumatai Kusigemati, 1983

comb. nov.

(New SJN: Tairiku-abu-togari-himebachi)

(Figs 31A–D, 65K)

Ethelurgus kumatai Kusigemati, 1983: 111.

Ethelurgus vulnerator fuscipes Townes, 1983: 133.

Ethelurgus sodalis fuscipes Townes, 1983; Horstmann, 2000: 70. **Syn. nov.**

Description. See Kusigemati (1983) and Townes (1983).

Materials examined. JAPAN: SEHU, F (holotype of *E. kumatai*) and M (paratype of *E. kumatai*), Hokkaido, Eniwa, 30. VI. 1962, em. from *Syrphus torvus*, T. Kumata leg.; KPM-NK 81955, F, Hokkaido, Horokanai Town, Moshiri, Uryu, Butokamabetsu-rindo, 17. VII. 2012, K. Watanabe leg.; KPM-NK 81935, F, Gunma Pref., Tsumagoi Vil., Kanbata, Takamine-kogen, 3. IX. 2015, K. Watanabe leg.; KPM-NK 81937, F, Gunma Pref., Katashina Vil., Marunuma, Yuzawa, 2. VII. 2008, K. Watanabe leg.; KPM-NK 81936, F, Tochigi Pref., Nasushiobara City, Shiobara, Utou-sawa, 22–28. V. 2008, T. Matsumura leg. (MsT); KPM-NK 81940, F, Tochigi Pref., Nasushiobara, Uwanohara, 7. X. 2010, E. Katayama leg.; KPM-NK 81939, F, Kanagawa Pref., Fujino Town, Mt. Jinba-yama, 7. VI. 2008, K. Watanabe leg.; KPM-NK 81952–81954, 3 F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 7. VIII. 2010, K. Watanabe leg.; KPM-NK 81947, F, ditto, 16–17. IX. 2011, K. Asahi

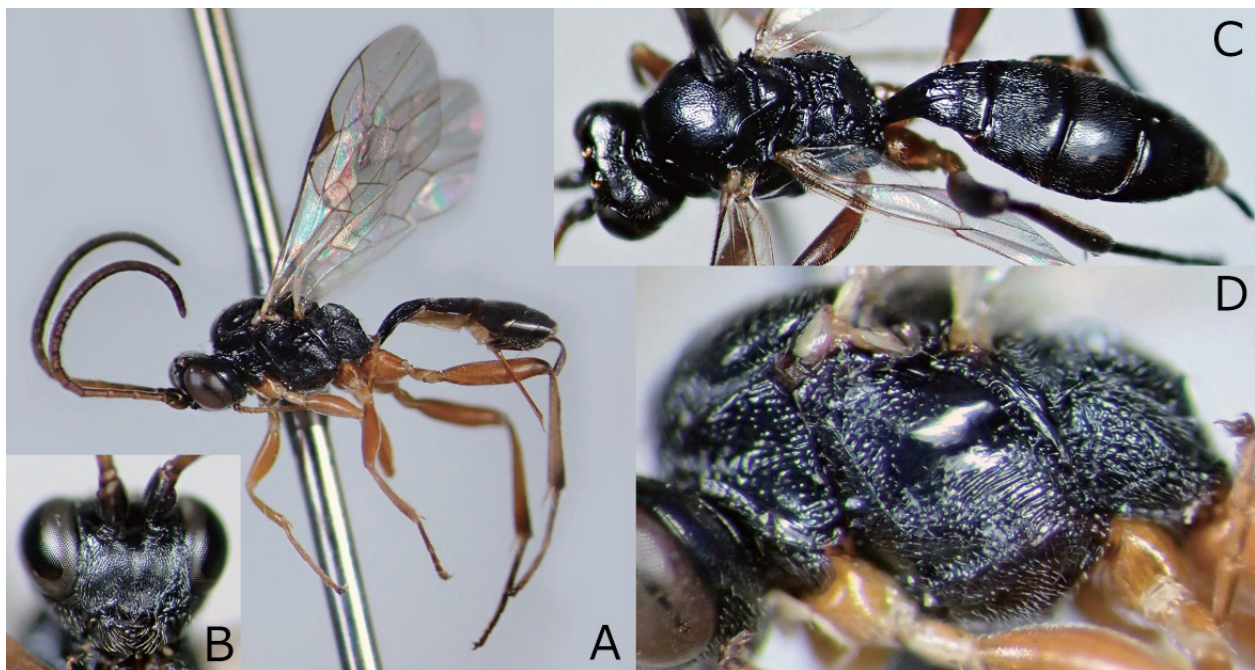


Fig. 30. *Ethelurgus episyrrhicola* Kusigemati, 1983, KPM-NK 81913 (B, C) and 81924 (A, D), females from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesosoma, lateral view.

leg.; KPM-NK 81942–81946, 5 F, ditto, 4. VIII. 2017, K. Watanabe leg.; KPM-NK 81949–81951, 3 F, Niigata Pref., Sado Is., Kanaishinbo, Hakuundai to Mt. Myokenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 81948, F, ditto, 10. IX. 2010; AEIC, F (holotype of *E. vulnerator fuscipes*), Nagano Pref., Kamikochi, 22. VII. 1954, Townes family leg.; KPM-NK 81927, 81928, 2 F, Toyama Pref., Toyama City, Arimine, Inonedani, 1–8. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81929–81934, 6 F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 16–25. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81941, F, Ishikawa Pref., Shiramine Vil., Hakusanshita, 21. VIII. 1982, H. Kurokawa leg.; KPM-NK 81938, F, Hyogo Pref., Yabu City, Mt. Hyonosen, Oodanganaru, 13–14. VII. 2013, K. Watanabe leg. (LT).

Distribution. Japan (Hokkaido, Honshu, and Sado Is.*).

Bionomics. Host record: *Syrphus torvus* Osten Sacken, 1875 (Diptera, Syrphidae) (Kusigemati, 1983).

Remarks. This is the first record of this species from Sado Is.

Genus *Rhembobius* Förster, 1869

Rhembobius Förster, 1869: 184. Type: *Phygadeuon quadrispinus* Gravenhorst, 1829. Designated by Ashmead (1900a).

Ulothymus Förster, 1869: 185. Type: *Ichneumon perscrutator* Thunberg, 1824. Designated by Perkins (1962)

Acanthocryptus Thomson, 1873: 520. Type: *Phygadeuon quadrispinus* Gravenhorst, 1829.

Original designation.

Two species, *Rh. perscrutator* (Thunberg, 1822) and *Rh. quadristriatus* (Uchida, 1956), have been recorded from Japan. The latter species is recorded by only a male holotype and I could not find the type. In this study, I record the distributional data of the former below. Japanese species can be distinguished by the following key.

Key to Japanese species of the genus *Rhembobius* (♀♂)

(female of *Rh. quadristriatus* is unknown)

1. Metasoma entirely black (Figs 32A, D), sometimes T II and T III slightly tinged with reddish brown. Legs black (Fig. 32A). Body length 5.0–8.0 mm.
..... *Rh. perscrutator* (Thunberg, 1822)
- . Posterior margins of T I, T II, and T III yellowish red. Legs largely yellowish red. Body length 6.5 mm.
..... *Rh. quadristriatus* (Uchida, 1956)

Rhembobius perscrutator (Thunberg, 1822)

(SJN: Tsuya-chibi-togari-himebachi)

(Figs 32A–D)

Ichneumon perscrutator Thunberg, 1822: 257.

Cryptus basalis Smith, 1874: 392.

Acanthocryptus nigrita mesocastaneus Constantineanu, 1929: 522.

Description. See Horstmann (2000).

Materials examined. JAPAN: KPM-NK 81959, F,

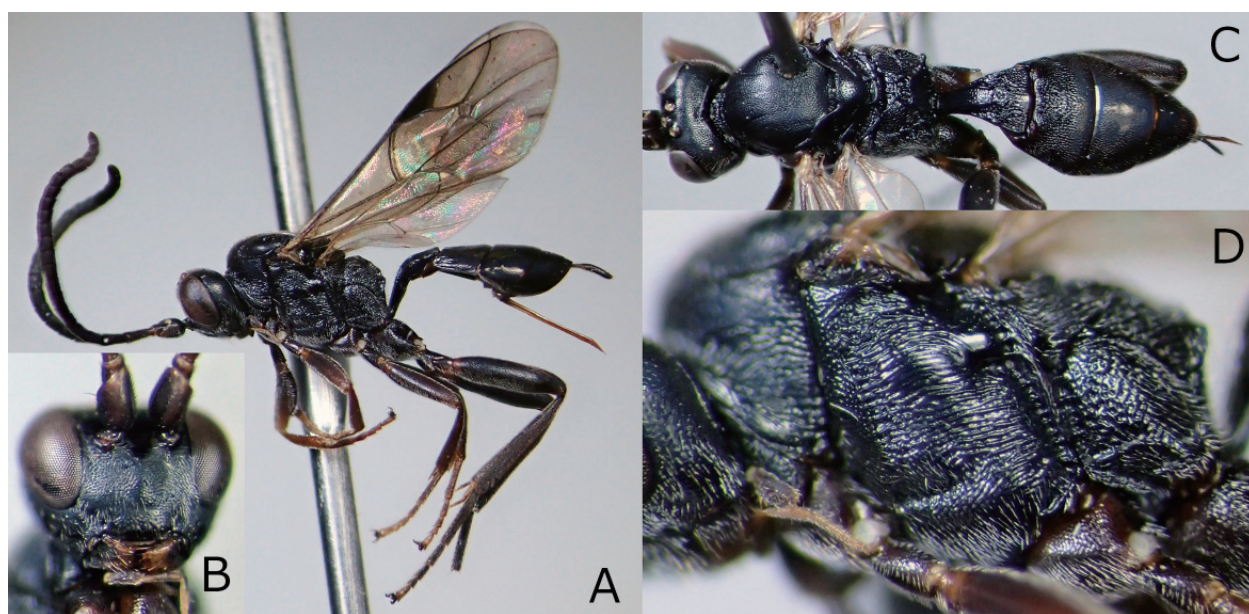


Fig. 31. *Ethelurgus sodalis kumatai* Kusigemati, 1983, KPM-NK 81947 (C) and 81950 (A, B, D), females from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesosoma, lateral view.

Saitama Pref., Yorii town, 27. V. 2013, T. Nambu leg.; KPM-NK 81957, F, Kanagawa Pref., Yokosuka City, Mt. Miura-fuji to Mt. Takeyama, 13. VII. 2008, K. Watanabe leg.; KPM-NK 81956, 81960, F & M, Niigata Pref., Nagaoka City, Urase Town, 7–23. VI. 2015, R. Shimizu *et al.* leg. (MsT); KPM-NK 81958, F, Toyama Pref., Toyama City, Arimine, Inonedani, 28. VII. – 4. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81961, F, Osaka Pref., Higashiosaka City, Hiraoka-park, 1. VI. 2012, K. Watanabe leg.; NHMUK, F (type of *Cryptus basalis*), “Hiogo”. GERMANY: ZSM, F (det. Sawoniewicz), Blankenburg, Schmiedeknecht leg. SLOVENIA: ZSM, F (det. Sawoniewicz), Rogaška, Slatina, 4. VII. 1938, E. Bauer leg.

Distribution. Japan (Kunashiri Is., Hokkaido, Honshu, and Shikoku); widely distributed in Palearctic region (Yu *et al.*, 2016).

Bionomics. Unknown in Japan. In Europe, some species of Syrphidae (Diptera) have been recorded as the host (Yu *et al.*, 2016).

Gelis genus group

(subtribe *Gelina* sensu Townes (1970))

Four genera, *Dichrogaster* Doumerc, 1855, *Gelis* Thunberg, 1827, *Townostilpnus* Aubert, 1961, and *Xenolytus* Förster, 1869, have been recorded from Japan. In this study, I review *Dichrogaster* below. The identification of genera see Townes (1970) and Schwarz (1995).

Genus *Dichrogaster* Doumerc, 1855

Dichrogaster Doumerc, 1855: 38. Type: *Microgaster perlae* Doumerc, 1855. Monobasic.

Otacustes Förster, 1869: 174. Type: *Otacustes atriceps* Ashmead, 1894 (= *Otacustes chrysopae* Ashmead, 1894). Included by Ashmead (1894).

Microtorus Förster, 1869: 178. Type: *Microtorus kichijoi* Uchida, 1940. Designated by Townes (1957).

Xenobrachys Förster, 1869: 179. Type: *Hemiteles longicaudatus* Thomson, 1884. Designated by Perkins (1962).

Brachycephalus Förster, 1869: 179. Type: *Hemiteles aestivalis* Gravenhorst, 1829. Designated by Townes (1944).

Brachycranium Ashmead, 1900b: 368. New name for *Brachycephalus*.

Chrysopoctonus Cushman, 1919: 518. Type: *Otacustes atriceps* Ashmead, 1894 (= *Otacustes chrysopae* Ashmead, 1894). Original designation.

Four species, *Dic. imperialis* Yoshida & Konishi, 2008, *Dic. kichijoi* (Uchida, 1940), *Dic. liostylus* (Thomson, 1885), and *Dic. parva* Yoshida & Konishi, 2008, have been recorded from Japan. In this study, I record *Dic. nitida* Sheng & Sun, 2014 from Japan for the first time and some new distributional data of four previously recorded species below. All species except for *Dic. liostylus* are relatively rarely collected in the field investigations. Key

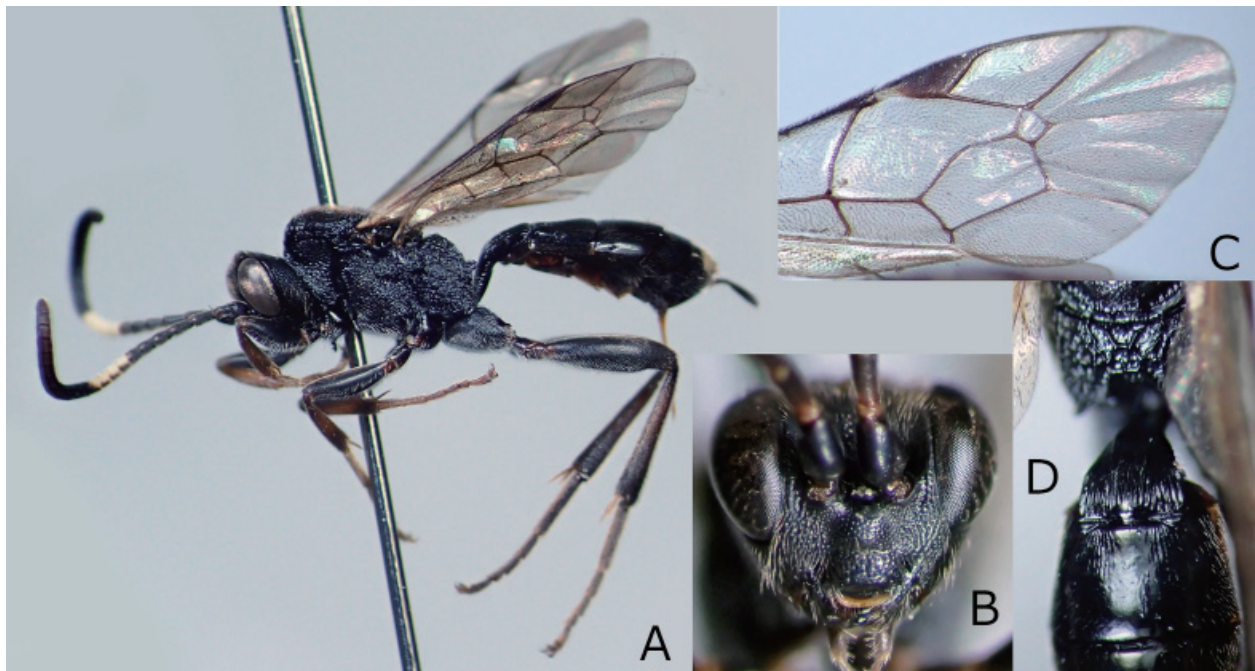


Fig. 32. *Rhembobius perscrutator* (Thunberg, 1822), KPM-NK 81957 (A, C, D) and 81961 (C), females from Japan — A, lateral habitus; B, head, frontal view; C, fore wing; D, propodeum, T I, and T II, dorsal view.

to species including four previously recorded species has been provided by Yoshida & Konishi (2008). *Dichrogaster nitida* apparently resembles *Dic. liostylus* in inclivous 2m-cu, but can be distinguished by the indistinct epomia (Fig. 63C) (distinct in *Dic. liostylus*, Fig. 63B) and the T II to T IV without dark transverse band (Fig. 36C) (usually with dark area(s) in *Dic. liostylus*, Figs 35A, C).

Dichrogaster imperialis Yoshida & Konishi, 2008
(SJN: Mikado-kusakagerou-togari-himebachi)
(Figs 33A–C)

Dichrogaster imperialis Yoshida & Konishi, 2008: 252.

Description. See Yoshida & Konishi (2008).

Materials examined. JAPAN: SEHU, M (paratype), Saitama Pref., Hanno, 2. V. 1968, H. Takizawa leg.; KPM-NK 81909, M, Tokyo, Okutama, Nippara, 24. X. 2004, A. Shimizu leg.; KPM-NK 81910, F, Kanagawa Pref., Oiso Town, Koma, Komayama, 16. IV. 2016, K. Watanabe leg.; SEHU, F (paratype), Kagoshima Pref., Terayama, 1. V. 1970, K. Kusigemati leg.

Distribution. Japan (Honshu, Kyushu, and Amamioshima Is.).

Bionomics. Unknown.

Dichrogaster kichijoi (Uchida, 1940)
(SJN: Kusakagerou-togari-himebachi)
(Figs 34A–D)

Hemiteles (Rhadiurgus) chrysopae Uchida, 1933a: 167.
Microtorus kichijoi Uchida, 1940: 66.

Description. See Yoshida & Konishi (2008).

Materials examined. JAPAN: SEHU, F (holotype of *Hemiteles (Rhadiurgus) chrysopae*), Hokkaido, Sapporo, 31. VII. 1931; KPM-NK 81839, 81840, 2 F, Gunma Pref., Tsumagoi Vil., Kanbata, Takamine-kogen, 3. IX. 2015, K. Watanabe leg.

Distribution. Japan (Hokkaido and Honshu*).

Bionomics. Host record: *Chrysopa septempunctata* Wesmael, 1841 (= *C. pallens* (Rambur, 1838) (Neuroptera: Chrysopidae) (Uchida, 1933a).

Remarks. This is the first record of this species from Honshu.

Dichrogaster liostylus (Thomson, 1885)
(SJN: Ana-kusakagerou-togari-himebachi)
(Figs 35A–C, 63B)

Hemiteles liostylus Thomson, 1885: 30.

Hemiteles schaffneri Schmiedeknecht, 1897: 109.

Description. See Yoshida & Konishi (2008).

Materials examined. This species is an exceptionally well-recorded species in Japanese Phygadeuontinae. In this study, I record this species based on the specimens collected newly recorded islands or prefectures.

JAPAN: KPM-NK 55037–55039, 3 F, Niigata Pref., Sado Is., Hakuundai to Mt. Myokenzan, 10. IX. 2010, K. Watanabe leg.; KPM-NK 55040–55047, 7 F & 1 M, Tokyo, Izuoshima Is., Oshima Town, Motomachi, Mt. Omaru, 17. VIII. – 5. X. 2012, K. Tsujii leg. (MsT); KPM-NK 55048–55054, 4 F & 3 M, ditto, 5. X. – 31. X. 2012; KPM-NK 55055, M, Tokyo, Aogashima Is., 8. X. 2011, K. Tsujii leg.; KPM-NK 55056–55065, 1 F & 9 M, Tokyo, Miyakejima Is., Miyake Vil., Kanjo-rindo, 25. VIII. – 22. IX. 2012, K. Tsujii leg. (MsT); KPM-NK 55066, 55067, 2 F, Tokyo, Mikurajima Is., Eiga-sawa, 20. IX. – 25. X. 2012, K. Tsujii leg. (MsT); KPM-NK 55068, 55069, 2 F, Tokyo, Hachijojima Is., Hachijo Town, Mt. Miharayama, 24. IX. – 28. X. 2012, K. Tsujii leg. (MsT); KPM-NK 55070, F, Yamanashi Pref., Koushu City, Yanagisawa-toge, 5. VIII. 2008, K. Watanabe leg.; KPM-NK 55071, 55072, 2 F, Toyama Pref., Nanto City, Togamura, Kamimomose, 1–8. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 55073, F, Hyogo Pref., Kasai City, Uzurano Town, 29. IV. 2011, K. Maeto & K. Watanabe leg.; KPM-NK 55074, 55075, F, Kagawa Pref., Takamatsu City, Enza Town, riverside of Koutougawa Riv., 5. V. 2011, K. Maeto & K. Watanabe leg.; KPM-NK 55076, F, Kochi Pref., Umaji Vil., 4. VIII. 2010, Y. Matsubara & K. Fukuda leg. (MsT); KPM-NK 55077, F, Kagoshima Pref., Amamioshima Is., Mt. Yuidake, 10. VIII. 2004, H. Makihara leg. (MsT).

Distribution. Japan (Kunashiri Is., Hokkaido, Honshu, Sado Is.*, Izuoshima Is.*, Miyakejima Is.*, Aogashima Is.*, Mikurajima Is.*, Hachijojima Is.*, Shikoku, Kyushu, Tsushima Is., Yakushima Is., Amamioshima Is.*, and Okinawajima Is.); Taiwan, India, and widely distributed in Palearctic region.

Bionomics. Host record: cocoon of Chrysopidae sp. (Neuroptera) (Yoshida & Konishi, 2008).

Remarks. This is the first record of this species from Sado Is., Izuoshima Is., Miyakejima Is., Aogashima Is., Mikurajima Is., Hachijojima Is., and Amamioshima Is.

Dichrogaster nitida Sheng & Sun, 2014
(New SJN: Sheng-kusakagerou-togari-himebachi)
(Figs 36A–D, 63C)

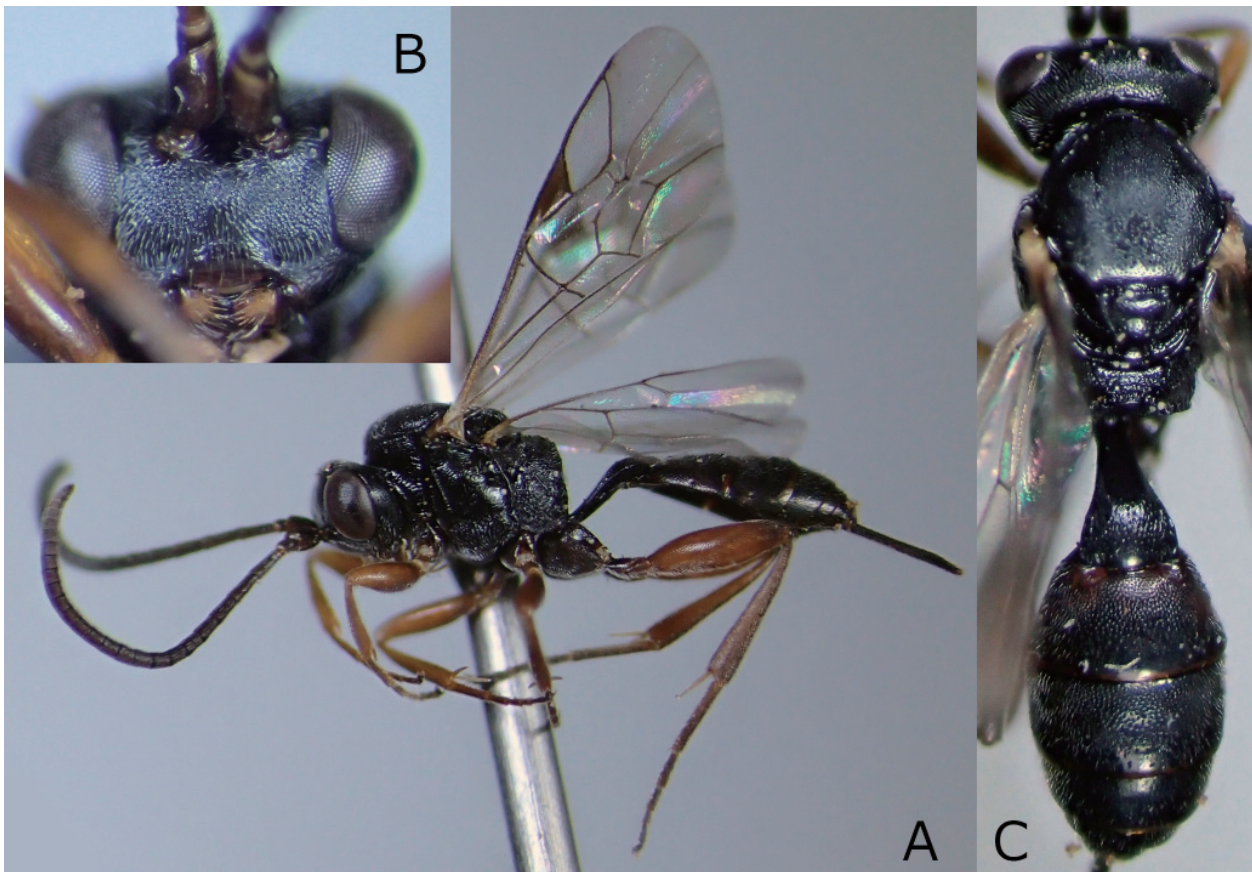


Fig. 33. *Dichrogaster imperialis* Yoshida & Konishi, 2008, KPM-NK 81910, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

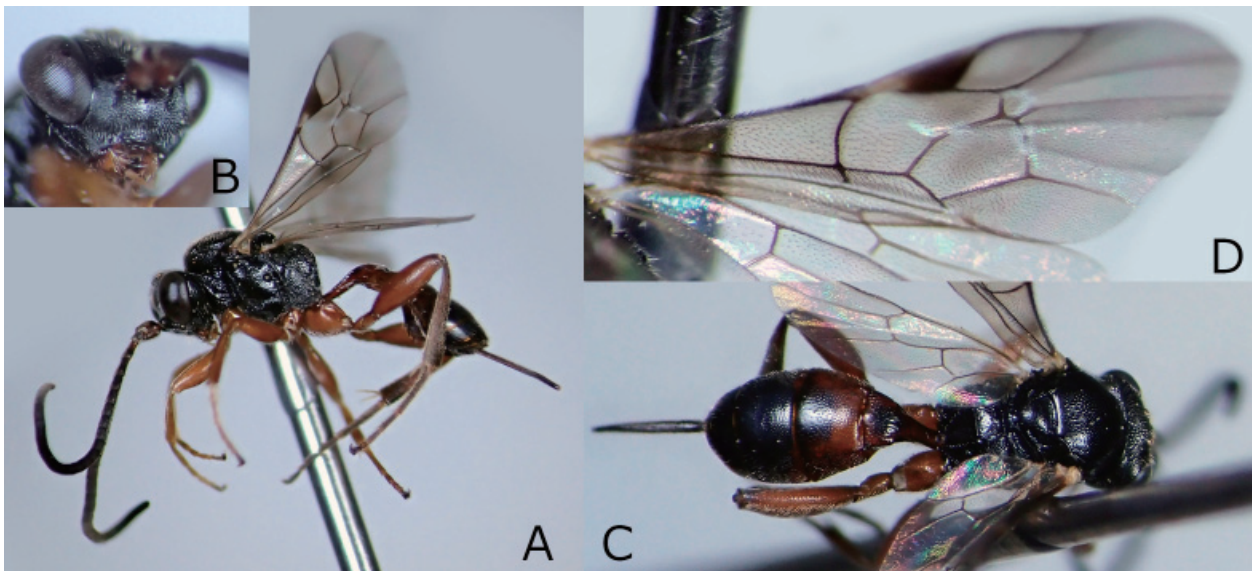


Fig. 34. *Dichrogaster kichijoi* (Uchida, 1940), KPM-NK 81840, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings.

Dichrogaster nitidus Sheng & Sun, 2014: 143.

Description. See Sheng & Sun (2014).

Material examined. JAPAN: KPM-NK 81908, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 5. IV. 2007, K. Watanabe leg.

Distribution. Japan (Honshu) and China.

Bionomics. Unknown.

Remarks. This is the first record of this species from Japan.

Dichrogaster parva Yoshida & Konishi, 2008
(SJN: Chibi-kusakagerou-togari-himebachi)
(Figs 37A–C)

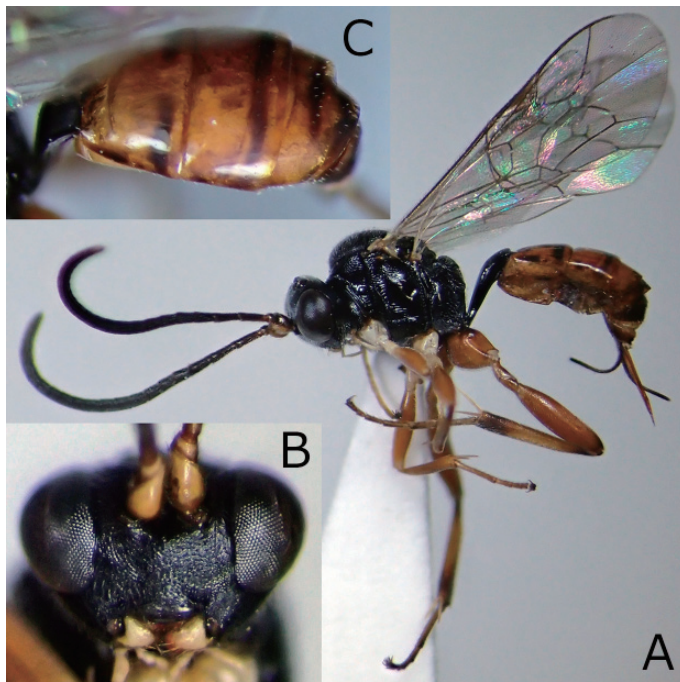


Fig. 35. *Dichrogaster liostylus* (Thomson, 1885), KPM-NK 55074, female from Japan — A, lateral habitus; B, head, frontal view; C, metasoma, dorso-lateral view.

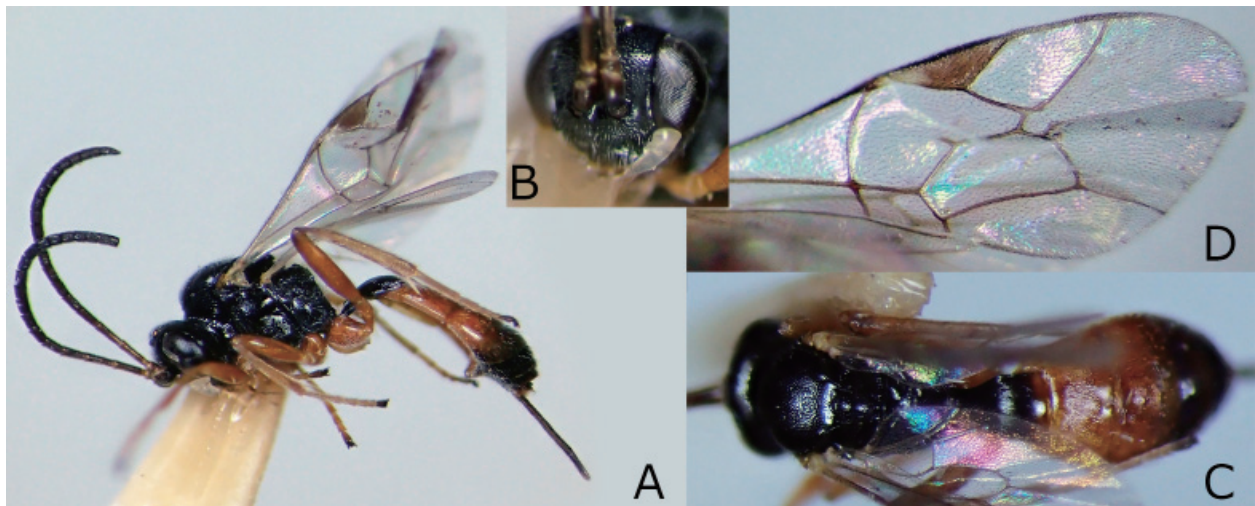


Fig. 36. *Dichrogaster nitida* Sheng & Sun, 2014, KPM-NK 81908, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings.

Dichrogaster parva Yoshida & Konishi, 2008: 255.

Description. See Yoshida & Konishi (2008).

Materials examined. JAPAN: KPM-NK 81907, F, Saitama Pref., Kumagaya City, Oasou, Arakawaoasou-park, 27. X. 2017, H. Handa leg.

Distribution. Japan (Honshu).

Bionomics. Unknown.

Hemiteles genus group

(subtribe Hemitelina sensu Townes (1970) and Horstmann (1992))

Three genera, *Aclastus* Förster, 1869, *Hemiteles* Gravenhorst, 1829, and *Xiphulcus* Townes, 1970, have

been recorded from Japan. In addition, I found *Obisiphaga* Morley, 1907 and *Polyaulon* Förster, 1869 from Japan. The taxonomic treatment of these genera requires the additional specimens and comparison with European species. In this study, I review *Aclastus* and *Hemiteles*. The identification of genera see Townes (1970).

Genus *Aclastus* Förster, 1869

Aclastus Förster, 1869: 175. Type: *Aclastus rufipes* Ashmead, 1902. Included by Ashmead (1902).

Microplex Förster, 1869: 175. Type: *Aclastus rufipes* Ashmead, 1902. Included by Roman (1909).

Daetora Förster, 1869: 175. Type: *Hemiteles solutus* Thomson, 1884. Designated by Perkins (1962).

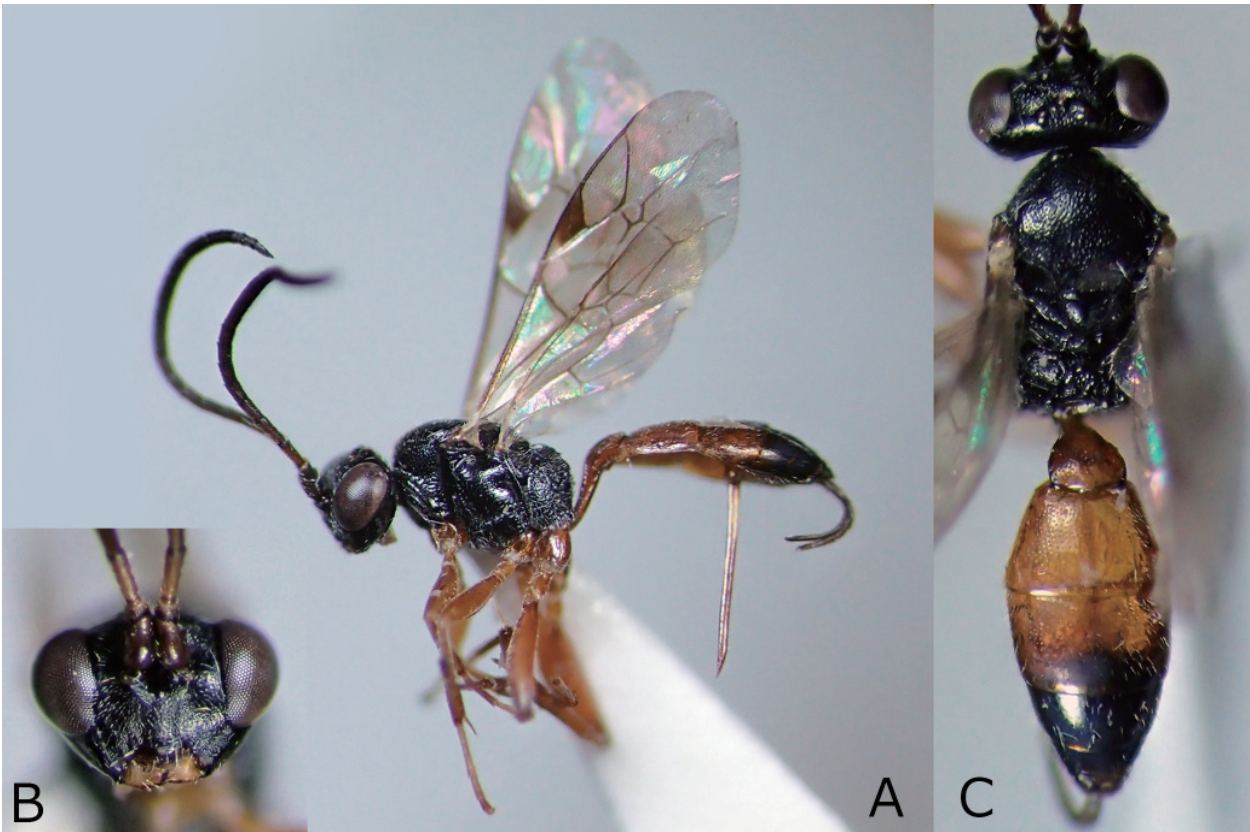


Fig. 37. *Dichrogaster parva* Yoshida & Konishi, 2008, KPM-NK 81907, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

Opisthostenus Förster, 1869: 175. Type: *Hemiteles* (*Opisthostenus*) *etorofuensis* Uchida, 1936. Included by Uchida (1936b).
Fetialis Rossem, 1990: 315. Type: *Fetialis alacris* Rossem, 1990. Original designation.

A single species, *Acl. etorofuensis* (Uchida, 1936), has been recorded from Japan. In addition, I found at least two undetermined species from Japan. In this study, I re-describe *Acl. etorofuensis* with some distributional data.

**Preliminary key to Japanese species
of the genus *Aclastus* (♀)**

- 1. T III almost entirely smooth (Fig. 38D). Antenna with 18–20 flagellomeres.
..... *Acl. etorofuensis* (Uchida, 1936)
- . T III largely punctate. Antenna with various number of flagellomeres.
..... 2
- 2. Antenna with 19–20 flagellomeres. Ovipositor straight, distinctly shorter than hind tibia.
..... *Acl. sp. A*
- . Antenna with 23–24 flagellomeres. Ovipositor entirely upcurved, almost as long as hind tibia.

..... *Acl. sp. B*

Aclastus etorofuensis (Uchida, 1936)
(SJN: Etorofu-mame-togari-himebachi)
(Figs 38A–D, 65L)

Hemiteles (*Opisthostenus*) *etorofuensis* Uchida, 1936b: 43.

Description. Female (n=4). Body length 3.2–4.0 mm. Body polished, covered with silver setae.
Head. Clypeus 1.45–1.6 times as wide as maximum length, punctate except for smooth anterior part, its anterior margin rounded. Face punctate, with a small longitudinal smooth area medially. MSL 1.5–1.8 times as long as BW. Frons, vertex, and gena finely punctate. OOL as long as or slightly longer than POL. OOL and POL distinctly longer than OD. Occipital carina complete, its lower end joined with hypostomal carina near mandibular base. Mandible strongly narrowed toward apex, slightly twisted. Upper tooth of mandible longer than lower tooth. Base of mandible flat. Antenna with 18–20 flagellomeres. FL I 5.7–8.0 times as long as maximum depth in lateral view. FL III 5.0–5.5 times as long as maximum depth in lateral view. The penultimate segments of flagellum distinctly longer than wide.

Mesosoma. Lateral part of pronotum largely smooth, with epomia. Mesoscutum and scutellum finely punctate, with notaulus. Mesopleuron smooth except for area finely punctate below speculum, with some setae along epicnemial carina and mesopleural suture. Epicnemial carina complete, its dorsal end reaching the anterior margin of mesopleuron. Posterior transverse carina of mesosternum largely absent laterally. Metapleuron largely smooth, with a complete juxtacoxal carina. Propodeum covered with weak irregular rugae. Propodeal carinae complete (Figs 38C, 65L). Area superomedia longer than wide, receiving the lateral section of anterior transverse carina anteriorly (Figs 38C, 65L). Areolet absent (Fig. 38A). Nervellus subvertical (Fig. 38A). Length of fore wing 2.9–3.7 mm. Hind femur 5.0–5.5 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.3: 0.4. Tarsal claws simple.

Metasoma. T I 2.0–2.2 times as long as maximum width, covered with longitudinal striae (Fig. 38D). Median dorsal carina and dorsolateral carina of T I indistinct. T II shorter than maximum wide. T II and T III smooth (Fig. 38D) except for the punctures on the laterotergites. T IV to T VI covered with fine punctures posteriorly. Ovipositor sheath 0.53–0.65 times as long as hind tibia. Ovipositor straight except for slightly upcurved apical part, without a nodus and ventral teeth.

Coloration (Figs 38A–D). Body (excluding wings and legs) black to blackish brown. Clypeus and malar space more or less tinged with dark reddish brown. Scape and pedicel yellowish brown. Mandible whitish yellow except for darkened apex. Palpi whitish yellow. Mesosoma and

T I usually partly tinged with reddish brown. Tegula yellowish brown. T II to T VII reddish yellow to reddish brown. Membranous part of metasomal sternites whitish yellow to reddish yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma yellowish brown to brown. Legs yellowish brown to reddish brown except for weakly darkened subbasal band and apical part of hind tibia.

Male. Not studied in this study.

Materials examined. JAPAN: SEHU, F (holotype), Etorofu Is., Shana, 11–20. VII. 1935, Y. Sugihara leg.; KPM-NK 81976, F, Hokkaido, Horokanai Town, Moshiri, Uryu, 11–17. VII. 2012, K. Watanabe *et al.* leg. (MsT); KPM-NK 81977, F, Aichi Pref., Shitara Town, Tsugu, Honsawa, 17. VI. 2019, S. Morishita leg.; KPM-NK 55020, F, Toyama Pref., Toyama City, Arimine, Jyurodani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT).

Distribution. Japan (Kunashiri Is., Etorofu Is., Hokkaido*, and Honshu), China, and Taiwan.

Bionomics. Unknown in Japan. In China, *Cotesia ruficrus* (Haliday, 1834) has been recorded as host (He, 1984; He *et al.*, 1996).

Remarks. This is the first record of this species from Hokkaido.

Genus *Hemiteles* Gravenhorst, 1829

Hemiteles Gravenhorst, 1829: 780. Type: *Hemiteles tristator* Gravenhorst, 1829 (= *Ichneumon bipunctator* Thunberg, 1824). Designated by Westwood (1840).

Ocyrmorus Förster, 1869: 180. Type: *Hemiteles cingulator* Gravenhorst, 1829 (= *Ichneumon bipunctator*



Fig. 38. *Aclastus etorofuensis* (Uchida, 1936), KPM-NK 81976, female from Japan — A, lateral habitus; B, head, frontal view; C, propodeum, dorso-lateral view; D, T I and T II, dorso-lateral view.

Thunberg, 1824). Designated by Townes (1944).

Three species, *H. bipunctator* (Thunberg, 1822), *H. hirashimai* Momoi, 1970, and *H. politus* (Ashmead, 1906), have been recorded from Japan. In this study, I found five additional species from Japan and four of them are undescribed. I describe them and record some distributional data of *H. hirashimai* below. Japanese species including new species and undetermined species can be distinguished by the following key.

**Preliminary key to Japanese species
of the genus *Hemiteles* (♀)**

1. Mesoscutum largely smooth.
..... *H. politus* (Ashmead, 1906) *
- Mesoscutum matt or densely punctate, without conspicuous smooth area.
..... 2
2. Flagellum with a white band (Figs 39A, 40A). Fore wing without a clouded area (Figs 39A, 40A). Hind TS I: II = 2.0: 0.6–0.7 (Fig. 63H). Ovipositor with a distinct nodus (Fig. 66J).
..... 3
- Flagellum without a white band (e.g., Figs 41A, 42A). Fore wing with or without a clouded area (e.g., Figs 41A, D, 42A, D). Ratio of Hind TS I: II is various (usually 2.0: 0.9) (Fig. 63I). Ovipositor with or without (Fig. 66K–M) a distinct nodus.
..... 4
3. T I matt with longitudinal striae (Fig. 40E), without median dorsal carina. Hind coxa blackish brown to black (Fig. 40A).
..... *H. japonicus* **sp. nov.**
- T I matt, at most narrowly striae and its median dorsal carina present basally. Hind coxa yellowish brown (Fig. 39A).
..... *H. hirashimai* Momoi, 1970
4. FL III longer than 4.5 times as long as maximum depth in lateral view. Subapical part of fore wing clouded. Pronotum laterally and mesopleuron at least partly marked with reddish brown.
..... *H. bipunctator* (Thunberg, 1822)
- FL III shorter than 4.1 times as long as maximum depth in lateral view. Subapical part of fore wing clouded or not clouded. Pronotum and mesopleuron entirely black or at most weakly tinged with reddish brown on collar and upper part of mesopleuron (Fig. 43D).
..... 5
5. Hind coxa, femur, and tibia entirely black except for

yellowish brown area in base of tibia (Fig. 41A). Fore wing without a clouded area (Fig. 41D).

- *H. kuro* **sp. nov.**
- At least hind coxa yellowish brown to reddish brown (Figs 42A, 43A). Fore wing with or without a clouded area (Figs 42D, 43E).
..... 6
 - 6. FL III 1.8 times as long as maximum depth in lateral view. Fore wing without a clouded area.
..... *H. sp.*
 - FL III longer than 3.0 times as long as maximum depth in lateral view. Fore wing with or without a clouded area.
..... 7
 - 7. Ovipositor sheath 0.75–0.8 times as long as hind tibia. T I 2.4–2.7 times as long as maximum width. Antenna with 26–30 flagellomeres. Subapical part of fore wing weakly but distinctly clouded just behind of pterostigma (Fig. 42D).
..... *H. maculipterus* **sp. nov.**
 - Ovipositor sheath 0.5–0.56 times as long as hind tibia. T I 2.1–2.2 times as long as maximum width. Antenna with 22–24 flagellomeres. Subapical part of fore wing not clouded (Fig. 43E).
..... *H. yamatonis* **sp. nov.**

* This species may be not *Hemiteles*.

***Hemiteles hirashimai* Momoi, 1970**
(SJN: Hirashima-mame-togari-himebachi)
(Figs 39A–C)

Hemiteles hirashimai Momoi, 1970: 349.

Description. See Momoi (1970).

Materials examined. JAPAN: KPM-NK 82083, F, Kanagawa Pref., Odawara City, Hayakawa, Sarusawarindo, 2. VI. 2014, K. Watanabe leg.; KPM-NK 82080, F, Niigata Pref., Myoukou City, Suginosawa, Myoukou-sasagamine, 17. VIII. 2013, S. Shimizu leg.; KPM-NK 82081, F, Toyama Pref., Toyama City, Arimine, Inonedani, 8–15. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82076, F, Kochi Pref., Umaji Vil., 6. VIII. 2010, Y. Matsubara & K. Fukuda leg. (MsT); MNHAH, F (holotype), Kagoshima Pref., Amamioshima Is., Yuwan, 31. VII. 1963, Y. Hirashima leg.; KPM-NK 82075, F, Kagoshima Pref., Amamioshima Is., Amami City, Sumiyoun Town, Santaro-toge, 2. VII. 2011, S. Fujie leg.; KPM-NK 82078, 82079, 82082, 82085, 82086, 4 F & 1 M, Kagoshima Pref., Tokunoshima Is., Kedoku, 21. V.

2008, K. Watanabe & A. Sakai leg.; KPM-NK 82077, M, Okinawa Pref., Iriomotejima Is., Uehara, 19. VII. 2007, H. Kawamoto leg.; KPM-NK 82084, F, Okinawa Pref., Iriomotejima Is., Komi, Airagawa-rindo, 23. VI. 2011, K. Watanabe leg.

Distribution. Japan (Honshu, Shikoku*, Amamioshima Is., Tokunoshima Is.*, Ishigakijima Is., and Iriomotejima Is.).

Bionomics. Unknown.

Remarks. This is the first record of this species from Shikoku and Tokunoshima Island.

***Hemiteles japonicus* sp. nov.**

(New SJN: Nihon-mame-togari-himebachi)

(Figs 40A–E, 63H, 64C, 66J)

Etymology. The specific name is from Japan.

Type series. Holotype: KPM-NK 55021, F, JAPAN, Kagoshima Pref., Kimotsuke Town, Minamikata, Kanaedake, 18–20. VII. 2019, K. Watanabe leg. (YPT).

Paratypes: JAPAN, KPM-NK 55022, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 21–28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 55023, F, Kochi Pref., Umaji Vil., 6. VIII. 2010, Y. Matsubara & K. Fukuda leg. (MsT).

Description. Female (n=3). Body length 4.6–5.6 (HT: 4.7) mm. Body matt and densely punctate and coriaceous, covered with silver setae.

Head. Clypeus 1.9 times as wide as maximum length, its anterior margin rounded. MSL 0.9–0.95 (HT: 0.9) times as long as BWM. Gena punctate and coriaceous. OOL shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible as long as lower tooth. Base of mandible flat. Antenna with 23–24 (HT: 24) flagellomeres. FL III 6.7 times as long as maximum depth in lateral view.

Mesosoma. Epomia distinct. Mesoscutum with some longitudinal striae near posterior end of notaulus. Notaulus long, fading out just behind of the center of mesoscutum. Scutellum without a lateral longitudinal carina except for distinct basal part. Mesopleuron longitudinally and obliquely striate just anterior to and below speculum, with coriaceous speculum. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron obliquely striate medially, without a juxtacoxal carina. Anterior transverse carina and posterior transverse carina of propodeum complete (Figs 40E, 64C). Lateral longitudinal carina and lateromedian longitudinal carina of propodeum absent (Fig. 64C). Area basalis



Fig. 39. *Hemiteles hirashimai* Momoi, 1970, KPM-NK 82086, female from Japan — A, lateral habitus; B, head, frontal view; C, propodeum, dorsal view.

indistinct (Fig. 64C). Area superomedia indistinct laterally (Fig. 64C). Area petiolaris not strongly elongated (Fig. 64C). Median parts of propodeum partly longitudinally striate (Fig. 64C). Length of fore wing 3.7–4.0 (HT: 3.7) mm. Areolet absent (Fig. 40D). Vein 2m-cu of fore wing with a single bulla (Fig. 40D). Nervellus inclivous, intercepted behind the middle (Fig. 40D). Hind femur 5.5–5.7 (HT: 5.5) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.6: 0.35: 0.15: 0.35–0.4 (HT: 0.4). Tarsal claws simple.

Metasoma. T I 1.55–1.7 (HT: 1.7) times as long as maximum width, longitudinally striate (Fig. 40E). Median dorsal carina of T I absent. Dorsolateral carina of T I complete except for indistinct area near spiracle. T II to T VI wider than long. Ovipositor sheath 0.9–0.93 (HT: 0.93) times as long as hind tibia. Ovipositor straight, with a distinct nodus and ventral teeth (Fig. 66J).

Coloration (Figs 40A–E). Body (excluding wings and legs) black to blackish brown. Ventral surface of scape, pedicel, and FL I reddish brown. Dorsal surfaces of scape, FL V to VII, and base of FL VIII white. Mandible reddish brown except for darkened apex and base. Palpi whitish yellow. T III sometimes tinged with reddish brown anteriorly. Apices of T VII and T VIII white. Membranous part of metasomal sternites whitish yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma brown to dark brown. Fore and mid legs brown to yellowish brown except for white trochanters, trochantelli, and base of tibiae. Hind coxa blackish brown, its apex tinged with white. Hind trochanter and base of tibia white. Hind trochantellus, femur and tibia except for base brown to dark brown. Median part of hind tibia more or less tinged with whitish yellow dorsally. Hind tibial spurs and

tarsus yellow to yellowish brown.

Male. Unknown.

Distribution. Japan (Honshu, Shikoku, and Kyushu).

Bionomics. Unknown.

Remarks. This species resembles *H. hirashimai*, but it can be distinguished by the above key. This species and *H. hirashimai* are differed from other Japanese species by the short area petiolaris, the short hind TS II, and the ovipositor with a distinct nodus. They may be classified into a separate genus, while its taxonomic treatment requires the additional specimens and comparison with world species.

***Hemiteles kuro* sp. nov.**

(New SJN: Sumiuro-mame-togari-himebachi)

(Figs 41A–E, 65M, 66K)

Etymology. The specific name is from the Japanese term “Kuro” (= black), which is the coloration of body and legs.

Type series. **Holotype:** KPM-NK 55024, F, JAPAN, Nagano Pref., Nagawa Town, Daimon, 26. VIII. 2011, S. Fujie leg.

Description. Female (n=1). Body length 5.8 mm. Body covered with silver setae.

Head matt and densely punctate. Clypeus 1.8 times as wide as maximum length, its anterior margin rounded. MSL 0.9 times as long as BWM. OOL shorter than POL. OOL slightly shorter than and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible slightly convex. Antenna with 29 flagellomeres. FL III 4.0 times as long as maximum depth in lateral view.

Mesosoma polished. Lateral part of pronotum

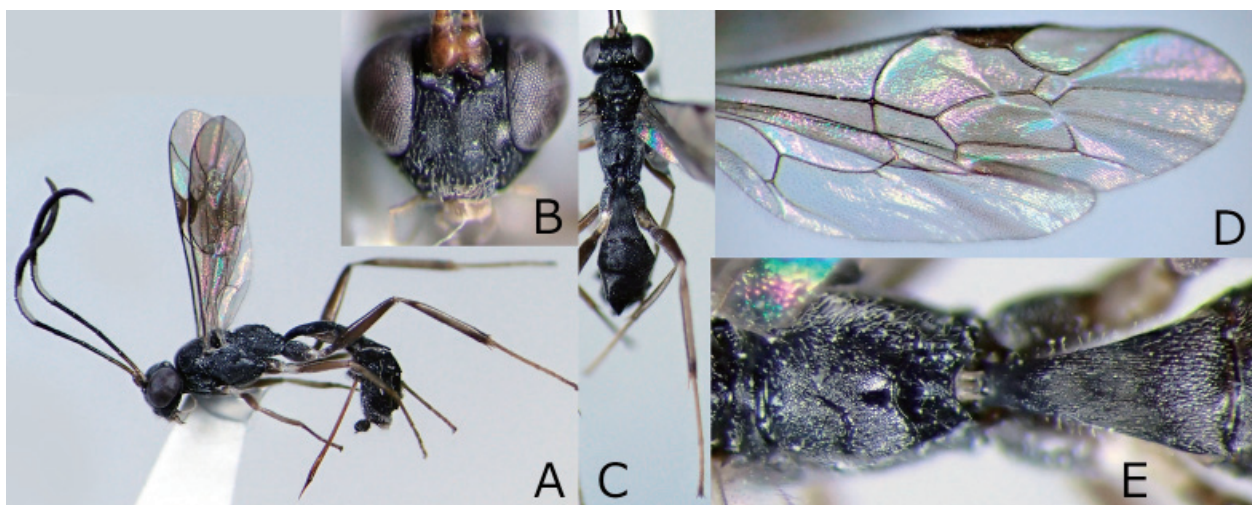


Fig. 40. *Hemiteles japonicus* sp. nov., KPM-NK 55021, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, propodeum and T I, dorsal view.

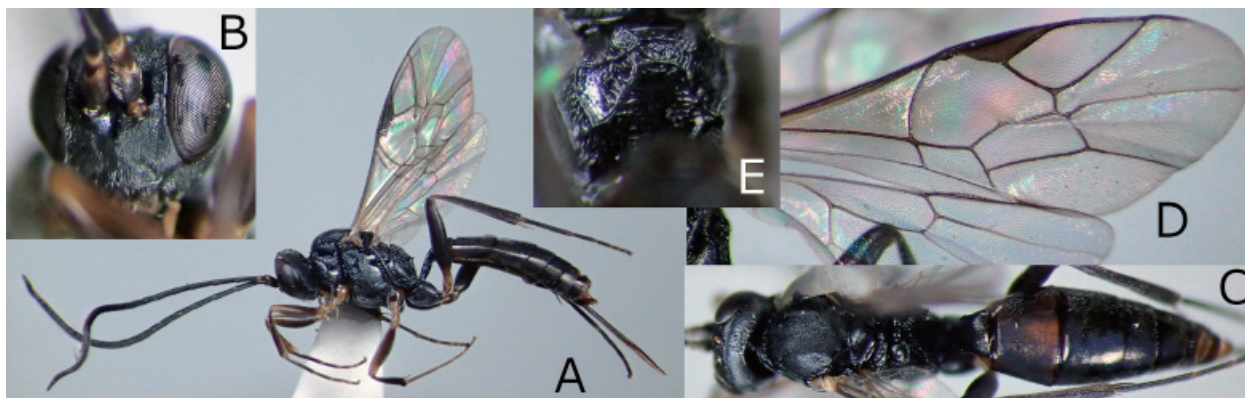


Fig. 41. *Hemiteles kuro* sp. nov., KPM-NK 55024, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, propodeum, dorsal view.

longitudinally striate medially, punctate dorsally and smooth ventrally. Epomia indistinct. Mesoscutum matt. Notaulus long, fading out just behind of the center of mesoscutum. Scutellum densely punctate and coriaceous, without a lateral longitudinal carina except for base. Mesopleuron longitudinally striate except for smooth speculum. Posterior transverse carina of mesosternum complete except for narrow indistinct area in front of mid coxae. Metapleuron punctures, without a juxtacoxal carina. Propodeal carinae complete (Figs 41E, 65M). Area basalis distinct (Figs 41E, 65M). Area superomedia distinct, transversely elongate, its length almost as long as area basalis (Figs 41E, 65M). Area petiolaris strongly elongated (Fig. 41E). Anterior part of propodeum largely smooth. Median part of propodeum partly longitudinally rugulose except for lateral smooth area. Posterior part of propodeum transversely rugulose. Postero-lateral corner of area dentipara weakly projected. Length of fore wing 4.2 mm. Areolet absent (Fig. 41D). Vein 2m-cu of fore wing with a single bulla (Fig. 41D). Nervellus inclivous, intercepted behind the middle (Fig. 41D). Hind femur 4.7 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.3: 0.4. Tarsal claws simple.

Metasoma polished. T I 1.8 times as long as maximum width, longitudinally striate. Median dorsal carina of T I absent. Dorsolateral carina of T I partly indistinct. T II to T VI wider than long, finely punctate. T II partly covered with minute longitudinal striae. Ovipositor sheath 1.1 times as long as hind tibia. Ovipositor straight, without a nodus and with minute ventral teeth (Fig. 66K).

Coloration (Figs 41A–E). Body (excluding wings and legs) black to blackish brown. Base of FL I reddish brown. Mandible reddish brown except for darkened apex and base. Palpi and tegula whitish yellow. T II tinged with reddish brown postero-medially. Apices of T III and T IV narrowly tinged with reddish brown. Membranous part

of metasomal sternites and ovipositor yellowish brown. Wings hyaline. Veins and pterostigma brown to dark brown. Fore and mid legs brown to yellowish brown except for white trochanters, trochantelli, tibial spurs, and base of tibiae. Hind coxa, femur, tibia, and tarsal segments blackish brown to black. Hind trochanter and trochantellus, and tibial spurs whitish yellow. Apex of hind coxa, bases of hind femur, tibia, and each tarsal segment tinged with yellowish brown.

Male. Unknown.

Distribution. Japan (Honshu).

Bionomics. Unknown.

Remarks. This species can be easily distinguished from other species by the black body, hind coxa, hind femur, hind tibia, and hind tarsus.

***Hemiteles maculipterus* sp. nov.**

(New SJN: Hanemon-mame-togari-himebachi)

(Figs 42A–E, 63I, 64D, 66L)

Etymology. The specific name is from the fore wing with clouded maculation.

Type series. **Holotype:** KPM-NK 55025, F, JAPAN, Shizuoka Pref., Kawanehonchou Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg. **Paratypes:** JAPAN, KPM-NK 55026, F, ditto; KPM-NK 55027, F, Kagoshima Pref., Yakushima Is., Arakawa, 4–7. VI. 2007, T. Yamauchi leg. (MsT); KPM-NK 55028, F, ditto, 22. VII. – 22. VIII. 2006; KPM-NK 55029–55031, 3 F, ditto, 29. VII. – 25. VIII. 2007.

Description. Female (n=7). Body length 3.7–5.2 (HT: 5.2) mm. Body matt and densely coriaceous, covered with silver setae.

Head. Clypeus 2.0 times as wide as maximum length, its anterior margin rounded. MSL 1.0–1.1 (HT: 1.0) times as long as BWM. OOL almost as long as POL. OOL and POL longer than OD. Occipital carina complete, its lower

end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible flat. Antenna with 26–30 (HT: 30) flagellomeres. FL III 3.3 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum covered with minute longitudinal striae ventrally. Epomia indistinct. Notaulus short, fading out in front of the center of mesoscutum. Scutellum without a lateral longitudinal carina except for base. Mesopleuron covered with minute longitudinal striae ventrally except for coriaceous speculum and posterior part. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron without a juxtacoxal carina. Anterior transverse carina and posterior transverse carina of propodeum complete (Fig. 64D) or lateral part of the latter sometimes partly indistinct. Lateral longitudinal carina absent except for distinct anterior section (Fig. 64D). Lateromedian longitudinal carina of propodeum complete (Figs 42E, 64D). Area basalis distinct (Fig. 64D). Area supermedia distinct, transversely elongate, its length almost as long as area basalis (Fig. 64D). Postero-lateral corner of area dentipara weakly projected. Area petiolaris strongly elongated (Fig. 64D). Median and posterior parts of propodeum irregularly rugulose except for transverse rugae on area petiolaris. Length of fore wing 4.0–4.4 (HT: 4.1) mm. Areolet absent (Fig. 42D). Vein 2m-cu of fore wing with a single bulla. Nervellus inclivous, intercepted behind the middle (Fig. 42D). Hind femur 4.7–4.9 (HT: 4.7) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9–0.95 (HT: 0.9): 0.65–0.7 (HT: 0.65): 0.3: 0.4. Tarsal claws simple.

Metasoma. T I 2.4–2.7 (HT: 2.7) times as long as maximum width, longitudinally and obliquely striate, sometimes with a shallow median longitudinal concavity posteriorly. Median dorsal carina of T I absent. Dorsolateral carina of T I indistinct. T II to T VI wider than long, finely and densely punctate. Ovipositor sheath 0.75–0.8 (HT: 0.75) times as long as hind tibia. Ovipositor straight except for slightly upcurved apex, without a nodus and with weak ventral teeth (Fig. 66L).

Coloration (Figs 42A–E). Body (excluding wings and legs) black to blackish brown. Scape, pedicel, and base of FL I reddish brown to brown. Mandible yellowish brown except for darkened apex and base. Palpi and tegula whitish yellow to yellowish brown. Apex of T I, T II, and base of T III reddish yellow. Posterior margins of T III to T VI narrowly tinged with reddish brown. Posterior part of T VII white. T III to T VII sometimes tinged with brown. Membranous part of metasomal sternites whitish yellow.

Ovipositor yellowish brown. Wings hyaline, area behind of pterostigma largely clouded. Veins and pterostigma brown to dark brown. Fore and mid coxae and all tibial spurs, trochanters and trochantelli whitish yellow to yellow. Fore and mid femora, tibiae, and tarsi yellowish brown to dark brown. Hind coxa and base of femur reddish brown. Hind femur except base, tibia except for base, and tarsus blackish brown. Base of hind tibia tinged with whitish yellow.

Male. Unknown.

Distribution. Japan (Honshu and Yakushima Is.).

Bionomics. Unknown.

Remarks. This species resembles *H. similis* (Gmelin, 1790) and *H. rubropleuralis* Kiss, 1929, but it can be distinguished by the following combination of character states: the fore wing with clouded area (absent in *H. similis*); FL III 3.3 times as long as maximum depth in lateral view (2.5–3.0 in *H. rubropleuralis*); mesosoma without red area (usually with red area in *H. similis*).

Hemiteles yamatonis sp. nov.

(New SJN: Haraaka-mame-togari-himebachi)

(Figs 43A–E, 65O, 66M)

Etymology. The specific name is from the old name of Japan “Yamato”.

Type series. **Holotype:** KPM-NK 55032, F, JAPAN, Toyama Pref., Toyama City, Kamegai, 4–11. VIII. 2009, M. Watanabe *et al.* leg. (MsT). **Paratypes:** JAPAN, KPM-NK 55033, F, Hokkaido, Sapporo City, Maruyama, 29. VII. 2009, K. Watanabe leg.; KPM-NK 55034, F, Kanagawa Pref., Yamakita Vil., Nakagawa, 3. VII. 2013, K. Watanabe leg.; KPM-NK 55035, F, Yamanashi Pref., Koushu City, Yanagisawa-toge, 5. VIII. 2008, K. Watanabe leg.; KPM-NK 55036, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 11–18. VIII. 2009, M. Watanabe *et al.* leg. (MsT).

Description. Female (n=5). Body length 4.4–4.7 (HT: 4.7) mm. Body densely coriaceous, covered with silver setae.

Head matt. Clypeus 2.0 times as wide as maximum length, its anterior margin rounded. MSL 1.0–1.1 (HT: 1.0) times as long as BWM. OOL almost as long as POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower tooth. Base of mandible flat. Antenna with 22–24 (HT: 24) flagellomeres. FL III 3.3 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum covered with longitudinal striae ventrally, the interspace of striae



Fig. 42. *Hemiteles maculipterus* sp. nov., KPM-NK 55025 (A, B, D, E, holotype) and 55026 (C, paratype), females — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, propodeum, dorsal view.

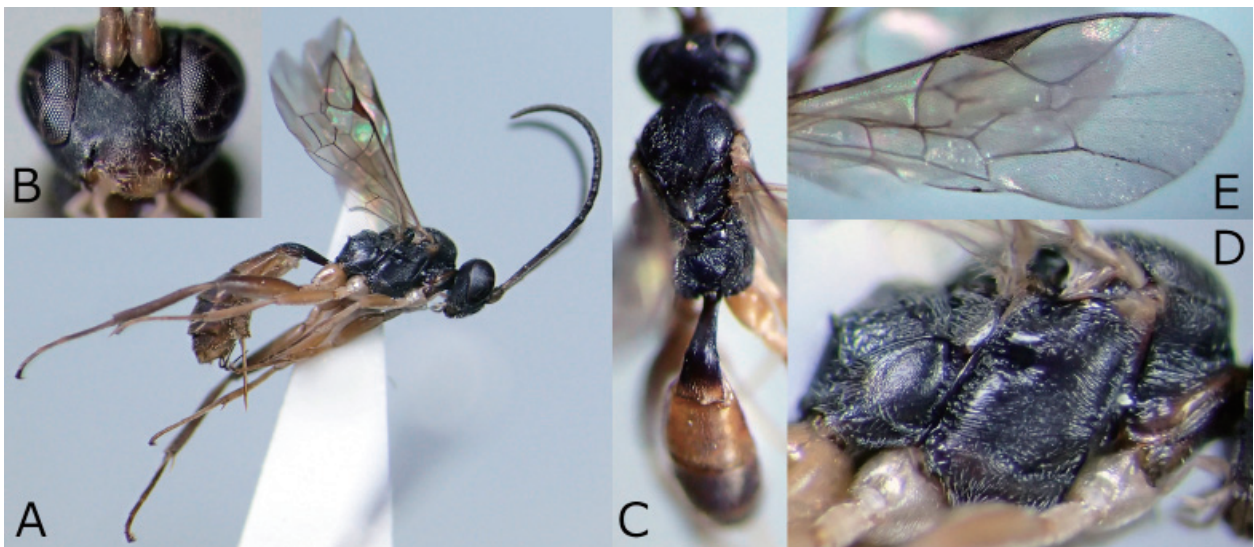


Fig. 43. *Hemiteles yamatonis* sp. nov., KPM-NK 55032 (A–D, holotype) and 55033 (E, paratype), females — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesosoma, lateral view; E, wings.

polished. Epomia indistinct. Mesoscutum matt. Notaulus short, fading out in front of the center of mesoscutum. Scutellum polished and punctate, without a lateral longitudinal carina except for posterior half. Mesopleuron covered with longitudinal striae ventrally except for smooth speculum (Fig. 43D). Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron with a complete juxtacoxal carina. Propodeal carinae complete (Fig. 65O). Area basalis distinct (Fig. 65O). Area superomedia distinct, transversely elongate, its length almost as long as area basalis (Fig. 65O). Posterolateral corner of area dentipara weakly projected. Area petiolaris strongly elongated. Propodeum polished, partly irregularly, obliquely, and transversely rugulose, with a smooth area in the median part of area petiolaris. Length of

fore wing 2.8–3.6 (HT: 3.6) mm. Areolet absent (Fig. 43E). Vein 2m-cu of fore wing with a single bulla. Nervellus inclivous, intercepted behind the middle (Fig. 43E). Hind femur 4.2–4.3 (HT: 4.2) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.8–0.9 (HT: 0.9): 0.6: 0.3: 0.4. Tarsal claws simple.

Metasoma. T I 2.1–2.2 (HT: 2.2) times as long as maximum width, longitudinally striate. Median dorsal carina of T I absent. Dorsolateral carina of T I indistinct. T II to T VI wider than long, finely and densely punctate. Ovipositor sheath 0.5–0.56 (HT: 0.5) times as long as hind tibia. Ovipositor straight, with or without an obtuse nodus and with weak ventral teeth (Fig. 66M).

Coloration (Figs 43A–E). Body (excluding wings and legs) black to blackish brown. Scape, pedicel, and base of

FL I reddish brown to brown. Clypeus more or less tinged with reddish brown. Mandible yellowish brown except for darkened apex and base. Palpi and tegula whitish yellow. Collar and antero-dorsal corner of mesopleuron tinged with reddish brown. Apex of T I, T II, and base of T III reddish yellow. Posterior margins of T III to T VI narrowly tinged with reddish brown. T VII whitish yellow. T III to T VII more or less tinged with brown. Membranous part of metasomal sternites whitish yellow. Ovipositor yellowish brown. Wings hyaline. Veins and pterostigma brown to dark brown. Legs yellowish brown to reddish brown. Fore and mid coxae, basal part of fore tibia, and all tibial spurs, trochanters and trochantelli whitish yellow to yellow. Hind femur, tibia except for base, and tarsus more or less darkened.

Male. Unknown.

Distribution. Japan (Hokkaido and Honshu).

Bionomics. Unknown.

Remarks. This species resembles *H. similis* (Gmelin, 1790), but it can be distinguished by the following combination of character states: hind coxa reddish brown (at least partly black in *H. similis*); mesosoma without red area (usually with red area in *H. similis*); ovipositor sheath 0.5–0.56 times as long as hind tibia (ca. 0.75 in *H. similis*). This species also resembles *H. maculipterus* **sp. nov.** but it can be distinguished by the above key.

***Mastrus* genus group**

(subtribe Mastrina sensu Townes (1970))

Four genera, *Brachypimpla* Strobl, 1902, *Charitopes* Förster, 1869, *Lochetica* Kriechbaumer, 1892, and *Mastrus* Förster, 1869, have been recorded from Japan. In addition, I found *Isadelphus*, *Odontoneura* Förster, 1869, and *Zoophthorus* Förster, 1869 from Japan. In this study, I newly record *Isadelphus* from Japan and review previously recorded genera. The taxonomic treatment of *Odontoneura* and *Zoophthorus* requires the additional specimens and comparison with European species. The identification of genera see Horstmann (1978).

Genus ***Brachypimpla*** Strobl, 1902

Brachypimpla Strobl, 1902: 15. Type: *Brachypimpla brachyura* Strobl, 1902. Monobasic.

Bassocryptus Habermehl, 1919: 18. Type: *Microcryptus gravenhorsti* Habermehl, 1910 (= *Brachypimpla brachyura* Strobl, 1902). Monobasic.

A single species, *Br. latipetiolator* (Uchida, 1935), have

been recorded from Japan. This species is apparently similar to the genera of *Acrolyta* genus group in a strong median carina of collar, while it can be distinguished by the lateral longitudinal carina of propodeum complete. In this study, I re-describe this species with some distribution records.

Brachypimpla latipetiolator (Uchida, 1935)

(SJN: Mame-hirata-togari-himebachi)

(Figs 44A–E, 66N, O)

Phygadeuon latipetiolator Uchida, 1935: 83.

Description. Female (n=4). Body length 8.2–9.5 mm. Body polished, covered with silver setae.

Head. Clypeus 1.5–1.8 times as wide as maximum length, matt, punctate, its anterior margin weakly rounded and transversely impressed. Face matt and densely punctate. MSL 1.2 times as long as BWM. Frons, gena, and vertex finely and densely punctate except for smooth area above antennal sockets. OOL as long as POL. OOL and POL slightly longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible convex. Antenna with 31–32 flagellomeres, subapical part slightly widened. The widened part of flagellum largely flattened ventrally. FL III 4.0 times as long as maximum depth in lateral view.

Mesosoma 1.7 times as long as maximum depth in lateral view. Upper side of collar with a high median carina. Lateral part of pronotum densely punctate dorsally, largely smooth ventrally. Epomia short and weak. Mesoscutum densely punctate. Notaulus distinct, fading out near center of mesoscutum. Scutellum densely punctate, without a lateral longitudinal carina except for base. Mesopleuron smooth except for punctures on dorsal and ventral areas and some longitudinal striae on a median area below speculum. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron punctate, with a complete juxtacoxal carina. Anterior and posterior transverse carinae of propodeum complete. Pleural carina and lateral longitudinal carina of propodeum complete. Area basalis distinct. Area superomedia indistinct laterally. Anterior part of propodeum densely punctate. Median and posterior parts of propodeum longitudinally, obliquely, and irregularly rugulose. Propodeum without projections. Length of fore wing 6.5–7.3 mm. Areolet present (Fig. 44D). Vein 2m-cu with two bullae. Nervellus inclivous, intercepted posteriorly (Fig. 44D). Hind femur 4.2–4.6

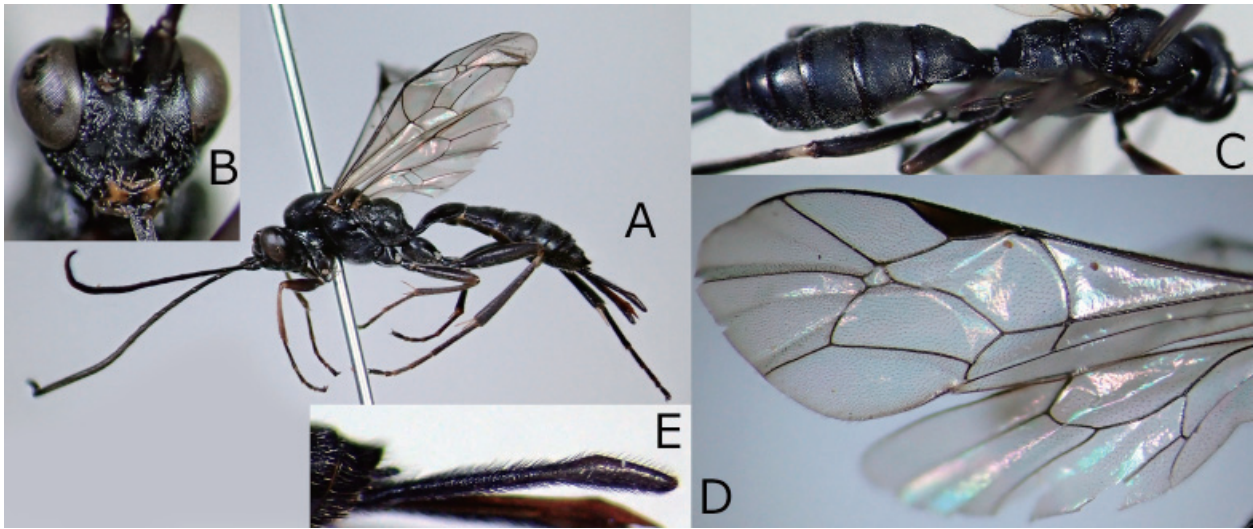


Fig. 44. *Brachypimpla latipetiolator* (Uchida, 1935), KPM-NK 81973, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, ovipositor sheath, lateral view.

times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 1.0: 0.6: 0.35–0.4: 0.4–0.5. Tarsal claws simple.

Metasoma. T I 1.3–1.4 times as long as maximum width, densely punctate. Median dorsal carina of T I present except for posterior part. Dorsolateral carina of T I complete. T II to T IV wider than long, densely punctate (Fig. 44C). T V to T VII covered with fine punctures. T VII and T VIII weakly elongated. Ovipositor sheath 0.75 times as long as hind tibia, its apical part distinctly expanded (Figs 44E, 66O). Ovipositor straight, compress laterally, with a nodus and ventral teeth (Fig. 66N).

Coloration (Figs 44A–E). Body (excluding wings) black to blackish brown. Mandible yellowish brown except for darkened apex and base. Fore and mid femora, tibiae, and tarsi more or less tinged with yellowish brown to reddish brown. Base of tibiae white. Tibial spurs whitish yellow. Membranous part of metasomal sternites yellowish brown. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma brown to blackish brown.

Male. Not studied in this study.

Materials examined. JAPAN: KPM-NK 81974, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 8–9. VIII. 2014, S. Shimizu leg. (MsT); KPM-NK 81973, F, ditto, 4. VIII. 2017, K. Watanabe leg.; KPM-NK 81975, F, Niigata Pref., Nagaoka City, Uruse Town, 14–26. V. 2015, R. Shimizu, Y. Shimizu & S. Shimizu leg. (MsT). KOREA: SEHU, F (holotype), Keijo, em. from “Larva of *Dendrolimus spectabilis* (Secondary parasite)”.

Distribution. Japan (Honshu* and Kyushu), China, and Korea.

Bionomics. Host record: *Dendrolimus spectabilis* (Butler, 1877) (Lepidoptera, Lasiocampidae) and *Rogas*

dendrolimi (Matsumura, 1926) (= *Aleiodes esenbeckii* (Hartig, 1838)) (Hymenoptera, Braconidae) (Uchida, 1935; Kamiya, 1939).

Remarks. This is the first record of this species from Honshu.

Genus *Charitopes* Förster, 1869

Charitopes Förster, 1869: 181. Type: *Hemiteles chrysopae* Brischke, 1890 (= *Hemiteles gastricus* Holmgren, 1868). Included by Brischke (1890).

Adiastola Förster, 1869: 180. Type: *Adiastola americana* Howard, 1897. Included by Howard (1897).

Two species, *Cha. gastricus* (Holmgren, 1868) and *Cha. striatus* Townes, 1983, have been recorded from Japan. Although key to species including Japanese species has been provided by Townes (1983), I found two undetermined species from Japan. The taxonomic treatment of these species required the additional specimens and comparison with European species. In this study, I record the distributional data of *Cha. gastricus* below.

Charitopes gastricus (Holmgren, 1868)

(SJN: Himekagerou-mame-togari-himebachi)
(Figs 45A–D, 64E)

Hemiteles gastricus Holmgren, 1868: 401.

Hemiteles (Charitopes) chrysopae Brischke, 1890: 105.

Hemiteles flavigaster Schmiedeknecht, 1897: 534.

Hemiteles flavocinctus Strobl, 1901: 232.

Hemiteles brunnescens Schmiedeknecht, 1905: 815.

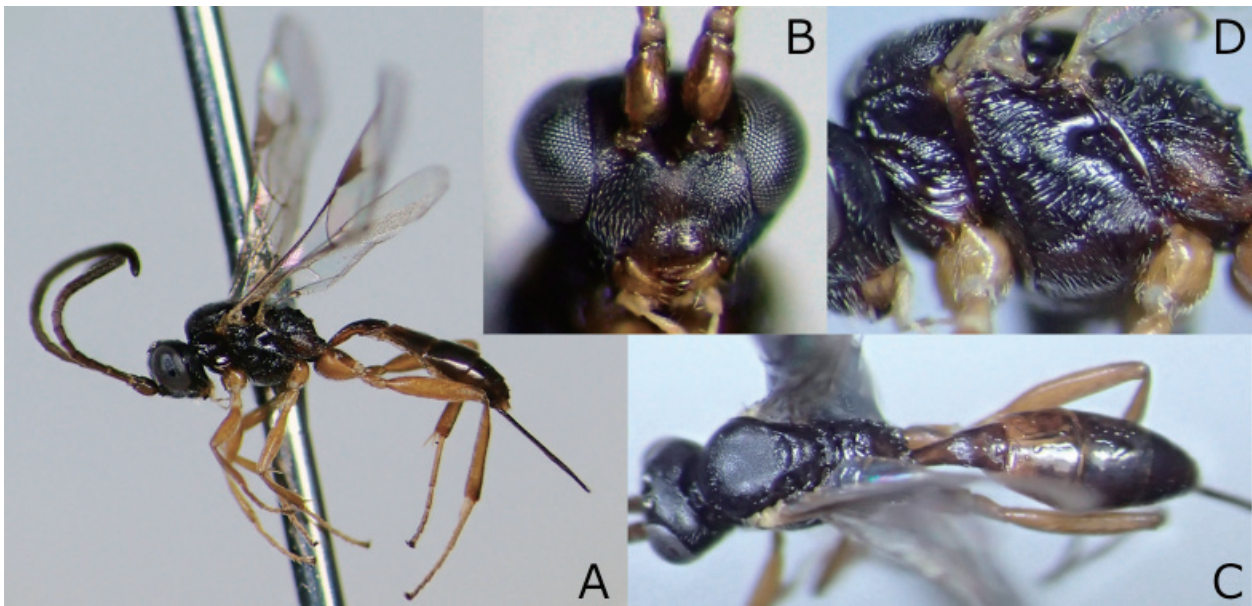


Fig. 45. *Charitopes gastricus* (Holmgren, 1868), KPM-NK 81962, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, mesosoma, lateral view.

Hemiteles silvicola Habermehl, 1920: 7.

Description. See Townes (1983).

Materials examined. JAPAN: KPM-NK 81962–81964, 3 F, Gunma Pref., Tsumagoi Vil., Kanbara, 3. IX. 2015, K. Watanabe leg.; KPM-NK 81965, F, Tochigi Pref., Nasushiobara City, Shiobara, Dodaira, 4. VII. 2008, 11. VII. 2008, T. Matsumura leg. (MsT); KPM-NK 81966, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 31. VII. 2013, K. Watanabe leg.; KPM-NK 81971, 81972, 2 F, Shizuoka Pref., Honkawane Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg.; KPM-NK 81967–81970, 4 F, Tottori Pref., Wakasa City, Mt. Hyonosen, 17. VII. 2011, K. Watanabe leg. GERMANY: ZSM, F (det. Horstmann), Schlüttsiel Husum anb....[?] 3.9.63.

Distribution. Japan (Honshu); widely distributed in Holarctic region.

Bionomics. Unknown in Japan. Aubert (1966, 1977) recorded *Pristiphora abietina* (Christ, 1791) (Hymenoptera, Tenthredinidae) as the host. Townes (1983) recorded *Hemerobius* sp. (Neuroptera, Hemerobiidae) as the host.

Genus *Isadelphus* Förster, 1869

Isadelphus Förster, 1869: 177. Type: *Hemiteles inimicus* Gravenhorst, 1829. Designated by Viereck (1914).

Perosis Förster, 1869: 169. Type: *Echthrus armatus* Gravenhorst, 1829. Designated by Viereck (1914).

Cecidonomus Bridgman, 1880: 264. Type: *Cecidonomus gallicola* Bridgman, 1880. Designated by Viereck (1914).

In this study, I record a new species, *I. nigrus* sp. nov., from Japan. This is the first record of this genus from Japan. Key to Eastern Palearctic species can be distinguished by the following key.

Key to Eastern Palearctic species of the genus *Isadelphus* (♀)

1. Hind coxa red to reddish yellow. Anterior part of clypeus with a tongue-like protrusion, its apex more or less truncate. Metasomal tergites at least partly red.
..... *I. inimicus* (Gravenhorst, 1829)
- Hind coxa brown to black (Fig. 46A). Anterior part of clypeus with two weak or indistinct teeth (Fig. 62I). Metasomal tergites at most tinged with brown.
..... 2
2. Hind coxa and T II brown. Ovipositor sheath 1.8 times as long as hind tibia.
..... *I. compressus* Sheng, 2001
- Hind coxa and T II black (Figs 46A, C, E). Ovipositor sheath 1.35 times as long as hind tibia.
..... *I. nigrus* sp. nov.

Isadelphus nigrus sp. nov.

(New SJN: Omagari-chibi-togari-himebachi)

(Figs 46A–E, 62I, 65P, 66P)

Etymology. The specific name is from the black (= Latin “*nigrus*”) body and legs.

Type series. **Holotype:** KPM-NK 82003, F, JAPAN, Kanagawa Pref., Yokohama City, Midori-ku, Niiharu, 28.



Fig. 46. *Isadelphus nigrus* sp. nov., KPM-NK 82002 (A, B, paratype) and 82003 (C-E, holotype), females — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings; E, T I to T III, dorso-lateral view.

III. 2007, M. Konishi leg. **Paratypes:** JAPAN, KPM-NK 81996, F, Hokkaido, Kuriyama Town, 8. VI. 2007, 22. VI. 2007, A. Ueda leg.; KPM-NK 81998, F, Fukushima Pref., Tajima Town, Tonyu, 8. VIII. 1999, 21. VIII. 1999, A. Shimizu leg.; KPM-NK 81991, 81992, 2 F, Saitama Pref., Yorii Town, 30. V. 2013, T. Nambu leg. (MsT); KPM-NK 81990, F, Kanagawa Pref., Hadano City, Mt. Koubouyama, 5. IV. 2007, K. Watanabe leg.; KPM-NK 81995, F, Kanagawa Pref., Atsugi City, Funako, Tokyo University of Agriculture, 22. IV. – 16. V. 2016, Y. Kato & S. Koizumi leg. (MsT); KPM-NK 81999, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 4–11. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81993, F, ditto, 15–29. IX. 2009; KPM-NK 82002, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 21. VII. 2009, 28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82001, F, Hyogo Pref., Sayo Town, Funakoshi, 1. – 8. V. 2010; KPM-NK 81997, F, Kagoshima Pref., Yakushima Is., Hanyama, 1. V. – 5. VI. 2007, T. Yamauchi leg. (MsT); KPM-NK 82000, F, Kagoshima Pref., Yakushima Is., Kankake, 2. III. – 28. III. 2007, T. Yamauchi *et al.* leg. (MsT); KPM-NK 81994, F, ditto, 1. V. – VI. 2007.

Description. Female ($n=14$). Body length 4.3–7.3 (HT: 7.0) mm. Body polished, covered with silver setae.

Head. Clypeus 2.1 times as wide as maximum length, sparsely punctate, its anterior margin rounded, with a pair of weak teeth medially (Fig. 62I). Face matt, densely and finely punctate (Fig. 46B). MSL 0.9–1.0 (HT: 1.0) times as long as BWM. Frons matt, densely and finely punctate except for transverse striae on area above antennal socket. Gena and vertex densely punctate, inter space of punctures coriaceous. OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible slightly longer than lower

tooth. Base of mandible slightly convex. Antenna with 22–24 (HT: 22) flagellomeres. FL III 3.3–4.0 (HT: 4.0) times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum densely punctate and coriaceous dorsally, longitudinally striate ventrally. Epomia short and weak. Mesoscutum matt, finely and densely punctate. Notaulus short and weak. Scutellum densely punctate, without a lateral longitudinal carina except for base. Mesopleuron punctate and longitudinally striate except for smooth speculum and smooth areas below speculum. Epicnemial carina strongly developed dorsally, reaching subtegular ridge. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron punctate, with a weak juxtacoxal carina. Propodeal carinae complete (Fig. 65P). Area basalis indistinct anteriorly (Fig. 65P). Area superomedia present, hexagonal (Fig. 65P). Anterior and median parts of propodeum irregularly rugulose and punctate. Posterior part of propodeum transversely rugulose. Length of fore wing 3.6–5.2 (HT: 5.2) mm. Areolet absent (Fig. 46D). Vein 2m-cu of fore wing with a single bulla (Fig. 46D). Nervellus inclivous, intercepted behind the middle (Fig. 46D). Hind femur 3.6–4.0 (HT: 4.0) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9–0.95 (HT: 0.95): 0.6: 0.3–0.4 (HT: 0.35): 0.45–0.5 (HT: 0.5). Tarsal claws simple.

Metasoma. T I 1.6–1.8 (HT: 1.7) times as long as maximum width, coriaceous except for smooth posterior margin, posterior part usually with some short and weak longitudinal striae. Median dorsal carina of T I present basally, weak. Dorsolateral carina of T I complete. T II to T VI wider than long. T II granulate (Fig. 46E). T III granulate anteriorly, sparsely and finely punctate posteriorly. T IV to T VII sparsely and finely punctate. Ovipositor sheath 1.3–1.35 (HT: 1.3) times as long as hind

tibia. Ovipositor decurved (Fig. 46A), with an indistinct nodus and ventral teeth (Fig. 66P).

Coloration (Figs 46A–E). Body (excluding wings and legs) black to blackish brown. Palpi dark brown. Posterior margins of T II to T IV narrowly tinged with reddish brown. Posterior margins of T V to T VII with a conspicuous white band. Membranous part of metasomal sternites yellowish brown. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma dark brown to blackish brown. Legs blackish brown to black except for apex and base of each segment more or less narrowly tinged with reddish brown to yellowish brown.

Male. Unknown.

Distribution. Japan (Hokkaido and Honshu).

Bionomics. Host unknown. KPM-NK 81991 and 81992 collected in the malaise trap in Bamboo forest.

Remarks. This species resembles *I. compressus* in the body structures and coloration but can be distinguished by the above key.

Genus *Lochetica* Kriechbaumer, 1892

Lochetica Kriechbaumer, 1892: 340. Type: *Phygadeuon pimplarius* Thomson, 1884 (= *Cecidonomus westoni* Bridgman, 1880). Monobasic.

A single species, *Lo. westoni* (Bridgman, 1880), has been recorded from Japan. In this study, I record a new species, *Lo. japonica* **sp. nov.**, from Japan. Japanese species can be distinguished by the following key.

Key to Japanese species of the genus *Lochetica* (♀)

1. Legs reddish brown. Median dorsal carina of T I present. Ovipositor sheath ca. 3.0 times as long as hind tibia.
..... *Lo. westoni* (Bridgman, 1880)
- . Legs largely blackish brown to black (Fig. 47A). Median dorsal carina of T I absent. Ovipositor sheath 2.3–2.38 times as long as hind tibia.
..... *Lo. japonica* **sp. nov.**

Lochetica japonica **sp. nov.**

(New SJN: Samehada-chibi-togari-himebachi)
(Figs 47A–H, 62J, 65Q, 66Q)

Etymology. The specific name is from Japan.

Type series. **Holotype:** KPM-NK 81989, F, JAPAN, Tochigi Pref., Nasushiobara City, Shiobara, Utou-sawa, 22–28. V. 2008, T. Matsumura leg. (MsT). **Paratype:**

JAPAN, KPM-NK 81988, F, Hokkaido, Sapporo City, Mt. Soranuma-dake, 14. VI. 2007, 4. VII. 2007, A. Ueda leg. (MsT).

Description. Female (n=2). Body length 5.2–5.5 (HT: 5.2) mm. Body polished, covered with dense silver setae.

Head. Clypeus 1.8–2.0 (HT: 1.8) times as wide as maximum length, its anterior margin rounded and obtuse, with dense setae along anterior margin (Fig. 62J). Face densely punctate. The border between clypeus and face indistinct (Fig. 47B). MSL 0.7–0.8 (HT: 0.7) times as long as BWM. Frons, gena, and vertex densely punctate, interspace of punctures coriaceous. Gena strongly convex in dorsal view (Fig. 47C). OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Mandible covered with dense setae and its ventral margin indistinct. Upper tooth of mandible as long as lower tooth. Base of mandible slightly convex. Antenna with 20–21 (HT: 20) flagellomeres. FL III 2.2 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum densely punctate, the punctures on ventral part more or less longitudinally lined. Epomia long below pronotal sulcus, its lower part parallel to front edge of pronotum. Mesoscutum matt, minutely punctate. Notaulus short and weak. Scutellum densely punctate, without a lateral longitudinal carina. Mesopleuron densely punctate except for small smooth areas below subtegular ridge and in posterior part of speculum, the punctures more or less longitudinally lined. Epicnemial carina strongly developed dorsally, reaching subtegular ridge. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron densely punctate, with a weak, partly indistinct juxtacoxal carina. Propodeal carinae complete (Figs 47G, 65Q). Area basalis indistinct anteriorly (Figs 47G, 65Q). Area superomedia present, pentagonal (Figs 47G, 65Q). Anterior part of propodeum densely punctate (Fig. 47G). Median part of propodeum irregularly rugulose (Fig. 47G). Posterior part of propodeum transversely rugulose, the interspace of rugae smooth. Length of fore wing 4.0–4.1 (HT: 4.0) mm. Areolet present, pentagonal (Fig. 47F). Vein 2m-cu of fore wing with a single bulla. Nervellus inclivous, intercepted behind the middle (Fig. 47F). Hind femur 3.6–3.7 (HT: 3.6) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.3: 0.6. Tarsal claws simple.

Metasoma. T I 1.9–2.0 (HT: 2.0) times as long as maximum width, densely punctate (Fig. 47H) except for smooth base. Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II almost as long as

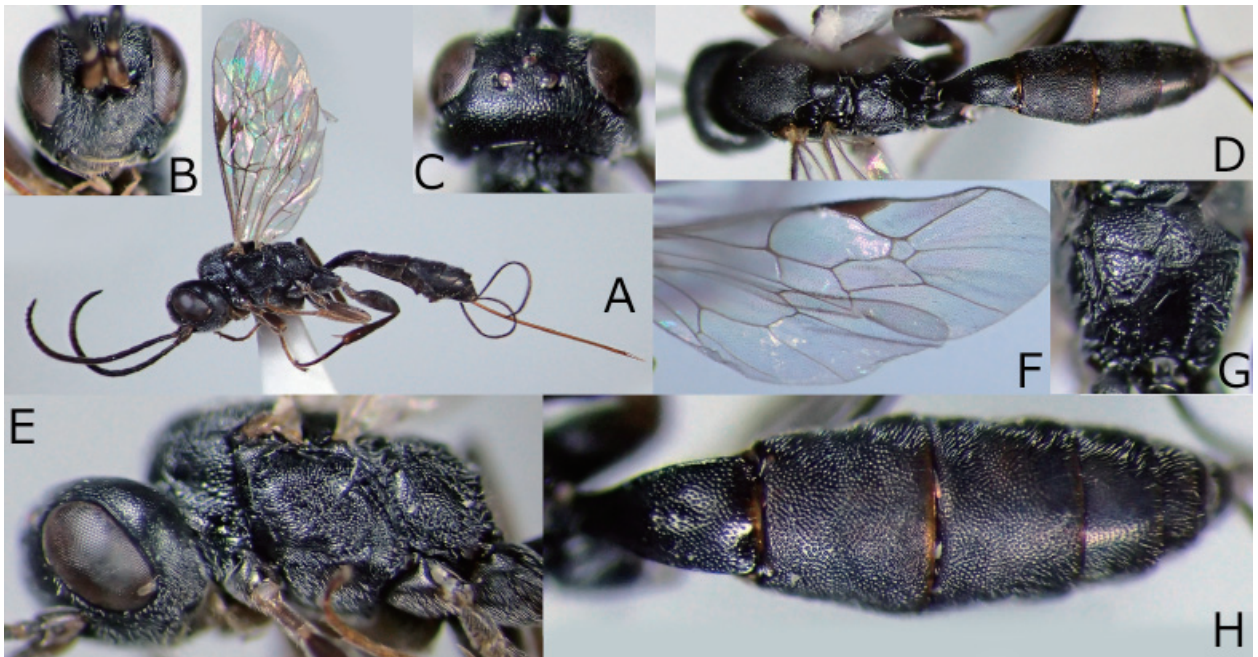


Fig. 47. *Lochetica japonica* sp. nov., KPM-NK 81989, holotype, female — A, lateral habitus; B, head, frontal view; C, head, dorsal view; D, head, mesosoma, and metasoma, dorsal view; E, head and mesosoma, lateral view; F, wings; G, propodeum, dorsal view; H, metasoma, dorsal view.

wide. T II to T V densely punctate (Fig. 47H). Ovipositor sheath 2.3–2.38 (HT: 2.38) times as long as hind tibia. Ovipositor straight, with a weak but distinctly angulated nodus and ventral teeth (Fig. 66Q).

Coloration (Figs 47A–H). Body (excluding wings and legs) black to blackish brown. Ventral surfaces of scape and pedicel, base of FL I, and apical part of mandible tinged with reddish brown. Palpi and tegula dark yellowish brown. Posterior margins of T I to T IV narrowly tinged with reddish brown. Membranous part of metasomal sternites dark brown. Ovipositor yellowish brown. Wings hyaline. Veins yellowish brown to dark brown. Pterostigma dark brown. Legs blackish brown to black. Fore and mid legs except for coxae at least partly paler than other parts of legs. Hind tibial spurs yellowish brown.

Male. Unknown.

Distribution. Japan (Hokkaido and Honshu).

Bionomics. Unknown.

Remarks. This species resembles *L. westoni* in the long epomia, the strongly bordered area postero-externa, and the distinct nodus with angulation, but can be distinguished by the above key.

Genus *Mastrus* Förster, 1869

Mastrus Förster, 1869: 176. Type: *Phygadeuon (Mastrus) neodiprioni* Viereck, 1911. Included by Viereck (1911).

Daictes Förster, 1869: 176. Type: *Phygadeuon (Daictes)*

fukaii Viereck, 1911. Included by Viereck (1911).

Aenoplex Förster, 1869: 176. Type: *Aenoplex betulaecola* Ashmead, 1896 (= *Orthocentrus pilifrons* Provancher, 1879). Included by Ashmead (1896).

Seven species, *Ma. ecornutus* Momoi, 1970, *Ma. fukaii* (Viereck 1911), *Ma. molestae* (Uchida, 1933), *Ma. oshimensis* (Uchida, 1930), *Ma. sugiharai* (Uchida, 1936), *Ma. takadai* Momoi, 1970, and *Ma. tenuibasalis* (Uchida, 1940), have been recorded from Japan. I found more than ten undetermined species from Japan. The taxonomic treatment of these species requires the additional specimens and comparison with European species. In this study, I re-describe *Ma. molestae* and record some distributional data of this species and *Ma. takadai* below.

Mastrus molestae (Uchida, 1933)
(SJN: Kuro-chibi-togari-himebachi)
(Figs 48A–D, 65R, 66R)

Hemiteles (Isadelphus) molestae Uchida, 1933b: 158.

Description. Female (n=2). Body length 6.0–7.0 mm. Body polished, covered with silver setae.

Head coriaceous. Clypeus 2.2 times as wide as maximum length, sparsely punctate dorsally, smooth ventrally and medially, its anterior margin rounded and with a pair of small tubercles. Face densely punctate (Fig. 65B). MSL 0.8 times as long as BWM. Frons, gena, and

vertex punctate. OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible flat. Antenna with 21 flagellomeres, subapical part not widened. FL III 5.0–5.7 times as long as maximum depth in lateral view.

Mesosoma. Upper side of collar without a median carina. Lateral part of pronotum punctate dorsally, smooth with some rugae ventrally. Epomia present. Mesoscutum matt, finely and densely punctate. Notaulus distinct, fading out near center of mesoscutum. Scutellum punctate, without a lateral longitudinal carina except for base. Mesopleuron punctate except for smooth area of speculum and its adjacent areas. Posterior transverse carina of mesosternum complete. Metapleuron punctate, with a complete juxtacoxal carina. Propodeal carinae and areas complete (Fig. 65R). Postero-lateral corner of area dentipara weakly projected. Area superomedia as long as wide, receiving lateral section of anterior transverse carina just behind of middle (Fig. 65R). Length of fore wing 5.0 mm. Areolet absent (Fig. 65D). Nervellus inclivous, intercepted posteriorly. Hind femur 4.0 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.5: 0.3: 0.5. Tarsal claws simple.

Metasoma. T I 1.3–1.4 times as long as maximum width, coriaceous, with some longitudinal striae posteriorly. Median dorsal carina of T I present except for posterior part. Dorsolateral carina of T I complete. T II granulate with punctures and minute, irregular rugae except for smooth posterior margin (Fig. 65C). T II to T VII wider than long. T III granulate with punctures and minute, irregular rugae except for smooth posterior half. T IV to T

VIII finely and sparsely punctate. T VII and T VIII weakly elongated. Ovipositor sheath 1.6–1.7 times as long as hind tibia. Ovipositor straight, weakly compress laterally, with a weak nodus and ventral teeth.

Coloration (Figs 48A–D). Body (excluding wings and legs) black to blackish brown. Basal spot of mandible and palpi whitish yellow. Ventral areas of scape and pedicel reddish brown. Tegula and membranous part of mesosternum whitish yellow. Posterior margins of T II and T III narrowly tinged with reddish yellow. Posterior margins of T IV to T VII tinged with whitish yellow. Ovipositor reddish brown. Wings hyaline. Veins and pterostigma brown to blackish brown except for yellowish brown base of pterostigma. Legs reddish brown. Trochanters, trochantelli, tibial spurs, apex of hind femur, and base of tibiae yellow to yellowish brown. TS V, apical part of hind femur, and hind tibia dark brown to blackish brown. Mid tibia sometimes partly darkened.

Male. Not studied in this study.

Materials examined. JAPAN: SEHU (holotype), F, Nagano Pref., Kamisuwa, 25. III. 1932, reared from *G. molesta*, G. J. Haeussler leg.; KPM-NK 81987, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 4. VIII. 2017, K. Watanabe leg.

Distribution. Japan (Honshu).

Bionomics. Host record: *Grapholita molesta* (Busck, 1916) (Lepidoptera, Tortricidae) (Uchida, 1933).

Mastrus takadai Momoi, 1970
(SJN: Takada-chibi-togari-himebachi)
(Figs 49A–C, 65S)

Mastrus takadai Momoi, 1970: 352.

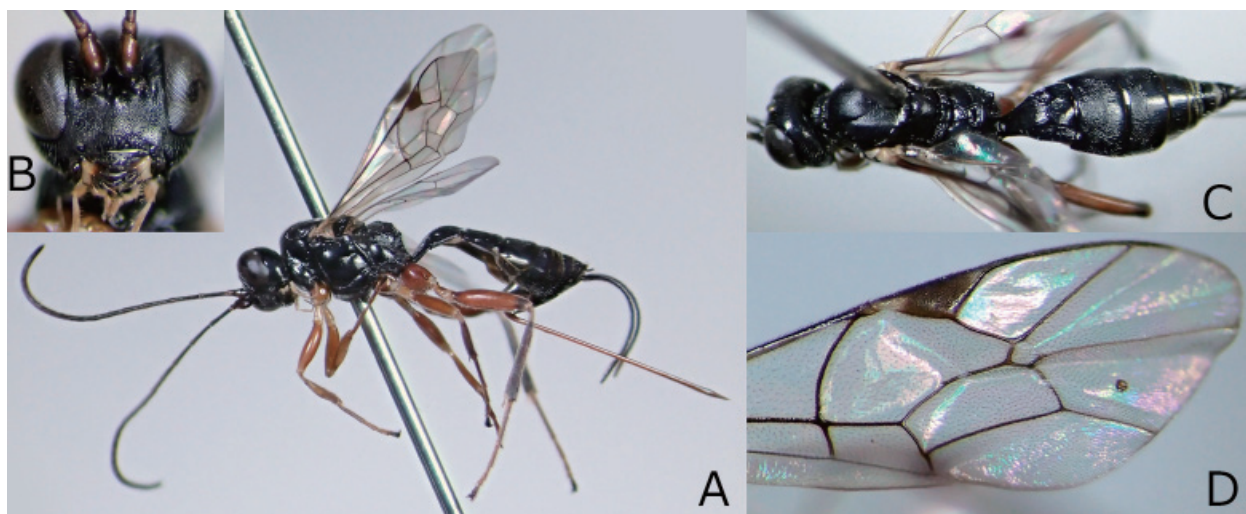


Fig. 48. *Mastrus molestae* (Uchida, 1933), KPM-NK 81987, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, fore wing.

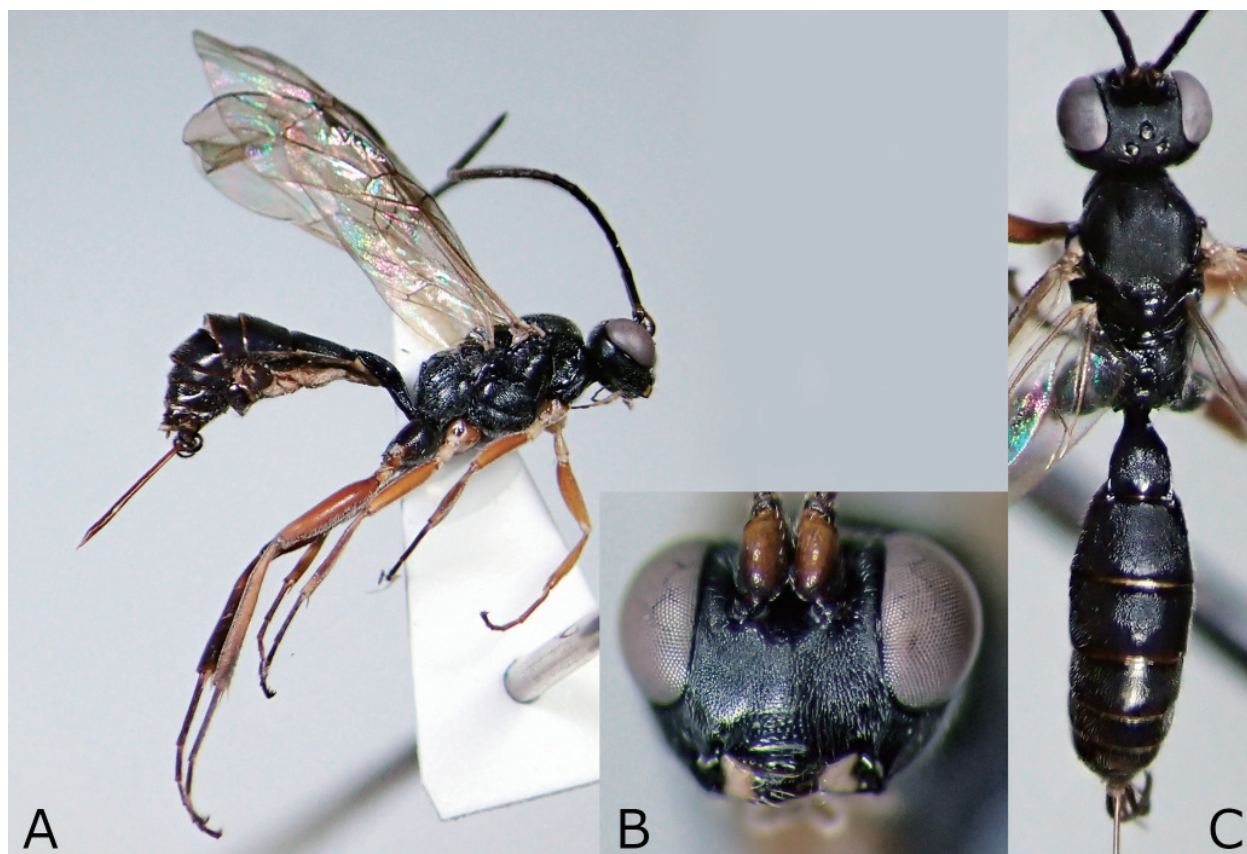


Fig. 49. *Mastrus takadai* Momoi, 1970, KPM-NK 81982 (A, B) and 81983 (C), females from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view.

Description. See Momoi (1970).

Materials examined. JAPAN: KPM-NK 81981, F, Hokkaido, Hidaka Town, Uenzaru-gawa, Natural forest, 10. VII. – 1. VIII. 2007, A. Ueda leg.; KPM-NK 81985, F, Hokkaido, Engaru Town, Maruseppu, 13. VII. 2012, K. Watanabe leg.; KPM-NK 81978, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 1. V. 2016, K. Watanabe leg.; KPM-NK 81986, F, Shizuoka Pref., Honkawane Town, Mt. Yamainudan, 14. VI. 2008, K. Watanabe leg.; KPM-NK 81979, F, Kagoshima Pref., Yakushima Is., Hanyama, 1–25. XII. 2006, T. Yamauchi leg. (MsT); KPM-NK 81980, 81983, 2 F, Kagoshima Pref., Yakushima Is., Arakawa, 2. V. – 4. VI. 2007, T. Yamauchi leg. (MsT); KPM-NK 81982, F, Kagoshima Pref., Yakushima Is., Kankake, 27. X. – 28. XI. 2006, T. Yamauchi *et al.* leg. (MsT); KPM-NK 81984, F, Kagoshima Pref., Yakushima Is., Mt. Aikodake, 2. V. – 5. VI. 2007, T. Yamauchi *et al.* leg. (MsT); MNHAH, F (holotype), Kagoshima Pref., Amamioshima Is., 24. V. 1965, H. Takada leg.

Distribution. Japan (Honshu, Yakushima Is., Amamioshima Is., and Okinawajima Is.).

Bionomics. Unknown.

Remarks. This is the first record of this species from Honshu and Yakushima Is.

Phygadeuon genus group

(subtribe Phygadeuontina sensu Townes (1970) and Horstmann (1992))

Seven genera, *Gnotus* Förster, 1869, *Phygadeuon* Gravenhorst, 1829, *Sulcarius* Townes, 1970, *Theroscopus* Förster, 1850, *Tricholinum* Förster, 1869, and *Uchidella* Townes, 1957, have been recorded from Japan. In addition, I found *Megacara*, *Stibeutes*, and *Tropistes* from Japan. In this study, I newly record *Megacara* and *Tropistes* from Japan and review *Gnotus*, *Orthizema*, and *Uchidella*. The taxonomic treatment of *Stibeutes* requires the additional specimens and comparison with European species. The identification of genera see Townes (1970).

Genus *Gnotus* Förster, 1869

Gnotus Förster, 1869: 179. Type: *Hemiteles tenuicornis* Gravenhorst, 1829 (= *Phygadeuon tenuipes* Gravenhorst, 1829). Designated by Perkins (1962).

Three species, *Gn. chionops* (Gravenhorst, 1829), *Gn. hyperae* Kusigemati, 1990, and *Gn. striatus* (Uchida, 1930), have been recorded from Japan. In this study, I re-describe

Gn. chionops (Gravenhorst, 1829) and *Gn. striatus* (Uchida, 1930) with some distributional data. Japanese species can be distinguished by the following key.

Key to Japanese species of the genus *Gnotus* (♀)

1. Body and legs largely black (Figs 51A, D). Pronotum and mesopleuron largely smooth. Fore wing with a clouded area (Fig. 51A).
..... *Gn. striatus* (Uchida, 1930)
- . Body and legs at least partly with reddish brown area (Figs 50A, C). Pronotum and mesopleuron more or less sculptured. Fore wing without a clouded area (Fig. 50A).
..... 2
2. Upper tooth of mandible 3.0 times as long as lower tooth (Fig. 62L). Ovipositor sheath almost as long as hind tibia. Anterior margin of clypeus truncate (Fig. 50C). T IV black, at most tinged with dark reddish brown (Fig. 50C).
..... *Gn. chionops* (Gravenhorst, 1829)
- . Upper tooth of mandible less than 2.0 times as long as lower tooth. Ovipositor sheath shorter than hind tibia. Anterior margin of clypeus rounded. T IV reddish brown.
..... *Gn. hyperae* Kusigemati, 1990

***Gnotus chionops* (Gravenhorst, 1829)**

(SJN: Himesuga-chibi-togari-himebachi)
(Figs 50A–D, 62L, 65T)

Hemiteles chionops Gravenhorst, 1829: 797.

Hemiteles scutellator Lange, 1911: 543.

Description based on Japanese specimens. Female (n=21). Body length 3.8–7.1 mm. Body polished, covered with silver setae.

Head. Clypeus 2.0 times as wide as maximum length, covered with long setae, its anterior margin truncate, without teeth. Face densely punctate (Fig. 50B). MSL 0.7–0.75 times as long as BWM. Frons densely punctate, the interspace of punctures coriaceous. Gena and vertex densely punctate. OOL slightly shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end strongly curved inward and joined with hypostomal carina distant from mandibular base. Upper tooth of mandible 3.0 times as long as lower tooth (Fig. 62L). Base of mandible slightly concave. Antenna with 20–21 flagellomeres. Subapical part of antenna slightly wider than basal part. FL III 2.67–3.3 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum punctate dorsally, longitudinally rugulose ventrally. Epomia distinct. Mesoscutum densely punctate. Notaulus distinct, fading out near center of mesoscutum. Scutellum punctate, with a lateral longitudinal carina except for apex. Mesopleuron longitudinally rugulose except for smooth speculum. Subtegular ridge strongly raised. Posterior transverse carina of mesosternum absent in front of mid coxae. Metapleuron densely punctate, with a complete juxtacoxal carina. Propodeal carinae complete except for reduced posterior section of lateromedian longitudinal carina. Area basalis and area superomedia distinct (Figs 50D, 65T). Postero-lateral corner of area dentipara weakly projected. Anterior and median parts of propodeum densely and shallowly punctate (Fig. 50D). Posterior part of propodeum coriaceous with oblique rugae. Length of fore wing 3.4–5.5 mm. Areolet absent. Vein 2m-cu of fore wing with two bullae. Nervellus slightly inclivous, intercepted behind the middle. Hind femur 4.7–4.9 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.8–0.85: 0.6: 0.2–0.25: 0.55. Tarsal claws simple.

Metasoma. T I 2.0–2.1 times as long as maximum width, punctate, some punctures longitudinally lined. Median dorsal carina of T I absent. Dorsolateral carina of T I complete. T II to T V wider than long, densely and finely punctate. Ovipositor sheath 1.0–1.05 times as long as hind tibia. Ovipositor straight, with a weak nodus and ventral teeth.

Coloration (Figs 50A–D). Body (excluding wings and legs) black to blackish brown. Basal half of antenna tinged with yellowish brown. Yellowish area of antenna sometimes reduced into ventral yellow markings of scape and pedicel. Mandible except for darkened apex, palpi, postero-dorsal corner of pronotum, and tegula yellow. Malar space and collar usually more or less tinged with yellowish brown. T II and T III largely or entirely reddish brown. T IV to T VI more or less tinged with brown. Posterior margins of T VI and T VII white. Membranous part of metasomal sternites yellowish brown. Ovipositor reddish brown. Wings hyaline. Veins yellowish brown to brown. Pterostigma brown to dark brown except for pale base. Legs reddish brown. Fore and mid coxae and all trochanters, trochantelli, and tibial spurs whitish yellow. Apical parts of hind femur and tibia more or less darkened.

Male. Not study in this study.

Materials examined. JAPAN: KPM-NK 82093, F, Tochigi Pref., Nasushiobara City, Shiobara, Utou-sawa, 22–28. V. 2008, T. Matsumura leg. (MsT); KPM-NK 82097, KPM-NK 82102, 2 F, Tochigi Pref., Nasushiobara City, Shiobara, Sakurakoen-bochi, 12–19. V. 2008, T.

Matsumura leg. (MsT); KPM-NK 82104, F, Ibaraki Pref., Daigo Town, Mt. Yamizo, 31. VII. 2010, T. Kurihara leg.; KPM-NK 82091, 82098, 2 F, Tokyo, Izuoshima Is., Oshima Town, Sashikiji, Mt. Futago, 5–31. X. 2012, K. Tsujii leg. (MsT); KPM-NK 82100, F, Tokyo, Hachijojima Is., Hachijyo Town, Mitsune, Mihararindo, 20. V. 2012, K. Tsujii leg.; KPM-NK 82103, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 26. V. 2013, K. Watanabe leg.; KPM-NK 82092, F, Yamanashi Pref., Koushu City, Katsunuma Town, Ootaki-fudou, 9. VII. 2007, K. Watanabe leg.; KPM-NK 82087, F, Nagano Pref., Ōtaki Vil., Mt. Ontake-san, 25. VI. – 15. VII. 2015, S. Shimizu leg. (MsT); KPM-NK 82096, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 6. VIII. 2010, K. Watanabe leg.; KPM-NK 82089, F, Tochigi Pref., Nasushiobara, Osonozawa, 13–21. IV. 2011, T. Matsumura leg. (MsT); KPM-NK 82099, F, Niigata Pref., Sado Is., Kanaishinbo, Hakuundai to Mt. Myokenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 82088, F, Niigata Pref., Myoukou City, Suginosawa, Myoukou-sasagamine, 10. IX. 2013, S. Shimizu leg.; KPM-NK 82101, F, ditto, 16. VII. 2013; TMNH, F, Aichi Pref., Shitara Town, Tsugu, Honsawa, 17. VI. 2019, S. Morishita leg.; KPM-NK 82095, F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 21–28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82090, F, ditto, 11–16. VIII. 2009; KPM-NK 82094, F, Toyama Pref., Toyama City, Arimine, Inonedani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT). GERMANY: ZSM, F (det. Horstmann), “6. 8. 1950 Iburg, T. W.”.

Distribution. Japan (Hokkaido, Honshu*, Sado Is.*, Izuoshima Is.*, Hachijojima Is.*, Amamioshima Is., Okinoerabujima Is., and Iejima Is.); widely distributed in

Holarctic region.

Bionomics. Unknown in Japan. In Europe, some species of Yponomeutidae (Lepidoptera) have been recorded as the host (Yu *et al.*, 2016).

Remarks. This is the first record of this species from Honshu, Sado Is., Izuoshima Is., and Hachijojima Is.

Gnotus striatus (Uchida, 1930)
(SJN: Shiwa-chibi-togari-himebachi)
(Figs 51A–D, 62M, 65U)

Leptocryptus striatus Uchida, 1930: 335.

Description. Female (n=15). Body length 4.2–7.1 mm. Body polished, covered with silver setae.

Head. Clypeus 1.7 times as wide as maximum length, its anterior margin rounded and narrowly depressed, without teeth. Face densely punctate (Fig. 51B). MSL 0.95–1.0 times as long as BWM. Frons sparsely and finely punctate. Gena and vertex finely punctate. OOL as long as or slightly longer than POL. OOL and POL longer than OD. Occipital carina complete, its lower end strongly curved inward and joined with hypostomal carina slightly distant from mandibular base. Upper tooth of mandible slightly longer than (ca. 2.0 times as long as) lower tooth (Fig. 62M). Base of mandible flat. Antenna with 20–25 flagellomeres. Subapical part of antenna slightly wider than basal part. FL III 3.3–4.0 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum largely smooth. Epomia distinct. Mesoscutum minutely punctate, strongly polished. Notaulus distinct, fading out in front of center

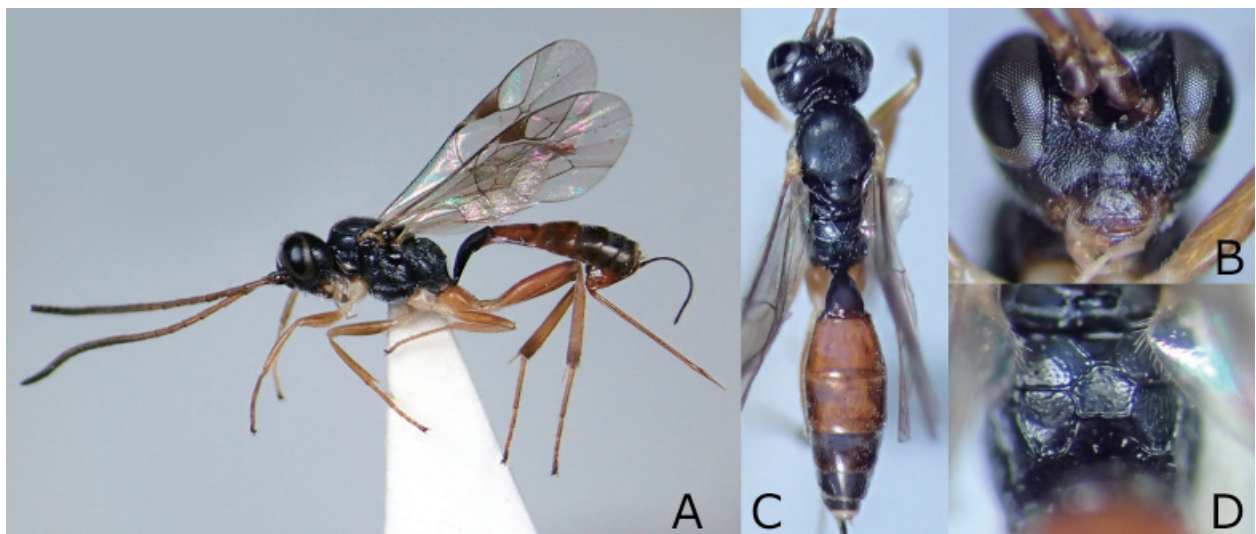


Fig. 50. *Gnotus chionops* (Gravenhorst, 1829), KPM-NK 82099, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, propodeum, dorsal view.

of mesoscutum. Scutellum punctate, with a lateral longitudinal carina except for apex. Mesopleuron smooth except for fine punctures on areas below subtegular ridge and speculum. Subtegular ridge strongly raised. Posterior transverse carina of mesosternum absent in front of mid coxae. Metapleuron finely punctate, with a complete juxtacoxal carina. Propodeal carinae complete except for median section of lateromedian longitudinal carina usually partly indistinct. Area basalis distinct (Figs 51C, 65U). Area superomedia distinct (Figs 51C, 65U), its lateral sides usually partly indistinct. Postero-lateral corner of area dentipara weakly projected. Propodeum largely smooth. Length of fore wing 3.7–5.75 mm. Areolet absent. Vein 2m-cu of fore wing with two bullae. Nervellus slightly inclivous, intercepted behind the middle. Hind femur 4.9–5.0 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.4: 0.5. Tarsal claws simple.

Metasoma. T I 2.7 times as long as maximum width, longitudinally striate (Fig. 51D). Median dorsal carina of T I present basally. Dorsolateral carina of T I present but indistinct posteriorly. T II to T V wider than long, densely and finely punctate, basal part of T II with a few longitudinal striae (Fig. 51D). Ovipositor sheath 0.65 times as long as hind tibia. Ovipositor straight, without a nodus and ventral teeth.

Coloration (Figs 51A–D). Body (excluding wings) dark brown to black. Mandible except for darkened apex, palpi, tibial spurs, membranous part of metasomal sternites, and ovipositor yellowish brown. Posterior margins of T IV to T

VII narrowly tinged with yellowish brown. Scutellum and postscutellum sometimes tinged with yellowish brown. Wings hyaline, with clouded area behind of pterostigma. Veins brown to dark brown. Pterostigma dark brown except for pale base.

Male. Unknown.

Materials examined. JAPAN: SEHU, F (lectotype), Hokkaido, Sapporo, 4/9, 1926, Uchida leg.; KPM-NK 82064, F, Hokkaido, Otofuke Town, Kibougaoka-koen, 25. VI. 2017, K. Watanabe leg.; KPM-NK 82057, F, Tochigi Pref., Kuriyama Vil., Kinunuma, 1. VIII. 2004, 14. VIII. 2004, H. Makihara leg. (MsT); KPM-NK 82052, F, Kanagawa Pref., Yokosuka City, Take, Mishimasya, 9. V. 2001, I. Kawashima leg.; KPM-NK 82062, F, Kanagawa Pref., Odawara City, Iriuda, KPMNH, 19. VI. 2014, H. Taru leg.; KPM-NK 82054, F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 16–25. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82053, F, ditto, 25. VIII. – 1. IX. 2009; KPM-NK 82055, 82056, 2 F, Toyama Pref., Nanto City, Togamura, Kamimomose, 21–28. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82059, F, Yamanashi Pref., Koushu City, Katsunuma Town, Ootaki-fudou, 9. VII. 2007, K. Watanabe leg.; KPM-NK 82058, F, ditto, 22. V. 2010; KPM-NK 82061, F, Nagano Pref., Outaki Vil., Mt. Ontakesan, Hakkaisan, 16. VII. 2007, K. Watanabe leg.; KPM-NK 82063, F, Hyogo Pref., Kami Town, Oziro-ku, Niiya, Mikata-kogen, 26. VI. – 18. VII. 2011, S. Fujie leg. (MsT); KPM-NK 82051, F, Hyogo Pref., Sanda City, Fukushima, Arima-fuji park, 16. V. 2017, K. Watanabe leg.; KPM-NK 82060, F, Tottori Pref.,

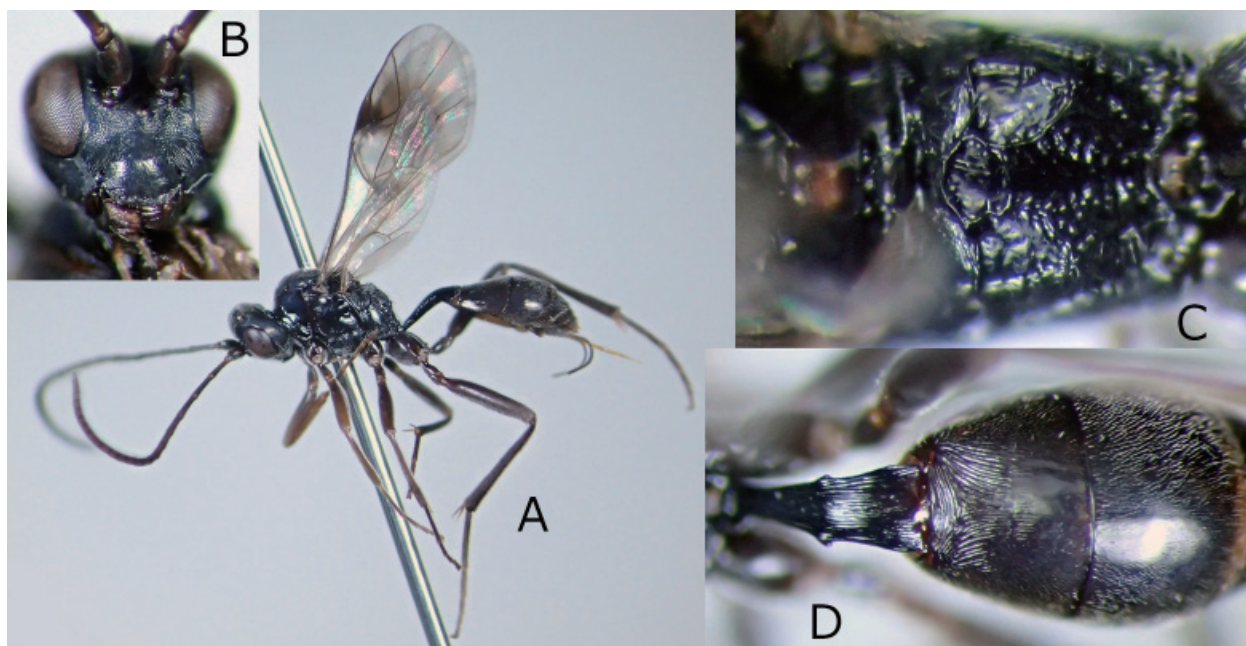


Fig. 51. *Gnotus striatus* (Uchida, 1930), KPM-NK 82064, female from Japan — A, lateral habitus; B, head, frontal view; C, propodeum, dorsal view; D, T I to T III, dorsal view.

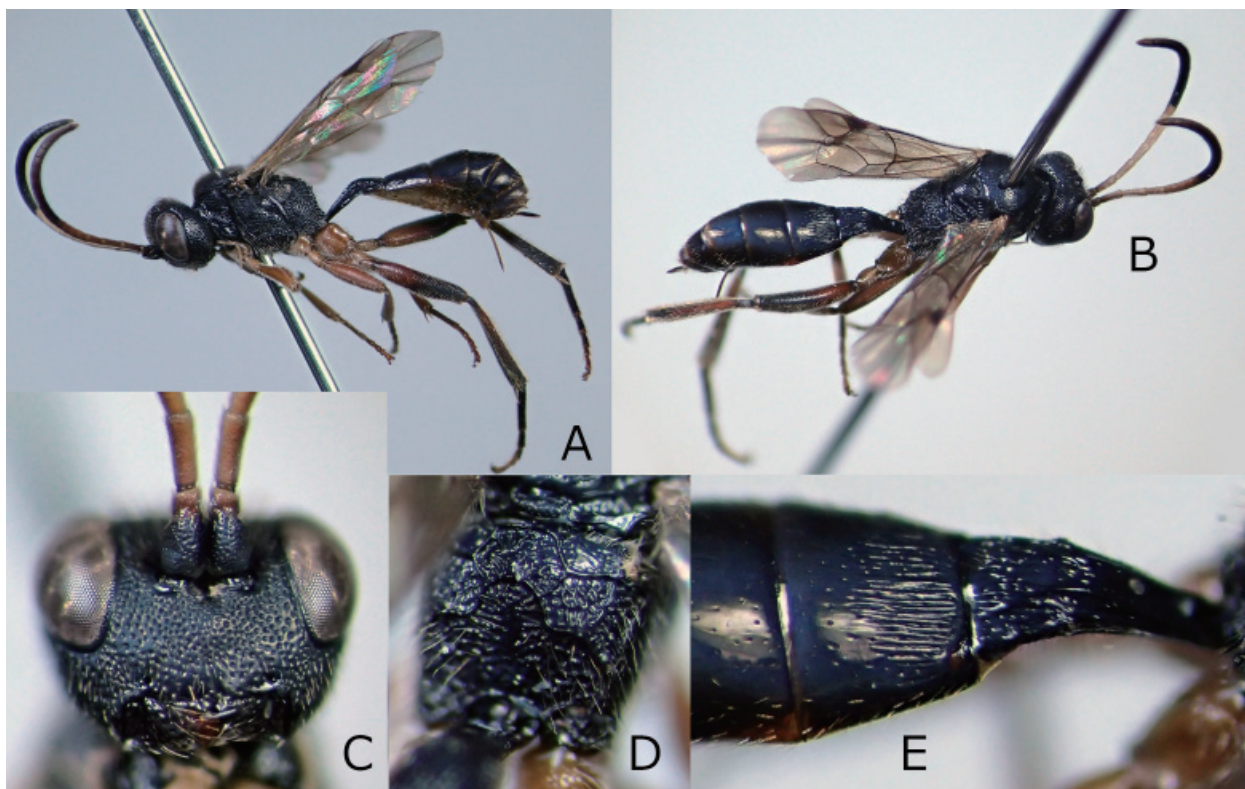


Fig. 52. *Megacara similis* Sheng, 1999, KPM-NK 81835, female from Japan — A, lateral habitus; B, dorsal habitus; C, head, frontal view; D, propodeum, dorsal view; E, T I and T II, dorso-lateral view.

Wakasa City, Mt. Hyonosen, Oodanganaru, 6. VIII. 2011, K. Watanabe leg.

Distribution. Japan (Kunashiri Is., Hokkaido, and Honshu).

Bionomics. Unknown.

Genus *Megacara* Townes, 1970

Megacara Townes, 1970: 102. Type species: *Phygadeuon lucens* Provancher, 1874. Original designation.

In this study, I newly record *Meg. similis* Sheng, 1999 from Japan. This is the first record of this genus from Japan. In addition, I recognize at least two undetermined species from Japan. The taxonomic treatment of these species requires the additional specimens and comparison with other species.

Megacara similis Sheng, 1999

(New SJN: Oozu-chibi-togari-himebachi)

(Figs 52A–D, 62K, 66S)

Megacara similis Sheng, 1999 in Sheng & Sun (1999): 80.

Description. See Sheng & Sun (2009).

Materials examined. JAPAN: KPM-NK 81834, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 17. V. 2015, K. Watanabe leg.; KPM-NK 81835, F, Toyama Pref., Toyama City, Kamegai, 1–8. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81836, F, Kagoshima Pref., Amamioshima Is., Sumiyou, Santaro-toge, 12. IV. 2007, 14. IV. 2007, T. Ishizaki leg.; KPM-NK 81837, F, ditto, 4. VI. 2007, K. Watanabe leg. CHINA: GSFPF, F (holotype), Henan, 11. VII. 1998, M-L. Sheng leg.

Distribution. Japan (Honshu and Amamioshima Is.) and China.

Bionomics. Unknown.

Remarks. This is the first record of this species from Japan. This species can be distinguished from the other undetermined species by the whitish yellow to reddish yellow hind coxa and the black metasomal tergites (Figs 52A, B, E).

Genus *Orthizema* Förster, 1869

Orthizema Förster, 1869: 178. Type: *Hemiteles* (*Orthizema*) *ornatus* Brischke, 1890 (= *Hemiteles subannulatum* Bridgman, 1883. Included by Brischke (1890).

Naetes Förster, 1869: 179. Type: *Hemiteles* (*Naetes*) *rufus* Brischke, 1892 (= *Hemiteles hadrocerus* Thomson, 1884. Included by Brischke (1892).

Phyzelus Förster, 1869: 185. Type: *Phyzelus fasciatus* Brischke, 1888. Included by Brischke (1888).

A single species, *Or. triannulatum* (Thomson, 1884), has been recorded from Japan. I found more than 10 species of this genus from Japan. The taxonomic treatment of these species requires the additional specimens and comparison with European species. In this study, I record *Or. semanotae* Sheng & Sun, 2014 from Japan for the first time.

Orthizema semanotae Sheng & Sun, 2014
(New SJN: Kamikiri-chibi-togari-himebachi)
(Figs 53A–D, 65V)

Orthizema semanotae Sheng & Sun, 2014: 147.

Description. See Sheng & Sun (2014).

Materials examined. JAPAN: KPM-NK 82047, F, Tokyo, Akiruno City, Ninomiya, Tamagawa-riverside, 3. V. 2010, K. Watanabe leg.; KPM-NK 82048, F, Kanagawa Pref., Atsugi City, Shimofurusawa, 19. IV. 2007, T. Ban leg.; KPM-NK 82050, F, Kanagawa Pref., Atsugi City, Funako, 22. IV. 2016, 16. V. 2016, Y. Kato & S. Koizumi leg. (MsT); KPM-NK 82049, F, Kanagawa Pref., Hadano City, Naganuki, 3. XI. 2018, T. Amano leg.; KPM-NK 82045, F, Toyama Pref., Toyama City, Higashikuromaki, Ueno, 13. X. 2010, T. Yamauchi leg. (LT); KPM-NK 82046, F, Osaka Pref., Takatsuki City, Mishimae, left bank of Yodo river, 27. X. 2012, S. Fujie leg.

Distribution. Japan* (Honshu) and China.

Bionomics. Unknown in Japan. In China, *Semanotus bifasciatus* (Motschulsky, 1857) (Coleoptera, Cerambycidae) is recorded as the host (Sheng & Sun, 2014).

Remarks. This is the first record of this species from Japan.

Genus *Tropistes* Gravenhorst, 1829

Tropistes Gravenhorst, 1829: 442. Type: *Tropistes nitidipennis* Gravenhorst, 1829. Monobasic.

Pseudolimerodes Strobl, 1902: 46. Type: *Pseudolimerodes compressiventris* Strobl, 1902 (= *Hemiteles falcatus* Thomson, 1884). Monobasic.

Boleslawia Sawoniewicz, 1996: 493. Type: *Boleslawia burakowskii* Sawoniewicz, 1996. Original designation.

In this study, I record a new species, *Tro. shimizui* sp. nov., from Japan. This is the first record of this genus from Japan.

Tropistes shimizui sp. nov.

(New SJN: Tachi-chibi-togari-himebachi)
(Figs 54A–D, 64F, 66T)

Etymology. The specific name is from Dr. So Shimizu, who is a young Japanese ichneumonologist and collector of holotype.

Type series. **Holotype:** KPM-NK 81833, F, JAPAN, Nagano Pref., Ueda City, Sugadairakogen, Tsukuba University, 4–25. VI. 2015, S. Shimizu leg. (MsT).

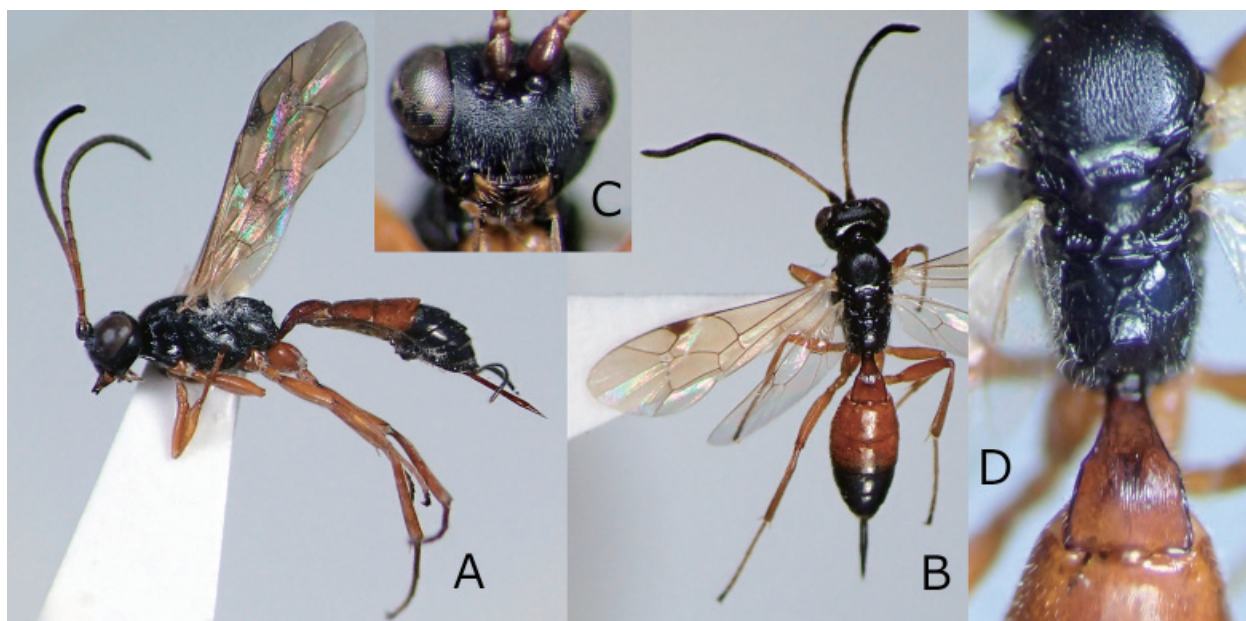


Fig. 53. *Orthizema semanotae* Sheng & Sun, 2014, KPM-NK 82047 (B–D) and 82049 (A), females from Japan — A, lateral habitus; B, dorsal habitus; C, head, frontal view; D, propodeum and T I, dorsal view.

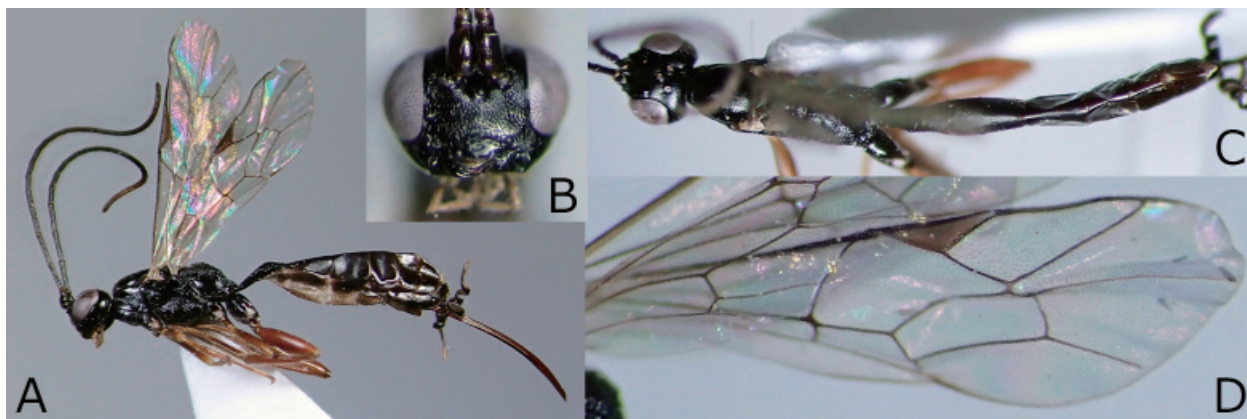


Fig. 54. *Tropistes shimizui* sp. nov., KPM-NK 81833, holotype, female — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, wings.

Description. Female (n=1). Body length 6.7 mm. Body polished, covered with silver setae.

Head. Clypeus 2.7 times as wide as maximum length, sparsely punctate except for smooth anterior margin, its anterior margin rounded, without teeth. Face punctate (Fig. 54B), the interspace of punctures coriaceous. MSL 0.9 times as long as BWM. Frons and vertex punctate, the interspace of punctures coriaceous. Gena sparsely and finely punctate, largely smooth laterally. OOL shorter than POL. OOL and POL longer than OD. Occipital carina complete, its lower end joined with hypostomal carina distant from mandibular base. Upper tooth of mandible almost as long as lower tooth. Base of mandible slightly convex. Antenna with 26 flagellomeres. Subapical part of antenna not widened. All segments of flagellomeres longer than wide. FL III 6.67 times as long as maximum depth in lateral view.

Mesosoma 2.1 times as long as maximum depth in lateral view. Lateral part of pronotum smooth dorsally, longitudinally rugulose ventrally. Epomia indistinct. Mesoscutum punctate, the interspace of punctures coriaceous dorsally, smooth anteriorly and laterally. Notaulus distinct, fading out in front of center of mesoscutum. Scutellum sparsely punctate, without a lateral longitudinal carina except for base. Mesopleuron longitudinally rugulose dorsally and ventrally, median part coriaceous except for smooth speculum. Posterior transverse carina of mesosternum largely absent in front of mid coxae. Metapleuron sparsely punctate, with an indistinct juxtacoxal carina. Anterior transverse carina of propodeum absent except for median section (Fig. 64F). Posterior transverse carina of propodeum complete (Fig. 64F). Lateromedian longitudinal carina of propodeum present except for posterior section (Fig. 64F). Lateral longitudinal carina of propodeum complete except for

indistinct anterior part (Fig. 64F). Pleural carina complete (Fig. 64F). Area basalis and area superomedia distinct (Fig. 64F). Anterior area of propodeum largely coriaceous. Median parts of propodeum transversely rugulose. Posterior part of propodeum largely smooth. Length of fore wing 4.7 mm. Areolet absent (Fig. 54D). Vein 2m-cu of fore wing with two bullae. Nervellus subvertical, intercepted near the middle (Fig. 54D). Hind femur 3.95 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.3: 0.55. Tarsal claws simple.

Metasoma laterally compressed except for first segment (Fig. 54C). T I 3.0 times as long as maximum width, coriaceous. Median dorsal carina of T I absent. Dorsolateral carina of T I present in front of the spiracle. T II and T III longer than wide, coriaceous. Ovipositor sheath 1.8 times as long as hind tibia. Ovipositor distinctly downcurved (Fig. 54A), without a nodus and ventral teeth (Fig. 66T).

Coloration (Figs 54A–D). Body (excluding wings and legs) black to blackish brown. Apex of mandible tinged with brown. Palpi and tegula yellowish brown. Membranous part of metasomal sternites whitish brown. Ovipositor reddish brown. Wings hyaline. Veins yellowish brown to brown. Pterostigma brown. Legs reddish brown except for black to blackish brown coxae, trochanters, and trochantelli.

Male. Unknown.

Distribution. Japan (Honshu).

Bionomics. Unknown.

Remarks. This species resembles *Tro. falcatus* (Thomson, 1884) in the character states of antenna, hind femur, and ovipositor, but it can be distinguished by the coxae black (orange in *Tro. falcatus*), the tegula yellowish brown (brown in *Tro. falcatus*), the metasomal tergites black (with red area in *Tro. falcatus*), the anterior part of

mesopleuron coriaceous medially (irregularly rugae in *Tro. falcatus*), and the area petiolaris largely smooth (distinctly sculptured in *Tro. falcatus*).

Genus *Uchidella* Townes, 1957

Itamus Förster, 1869; 179. Type: *Hemiteles* (*Itamus*) *okamotoi* Uchida, 1936. Included by Uchida (1936a).
Uchidella Townes, 1957: 119. New name for *Itamus*.

Two species, *U. longicaudata* Horstmann, 1997 and *U. okamotoi* (Uchida, 1936), have been recorded from Japan. In this study, I describe a new species, *U. toichii* sp. nov., and record some distributional data of *U. okamotoi* below. Matsumoto (2013) recorded the *U. longicaudata* from Hokkaido, while this record may be based on the misidentification of *Bathythrix*. Japanese species can be distinguished by the following key.

Key to Japanese species of the genus *Uchidella* (♀)

1. Ovipositor sheath shorter than 0.6 times of hind tibia.
Clypeus usually tinged with yellowish brown (Fig. 55B). Mesosoma with large reddish yellow areas (Figs 55A, C, D).
..... *U. okamotoi* (Uchida, 1936)
- . Ovipositor sheath at least slightly longer than hind tibia. Clypeus black (Fig. 56B). Mesosoma almost entirely black (Figs 56A, D, E).
..... 2
2. Area superomedia of propodeum as long as wide (Fig. 64H). Antenna dark brown to blackish brown

(Fig. 56A). T II to T V with black areas (Figs 56G, H). Hind coxa, femur, and tibia sometimes partly or entirely darkened.

..... *U. toichii* sp. nov.

- Area superomedia of propodeum wider than long. Antenna yellow to yellowish brown. Metasomal tergites yellow to yellowish brown except for T I. Hind coxa, femur, and tibia yellow to yellowish brown.

..... *U. longicaudata* Horstmann, 1997

***Uchidella okamotoi* (Uchida, 1936)**

(SJN: Okamoto-chibi-togari-himebachi)

(Figs 55A–E, 64G)

Leptocryptus marginatus Uchida, 1930: 335

Hemiteles (*Itamus*) *okamotoi* Uchida, 1936a: 13.

Description. Female (n=9). Body length 5.6–7.0 mm. Body polished, covered with silver setae.

Head. Clypeus 1.9–2.0 times as wide as maximum length, finely and sparsely punctate, its anterior margin subtruncate, without teeth. Face finely punctate (Fig. 55B), flat. MSL 0.5–0.6 times as long as BWM. Frons finely punctate except for smooth area above antennal sockets. Gena and vertex finely punctate. OOL distinctly longer than POL and OD. POL almost as long as OD. Occipital carina complete, its lower end and joined with hypostomal carina at mandibular base. Upper tooth of mandible distinctly longer than lower tooth. Base of mandible flat. Antenna with 24–26 flagellomeres. FL III 3.3–4.0 times as long as maximum depth in lateral view.

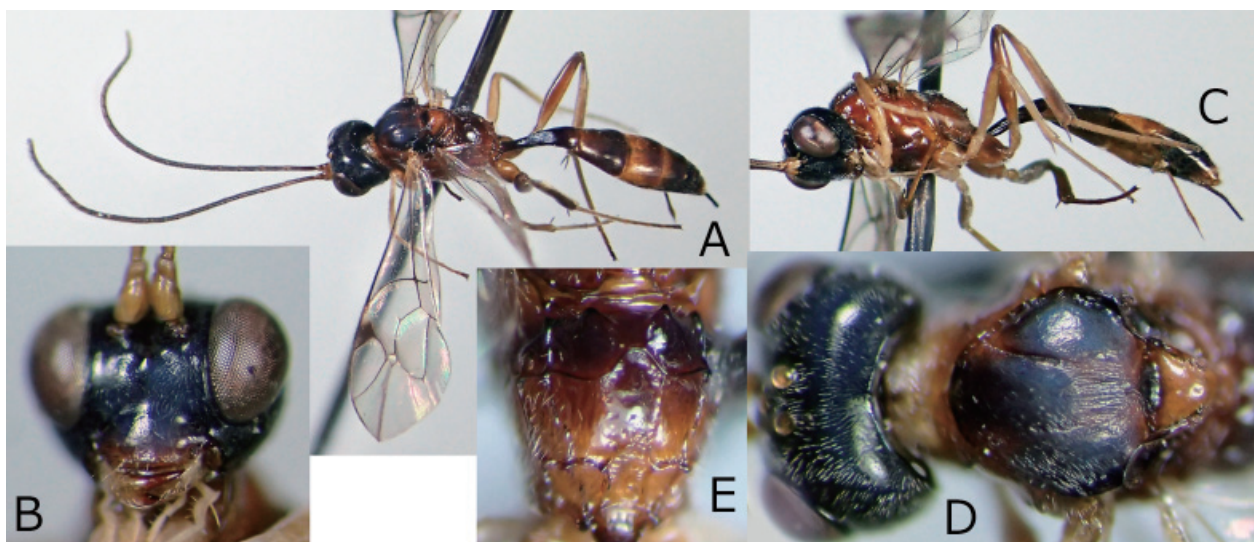


Fig. 55. *Uchidella okamotoi* (Uchida, 1936), KPM-NK 82073, female from Japan — A, dorsal habitus; B, head, frontal view; C, head, mesosoma, and metasoma, lateral view; D, head, mesoscutum and scutellum, dorsal view; E, propodeum, dorsal view.

Mesosoma. Lateral part of pronotum smooth. Epomia distinct and long. Mesoscutum densely and finely punctate. Notaulus distinct, fading out near center of mesoscutum (Fig. 55D). Scutellum largely smooth, with a lateral longitudinal carina except for apex (Fig. 55D). Mesopleuron smooth except for fine punctures on areas above and below speculum. Posterior transverse carina of mesosternum narrowly absent in front of mid coxae. Metapleuron finely punctate, with a complete juxtacoxal carina. Propodeal carinae almost complete (Fig. 55E, 64G). Median section of lateromedian longitudinal carina sometimes partly indistinct (Figs 55E, 64G). Area basalis usually distinct (Figs 55E, 64G). Area superomedia longer than wide, sometimes indistinct laterally (Fig. 55E, 64G). Postero-lateral corner of area dentipara weakly projected. Propodeum finely and sparsely punctate (Fig. 55E). Length of fore wing 4.3–4.8 mm. Areolet present (Fig. 55A). Vein 2m-cu of fore wing with two bullae. Nervellus subvertical, intercepted slightly behind the middle. Hind femur 5.3–5.6 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.7–0.75: 0.5–0.55: 0.25: 0.3. Tarsal claws simple.

Metasoma. T I 3.1–3.5 times as long as maximum width, largely longitudinally striate except for smooth apex. Median dorsal carina of T I absent. Dorsolateral carina of T I complete but weak. T II almost as long as wide. T II to T VI densely and finely punctate. Ovipositor sheath 0.38–0.5 times as long as hind tibia. Ovipositor straight, with an obtuse nodus and without ventral teeth.

Coloration (Figs 55A–E). Head black. clypeus at least reddish brown apically. Scape, pedicel, base of FL I, mandible except for darkened apex, and palpi yellowish brown. Antenna brown except for yellowish brown area. Mesosoma and metasoma (excluding wings and legs) reddish brown. Dorsal surfaces of mesoscutum and propodeum more or less darkened. Scutellum reddish yellow. T I dark brown to blackish brown except for apex. T II to T VII sometimes partly darkened. Membranous part of metasomal sternites yellowish brown. Ovipositor yellowish brown. Wings hyaline. Veins yellowish brown to dark brown. Pterostigma dark brown to blackish brown except for pale base. Legs yellowish brown to reddish brown. Hind coxa, hind femur, base and apical part of hind tibia usually darker than other parts of legs.

Male (n=3). Similar to female. Antenna with 23–24 flagellomeres. FL 10 to FL 13 with a longitudinal tyloids. Body coloration slightly paler than female.

Materials examined. JAPAN: KPM-NK 82071, F, Chiba Pref., Shiroy City, Ki, 26. VII. 2006, H. Suda leg.; KPM-NK 82065, M, Kanagawa Pref., Yokosuka City,

Nagasawa, 13. VII. 2001, I. Kawashima leg.; KPM-NK 82067, M, Kanagawa Pref., Miura City, Koajiro, 9. VIII. 2001, I. Kawashima leg.; KPM-NK 82072, F, Kanagawa Pref., Hadano City, Mt. Koubou-yama, 9. X. 2006, H. Katahira leg.; KPM-NK 82074, F, ditto, 13. X. 2008, K. Watanabe leg.; KPM-NK 82073, F, Yamanashi Pref., Koushu City, Katsunuma Town, Ootaki-fudou, 4. VIII. 2007, K. Watanabe leg.; KPM-NK 82066, F, Kagoshima Pref., Mt. Kirishima, 15. VIII. 1953, H. Nagase leg.; KPM-NK 82068, M, Kagoshima Pref., Osumicho, 25. VI. 1980, H. Nagase leg.; KPM-NK 82069, F, Kagoshima Pref., Yakushima Is., Arakawa, 22. VII. – 22. VIII. 2006, T. Yamauchi leg. (MsT).

Distribution. Japan (Honshu, Shikoku, Kyushu, Yakushima Is.*, and Amamioshima Is.).

Bionomics. Unknown.

Remarks. This is the first record of this species from Yakushima Is.

Uchidella toichii sp. nov.

(New SJN: Uchida-chibi-togari-himebachi)

(Figs 56A–H, 64H, 66U)

Etymology. The specific name is from Dr. Toichi Uchida, who is a Japanese ichneumonologist.

Type series. **Holotype:** KPM-NK 82011, F, JAPAN, Gunma Pref., Katashina Vil., Marunuma, Yuzawa, 12. VII. 2014, K. Watanabe leg. **Paratypes:** JAPAN, KPM-NK 82005, 82038, 82044, 3 F, Hokkaido, Horokanai Town, Moshiri, Uryu, 11–17. VII. 2012, K. Watanabe leg. (MsT); KPM-NK 82013, F, ditto, 16. VII. 2012, M. Ito leg.; KPM-NK 82021, F, ditto, 17. VII. 2012; KPM-NK 82027, F, Hokkaido, Sapporo City, Maruyama, 29. VII. 2009, K. Watanabe leg.; KPM-NK 82007, F, Fukushima Pref., Hinoemata Vil., Hirosawa-rindo, 19. VII. 2006, T. Ishizaki leg.; KPM-NK 82008, F, Gunma Pref., Katashina Vil., Mt. Hotaka-san, 1. VIII. 2007, K. Watanabe leg.; KPM-NK 82023, F, same locality and collector of holotype, 2. VII. 2008, K. Watanabe leg.; KPM-NK 82018, M, Saitama Pref., Ootaki Vil., Mukaidani, 12. XI. 1986, K. Hara leg.; KPM-NK 82016, F, Tokyo, Oume City, Mt. Otsuka-yama, 1. VI. 2008, K. Watanabe leg.; KPM-NK 82020, F, Tokyo, Izuoshima Is., Oshima Town, Mt. Omaru, Tsubakinomori, 5–31. X. 2012, K. Tsujii leg. (MsT); KPM-NK 82029, F, Tokyo, Izuoshima Is., Oshima Town, Sashikiji, Mt. Futago, 5–31. X. 2012, K. Tsujii leg. (MsT); KPM-NK 82025, F, Kanagawa Pref., Yokosuka City, Mt. Miura-fuji to Mt. Takeyama, 13. VII. 2008, K. Watanabe leg.; KPM-NK 82037, F, Kanagawa Pref., Yamakita Town, Kurokura, Yushin, 18. V. 2016, K. Watanabe leg.; KPM-NK 82004,

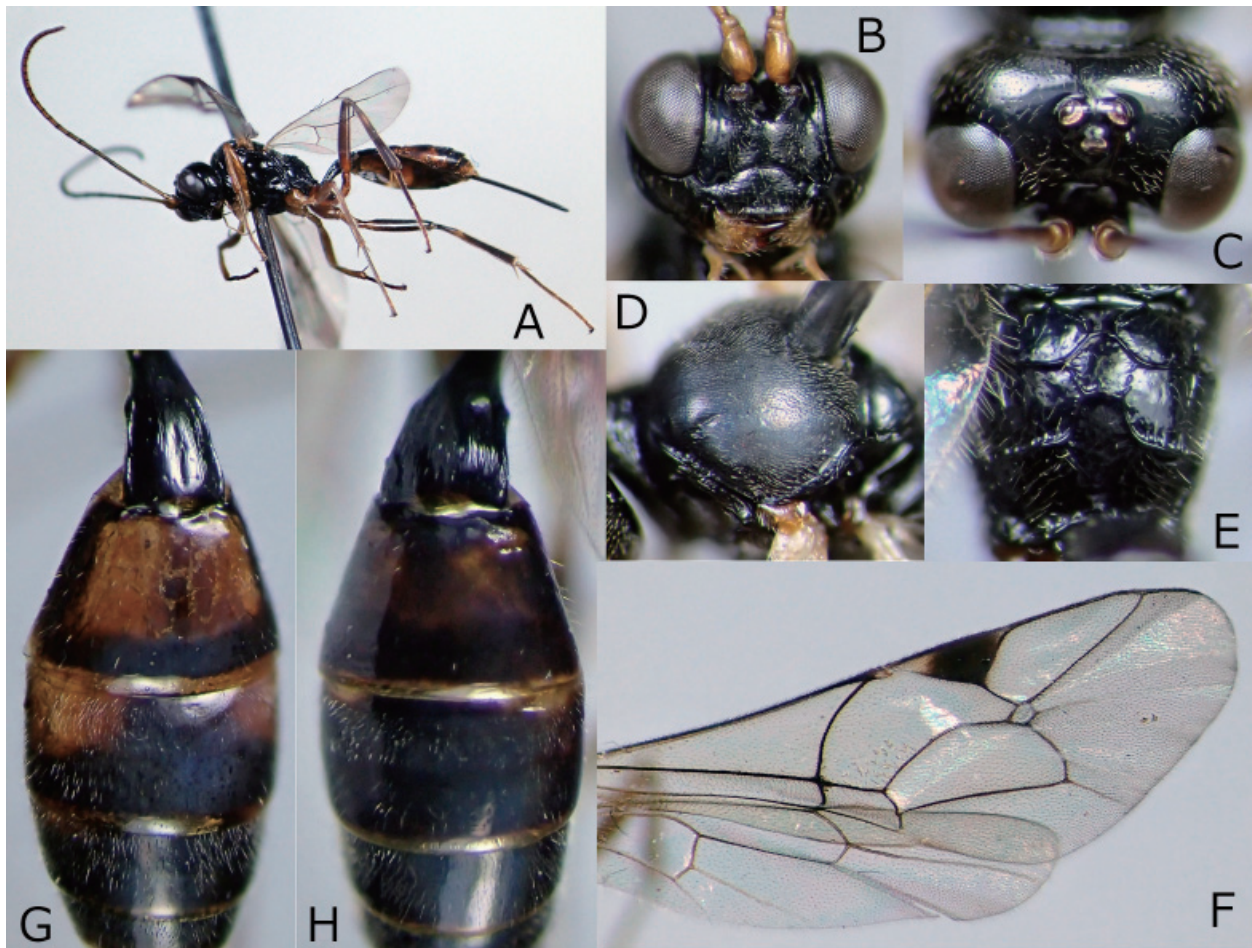


Fig. 56. *Uchidella toichii* sp. nov., KPM-NK 82011 (A–G, holotype) and 82042 (H, paratype), females — A, lateral habitus; B, head, frontal view; C, head, dorsal view; D, mesoscutum, dorso-lateral view; E, propodeum, dorsal view; F, wings; G, H, T II to T IV, dorsal view.

82014, 82019, 82024, 82026, 5 F, Niigata Pref., Sado Is., Kanaishinbo, Hakuundai to Mt. Myokenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 82039, F, ditto, 10. IX. 2010, K. Watanabe leg.; KPM-NK 82017, F, Niigata Pref., Sado Is., Umedu, Mt. Donden-san, 5. VIII. 2009, J. Imura leg.; KPM-NK 82015, 82034, 82036, 3 F, Niigata Pref., Nagaoka City, Suyoshi Town, Mt. Nokogiri-yama, 25. V. – 7. VI. 2014, S. Shimizu & R. Shimizu leg.; KPM-NK 82028, F, Toyama Pref., Nanto City, Togamura, Kamimomose, 4–11. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82033, F, ditto, 1–8. IX. 2009; KPM-NK 82030, F, ditto, 8–15. IX. 2009; KPM-NK 82032, 82040, 2 F, Toyama Pref., Toyama City, Arimine, Jyuroudani, 8–15. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82042, F, Toyama Pref., Toyama City, Arimine, Inonedani, 28. VII. – 4. VIII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 82041, F, ditto, 15–22. IX. 2009; KPM-NK 82006, 82009, 2 F, Fukui Pref., Oono City, Hatogayu, 26. IX. 1982, H. Kurokawa leg.; KPM-NK 82010, F, Fukui Pref., Oono City, Mt. Akasagi, 27. VIII. 1980, T. Murota leg.; KPM-NK 82031, F, Hyogo Pref., Kobe City, Aina, 23. VI. 2016, K. Ogura leg.; KPM-NK 82035, M, Hyogo

Pref., Kobe City, Aina, 6. VII. 2016, K. Ogura leg.; KPM-NK 82043, F, Hyogo Pref., Shinonsen Town, Kishida, 12. X. 2012, S. Fujie leg.; KPM-NK 82012, 82022, 2 F, Tottori Pref., Wakasa City, Mt. Hyonosen, Oodanganaru, 6. VIII. 2011, K. Watanabe leg.

Description. Female (n=40). Body length 5.1–7.3 (HT: 7.3) mm. Body polished, covered with silver setae.

Head. Clypeus 2.1 times as wide as maximum length, finely and sparsely punctate, its anterior margin subtruncate, without teeth. Face finely punctate (Fig. 56B), flat. MSL 0.6–0.7 (HT: 0.7) times as long as BWM. Frons finely punctate except for smooth area above antennal sockets. Gena and vertex finely punctate. OOL distinctly longer than POL and OD (Fig. 56C). POL almost as long as OD (Fig. 56C). Occipital carina complete, its lower end and joined with hypostomal carina at mandibular base. Upper tooth of mandible distinctly longer than lower tooth. Base of mandible flat. Antenna with 19–23 (HT: 23) flagellomeres. FL III 6.1 times as long as maximum depth in lateral view.

Mesosoma. Lateral part of pronotum smooth except for punctures on dorsal margin. Epomia distinct and long.

Mesoscutum densely and finely punctate. Notaulus distinct, fading out in front of center of mesoscutum. Scutellum sparsely punctate, with a lateral longitudinal carina except for apex. Mesopleuron smooth except for fine punctures on areas below speculum and anterior part. Posterior transverse carina of mesosternum absent in front of mid coxae. Metapleuron finely punctate, with a complete juxtacoxal carina. Propodeal carinae complete (Figs 56E, 64H). Median section of lateromedian longitudinal carina sometimes narrowly indistinct (Figs 56E, 64H). Area basalis distinct (Figs 56E, 64H). Area superomedia distinct, as long as wide (Figs 56E, 64H). Postero-lateral corner of area dentipara not projected. Propodeum finely and sparsely punctate. Length of fore wing 4.4–6.8 mm. Areolet present (Fig. 56F). Vein 2m-cu of fore wing with two bullae (Fig. 56F). Nervellus subvertical, intercepted slightly behind the middle (Fig. 56F). Hind femur 5.2–5.7 (HT: 5.7) times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.3: 0.4. Tarsal claws simple.

Metasoma. T I 2.1–2.5 (HT: 2.4) times as long as maximum width, largely longitudinally striate except for smooth apex. Median dorsal carina of T I indistinct. Dorsolateral carina of T I complete. T II wider than long. T II and T III largely smooth (Figs 56G, H). T IV to T VI finely and sparsely punctate. Ovipositor sheath 1.03–1.1 (HT: 1.08) times as long as hind tibia. Ovipositor straight, with a nodus and ventral teeth (Fig. 66U).

Coloration (Figs 56A–H). Body (excluding wings and legs) black. Scape, pedicel, ventral surface of FL I, mandible except for darkened apex, and palpi yellowish brown. Antenna dark brown except for yellowish brown area. Median part of Collar with yellowish brown area. Tegula dark yellowish brown to yellowish brown. Mesoscutum with blue dull reflection. Apex of T I sometimes tinged with reddish brown. Posterior margins of T II to T V tinged with reddish brown. T II usually largely reddish brown except for blackish brown posterior and lateral areas. T III usually reddish brown basally. T IV sometimes with reddish brown area near antero-lateral corner. Reddish brown areas of T II to T IV sometimes reduced. Posterior margin of T VI and T VII white. Membranous part of metasomal sternites yellowish brown. Ovipositor yellowish brown. Wings hyaline. Veins yellowish brown to dark brown. Pterostigma dark brown to blackish brown except for pale base. Legs yellowish brown to reddish brown. Hind coxa with blackish brown spots on anterior and posterior surfaces (the latter spot sometimes indistinct). Hind femur, hind tibia except for subbasal part, and hind tarsus usually darkened.

Male (n=1). Similar to female. Antenna without tyloids. Scutellum and postscutellum weakly tinged with reddish brown. Coxae, trochanters, and trochantelli entirely whitish yellow.

Distribution. Japan (Hokkaido, Honshu, Sado Is. & Izuoshima Is.).

Bionomics. Unknown.

Remarks. This species resembles *U. brevicauda* Horstmann, 1993 in the long ovipositor, but it can be distinguished by the area superomedia as long as wide (longer than wide in *U. brevicauda*).

Rothneyia genus group

(subtribe Rothneyiina sensu Townes (1970))

A single genus, *Nipponaetes* Uchida, 1933, has been recorded from Japan. In this study, I review this genus.

Genus *Nipponaetes* Uchida, 1933

Nipponaetes Uchida, 1933b: 160. Type: *Hemiteles* (*Nipponaetes*) *haeussleri* Uchida, 1933. Original designation.

Potia Seyrig, 1952: 36. Type: *Potia inelegans* Seyrig, 1952. Original designation.

Thalops Townes, 1958: 57. Type: *Thalops fessus* Townes, 1958. Original designation.

Zurquilla Gauld, 1997 in Gauld *et al.* (1997): 404. Type: *Zurquilla hansonii* Gauld, 1997. Original designation.

Two species, *N. haeussleri* (Uchida, 1933) and *N. striatus* Momoi, 1970, have been recorded from Japan. In this study, I re-describe the former with new distributional data below. Momoi (1970) used the striation of T II for the separation of both species, while this character states varied (Konishi *et al.*, 2014; in this study). Thus, taxonomic position of *N. striatus* should be revised in the future study. Japanese species can be distinguished by the following key.

Key to Japanese species of the genus *Nipponaetes* (♀)

1. Malar space with a triangular yellow marking (Fig. 57B). Hind coxa reddish brown (Fig. 57A).
..... *N. haeussleri* (Uchida, 1933)
- . Malar space without a triangular yellow marking.
Hind coxa blackish brown to black.
..... *N. striatus* Momoi, 1970

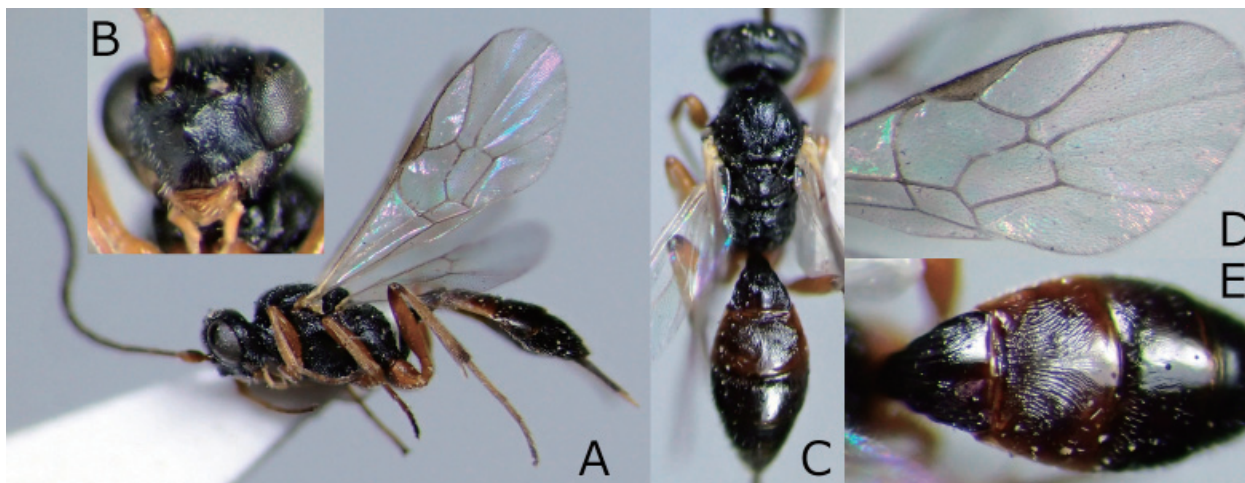


Fig. 57. *Nipponaetes haeussleri* (Uchida, 1933), KPM-NK 81832, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, fore wing; E, T I to T III, dorsal view.

***Nipponaetes haeussleri* (Uchida, 1933)**

(SJN: Kobu-togari-himebachi)

(Figs 57A–D, 62E, 65W)

Hemiteles (*Nipponaetes*) *haeussleri* Uchida, 1933b: 159.

Description. Female (n=3). Body length 3.3–3.4 mm. Body covered with silver setae.

Head. Clypeus 1.8 times as wide as maximum length, its anterior margin truncate (Fig. 57B), its median part slightly concave. Face polished, densely punctate, with a median strong convexity (Figs 57A, B, 62E). MSL 1.3 times as long as BWM. Frons, vertex, and gena matt. OOL shorter than POL. Occipital carina complete, joined with hypostomal carina distant from mandibular base. Upper tooth of mandible distinctly longer than lower tooth. Base of mandible flat. Antenna with 20 flagellomeres.

Mesosoma. Lateral part of pronotum largely granulate, with epomia. Mesoscutum granulate and polished, with distinct notaulus. Scutellum polished, coriaceous, lateral carina present except for apex. Mesopleuron polished, granulate except for smooth speculum. Metapleuron granulate, with a complete juxtacoxal carina. Propodeal carinae complete and strong (Fig. 65W). Propodeum polished and irregularly or transversally rugulose. Length of fore wing 2.9–3.3 mm. Fore wing without areolet (Fig. 57D). Nervellus subvertical, intercepted near the middle (Fig. 57A). Hind femur 5.0 times as long as maximum depth in lateral view. Hind TS I: II: III: IV: V = 2.0: 0.9: 0.6: 0.4: 0.5. Tarsal claws simple.

Metasoma. T I 1.4–1.5 times as long as maximum width, longitudinally striated medially and laterally. Median dorsal carina of T I present except for posterior part. Dorsolateral carina of T I complete. T II granulate,

sometimes covered with longitudinal striae anteriorly and oblique striae posteriorly except for smooth area on posterior part (Figs 57C, E). T III to T V sparsely punctate except for weak, oblique striae on antero-lateral area of T III. Ovipositor sheath 0.75 times as long as hind tibia. Ovipositor straight, without a nodus.

Coloration (Figs 57A–D). Body (excluding wings and legs) black to blackish brown. Ventral part of scape and pedicel and base of FL I reddish brown. Mandible yellow except for darkened apex. A small spot of malar space, palpi, and tegula yellow. T II more or less tinged with reddish brown. Membranous part of metasomal sternites and ovipositor yellowish brown. Wings hyaline. Veins and pterostigma yellowish brown to brown. Legs reddish brown to yellowish brown. Apex of hind femur and base and apical parts of hind tibia blackish brown. Apical part of T I and T III to T VII sometimes tinged with dark reddish brown.

Male. Not studied in this study.

Materials examined. JAPAN: KPM-NK 81832, F, Osaka Pref., Takatsuki City, Kanmaki, 29. IV. 2011, M. Ito leg.; KU, F (det. Momoi), Miyazaki Pref., Miyazaki, Yamashiro, 12. VII. 1964, K. Yasumatsu & T. Nishida leg. KOREA: SEHU, F (holotype), Keikido, Suigen, 30. X.

Distribution. Japan (Honshu*, Kyushu, Amamioshima Is., and Okinawajima Is.); Korea, the Philippines, and India

Bionomics. Host record: *Grapholita molesta* (Busck, 1916) (Lepidoptera, Tortricidae) (Uchida, 1933b; Japan); *Cotesia ruficrus* (Haliday, 1834) (Hymenoptera, Braconidae) (He, 1984; China); Egg sac of Araneida (Araneae) (Broad *et al.*, 2004; India). The above specimen deposited in KU is collected by sweeping in paddy field.

Remarks. This is the first record of this species from Honshu.

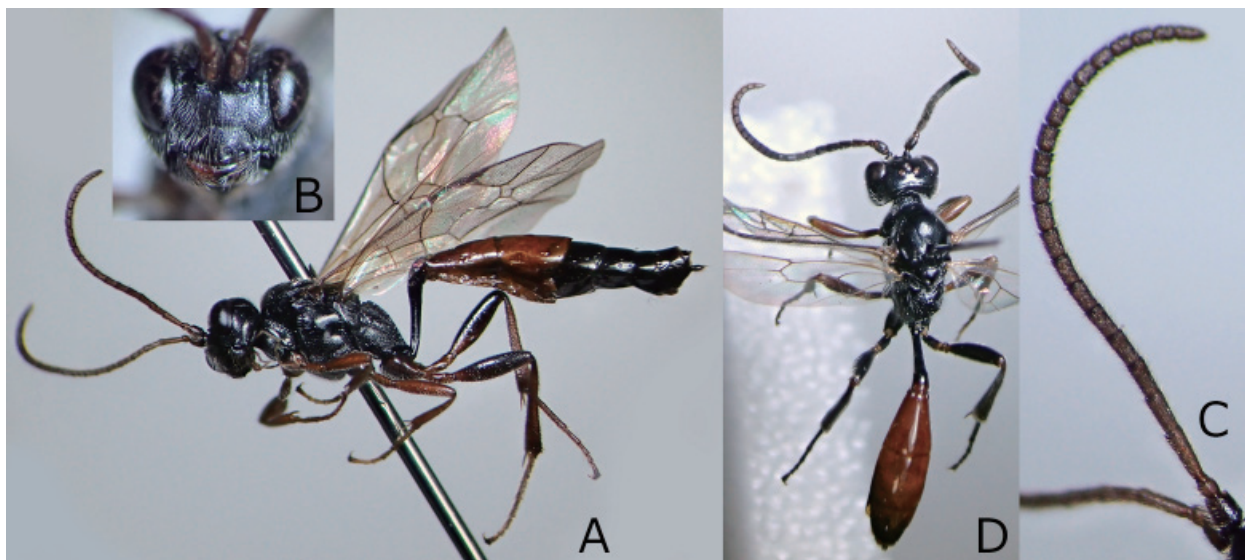


Fig. 58. *Mesoleptus laevigatus* (Gravenhorst, 1829), KPM-NK 81741 (A–C) and 81742 (D), females from Japan — A, lateral habitus; B, head, frontal view; C, antenna, lateral view; D, head, mesosoma, and metasoma, dorsal view.

***Stilpnus* genus group**

(subtribe Stilpnina sensu Townes (1970))

Three genera, *Atractodes* Gravenhorst, 1829, *Mesoleptus* Gravenhorst, 1829, and *Stilpnus* Gravenhorst, 1829, have been recorded from Japan. In this study, I review *Mesoleptus* and *Stilpnus*. The identification of genera see Townes (1970), Jussila (1979), and Jussila (1987).

Genus *Mesoleptus* Gravenhorst, 1829

Mesoleptus Gravenhorst, 1829: 3. Type: *Ichneumon laevigatus* Gravenhorst, 1820. Designated by Curtis (1837).

Exolytus Holmgren, 1859: 328. Type: *Ichneumon laevigatus* Gravenhorst, 1820. Monobasic.

Two species, *Mes. laticinctus* (Walker, 1874) and *Mes. sapporensis* (Uchida, 1930), have been recorded from Japan. I recognize a newly recorded species, *Mes. laevigatus* (Gravenhorst, 1829), and at least three undetermined species from Japan. The taxonomic treatment of the undetermined species requires the additional specimens and comparison with European species. In this study, I record *Mes. laevigatus* from Japan for the first time and some distribution records of *Mes. sapporensis* below.

***Mesoleptus laevigatus* (Gravenhorst, 1829)**

(New SJN: Futohige-haraaka-onashi-himebachi)

(Figs 58A–D)

Ichneumon laevigatus Gravenhorst, 1820: 371.

Ichneumon censor Thunberg, 1822: 269.

Ichneumon transversor Thunberg, 1822: 268.

Atractodes dionaeus Haliday, 1838: 118.

Exolytus aequalis Förster, 1876: 55.

Exolytus binoculus Förster, 1876: 113

Exolytus complacens Förster, 1876: 89

Exolytus cooperator Förster, 1876: 80.

Exolytus dichrocerus Förster, 1876: 56.

Exolytus egregius Förster, 1876: 81.

Exolytus integrellus Förster, 1876: 62.

Exolytus molestus Förster, 1876: 82.

Exolytus monticola Förster, 1876: 52.

Exolytus perditorius Förster, 1876: 95

Exolytus peregrinus Förster, 1876: 114

Exolytus pontresinensis Förster, 1876: 79.

Exolytus propugnator Förster, 1876: 111

Exolytus spoliator Förster, 1876: 66.

Exolytus taeniolatus Förster, 1876: 66.

Exolytus tenuiventris Förster, 1876: 92

Exolytus tribulator Förster, 1876: 86

Exolytus vetustus Förster, 1876: 65.

Exolytus transsylvanicus Kiss, 1924: 76.

Description. See Jussila *et al.* (2010).

Materials examined. JAPAN: KPM-NK 81743, F, Hokkaido, Okushiri Is., Tamaura, 28. VII. 2000, T. Nambu leg. (YPT); KPM-NK 81742, M, Yamanashi Pref., Hokuto City, Masutomi, Biwakubo-sawa, 28. VII. 2007, K. Watanabe leg.; KPM-NK 81741, M, Toyama Pref., Toyama City, Kamegai, 8–15. IX. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81744–81746, 1 F & 2 M,



Fig. 59. *Mesoleptus sapporensis* (Uchida, 1930), KPM-NK 81740, female from Japan — A, lateral habitus; B, head, frontal view.

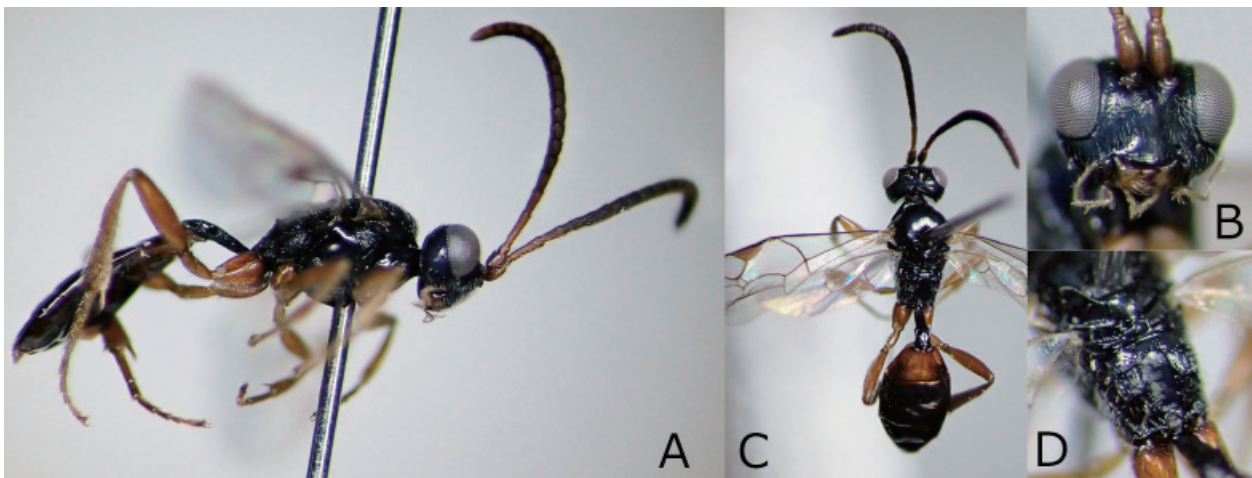


Fig. 60. *Stilpnus (Stilpnus) pavoniae* (Scopoli, 1763), KPM-NK 81749, female from Japan — A, lateral habitus; B, head, frontal view; C, head, mesosoma, and metasoma, dorsal view; D, propodeum, dorsal view.



Fig. 61. *Stilpnus (Stilpnus) subzonulus* Förster, 1876, KPM-NK 81748, female from Japan — A, lateral habitus; B, head, frontal view.

Toyama Pref., Nanto City, Togamura-kamimomose, 15–29. VII. 2009, M. Watanabe *et al.* leg. (MsT).

Distribution. Japan (Hokkaido, Okushiri Is., and Honshu); widely distributed in Palearctic region (Yu *et al.*, 2016).

Bionomics. Unknown in Japan. *Sarcophaga pseudoscopia* (Kramer, 1911) (Diptera) has been

recorded as host in Romania (Ciocchia, 1979).

Remarks. Momoi (1966b) examined the Japanese specimens of “*M. laevigatus*” and concluded all of them should be identified as *Mes. laticinctus*. He also deleted the record of this species from Japan. However, I recognized total of six specimens of this species from Japan. This is the first record of this species from Japan.

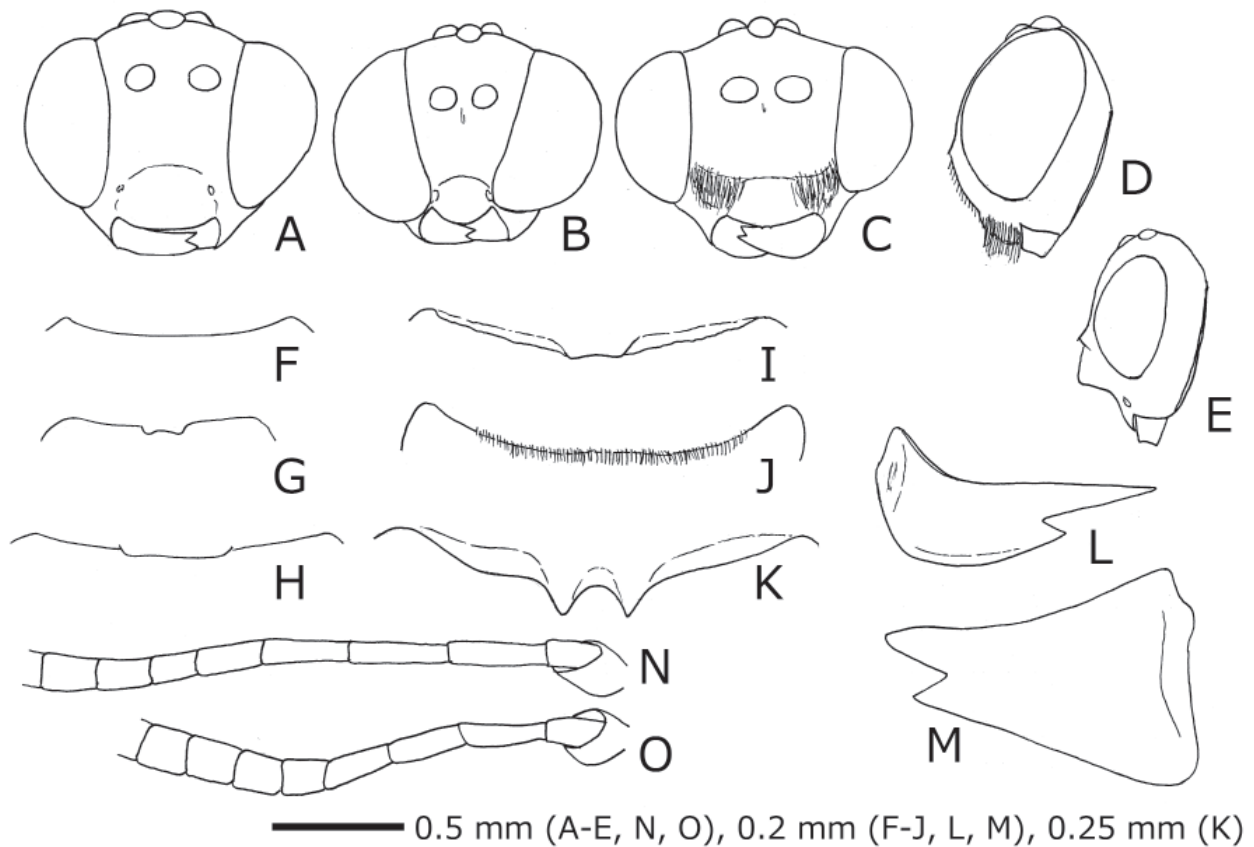


Fig. 62. *Bathythrix kuwanae* Viereck, 1912 (A, KPM-NK 81718), *Ba. margaretae* Sawoniewicz, 1980 (B, KPM-NK 55017), *Ba. thomsoni* (Kerrich, 1942) (C, KPM-NK 81675), *Diaglyptidea conformis* (Gmelin, 1790) (D, KPM-NK 81645), *Nipponaetes haeussleri* (Uchida, 1933) (E, KPM-NK 81832), *Acrolyta japonica* **sp. nov.** (F, N, KPM-NK 54996, holotype), *Acr. rufocincta* (Gravenhorst, 1829) (G, KPM-NK 81732), *Surculus japonicus* **sp. nov.** (H, KPM-NK 81861, holotype), *Isadelphus nigrus* **sp. nov.** (I, KPM-NK 82003, holotype), *Lochetica japonica* **sp. nov.** (J, KPM-NK 81989, holotype), *Megacara similis* Sheng, 1999 (K, KPM-NK 81837), *Gnotus chionops* (Gravenhorst, 1829) (L, KPM-NK 82100), *Gn. striatus* (Uchida, 1930) (M, KPM-NK 82060), and *Acr. flavicoxis* Sheng & Sun, 2014 (O, KPM-NK 81837), females from Japan — A–C, head, frontal view; D, E, head, lateral view; F–K, anterior margin of clypeus; L, M, mandible; N, O, basal part of antenna, lateral view.

***Mesoleptus sapporensis* (Uchida, 1930)**

(SJN: Sapporo-onashi-togari-himebachi)

(Figs 59A, B)

Exolytus laevigatus var. *sapporensis* Uchida, 1930: 323.

Description. See Momoi (1966b).

Materials examined. JAPAN: SEHU, F (lectotype), Sapporo; KPM-NK 81737, 81738, 2 M, Hokkaido, Horokanai Town, Moshiri, Uryu, 17. VII. 2012, K. Watanabe leg.; KPM-NK 81735, M, Tokyo, Akiruno City, Ninomiya, Tamagawa-riverside, 3. V. 2010, K. Watanabe leg.; KPM-NK 81736, M, Kanagawa Pref., Nakai Town, Zoushiki, 19. V. 2017, K. Watanabe leg.; KPM-NK 81739, M, Niigata Pref., Sado Is., Hakuundai to Mt. Myoukenzan, 4. VIII. 2009, K. Watanabe leg.; KPM-NK 81740, M, ditto, 10. IX. 2009, K. Watanabe leg.; KPM-NK 81733, M, Toyama Pref., Toyama City, Kamegai, 8–15. IX. 2009, M.

Watanabe *et al.* leg. (MsT); KPM-NK 81734, F, Toyama Pref., Toyama City, Arimine, Inonedani, 7–14. VII. 2009, M. Watanabe *et al.* leg. (MsT); KPM-NK 81723, M, Fukui Pref., Arashiguchi-Oono, 24. VI. 1980, H. Kurokawa leg.

Distribution. Japan (Hokkaido, Honshu, and Shikoku).

Bionomics. Unknown.

Genus *Stilpnus* Gravenhorst, 1829

Subgenus *Stilpnus* Gravenhorst, 1829

Stilpnus Gravenhorst, 1829: 664. Type: *Ichneumon gagates* Gravenhorst, 1807. Designated by Curtis (1832).

Three species, *Stil. japonicus* Jussila, 1988, *Stil. pavoniae* (Scopoli, 1763), and *Stil. subzonulus* Förster, 1876, have been recorded. I recognize two undetermined species from Japan. The taxonomic treatment of these species requires the additional specimens. In this study, I

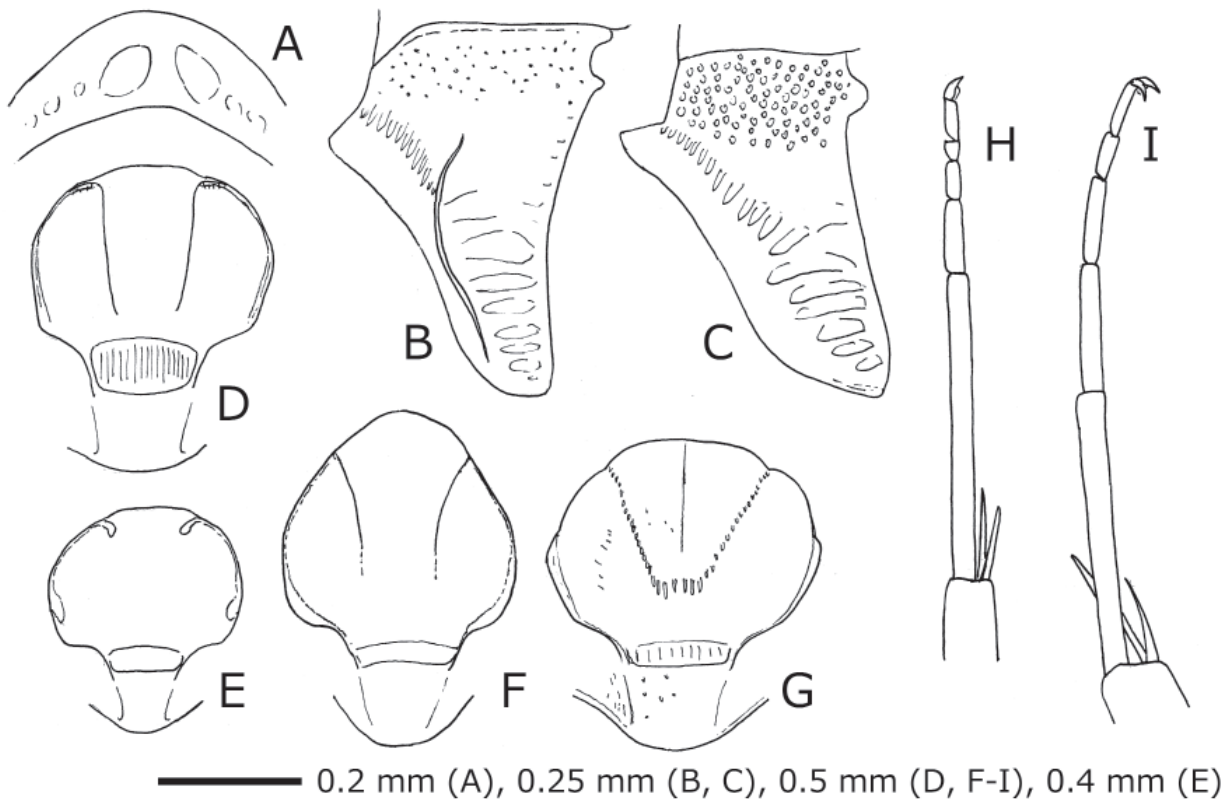


Fig. 63. *Acrolyta japonica* sp. nov. (A, KPM-NK 54996, holotype), *Dichrogaster liostylus* (Thomson, 1885) (B, KPM-NK 55074), *Dic. nitida* Sheng & Sun, 2014 (C, KPM-NK 81908), *Bathythrix kuwanai* Viereck, 1912 (D, KPM-NK 81718), *Retalia japonica* Kusigemati, 1985 (E, KPM-NK 81676), *Surculus japonicus* sp. nov. (F, KPM-NK 81861, holotype), *Bentyra ryukyana* sp. nov. (G, KPM-NK 81887, holotype), *Hemiteles japonicus* sp. nov. (H, KPM-NK 55021, holotype), and *H. maculipterus* sp. nov. (I, KPM-NK 55025, holotype), females from Japan — A, median part of collar, dorsal view; B, C, lateral part of pronotum; D–G, mesoscutum and scutellum, dorsal view; H, I, hind tarsus, lateral view.

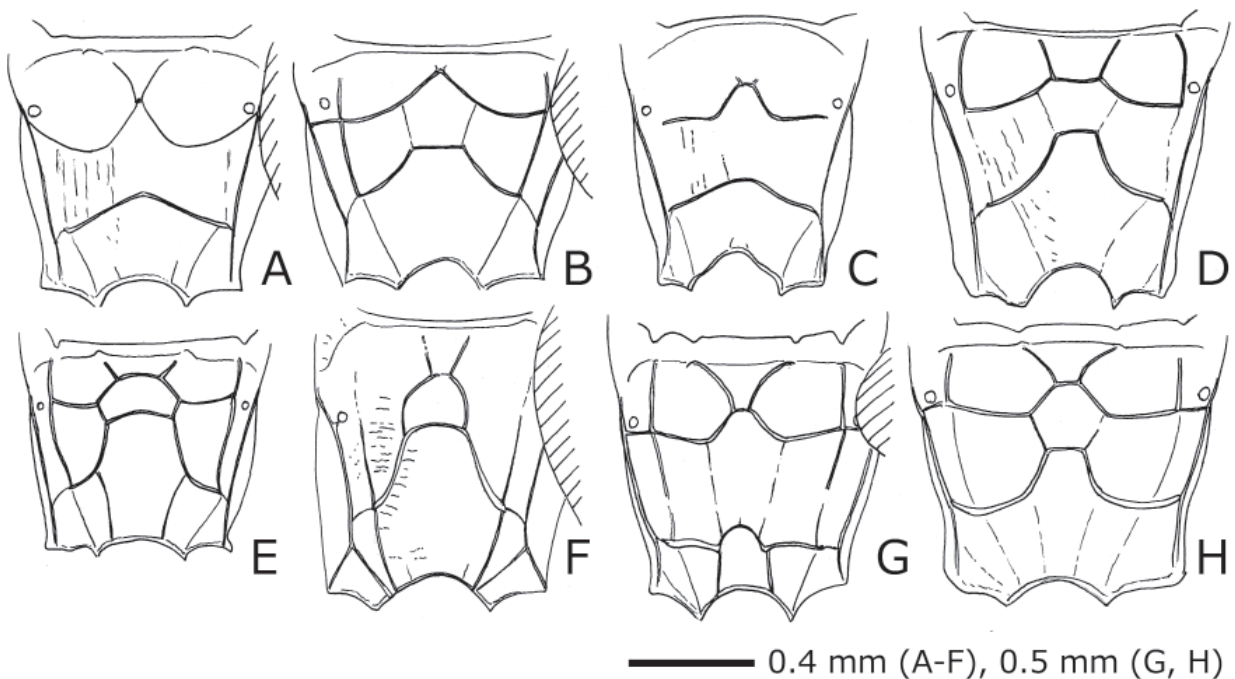


Fig. 64. *Surculus japonicus* sp. nov. (A, KPM-NK 81861, holotype), *Paraphylax elegans* sp. nov. (B, KPM-NK 55078, holotype), *Hemiteles japonicus* sp. nov. (C, KPM-NK 55021, holotype), *H. maculipterus* sp. nov. (D, KPM-NK 55026, paratype), *Charitopes gastricus* (Holmgren, 1868) (E, KPM-NK 81963), *Tropistes shimizui* sp. nov. (F, KPM-NK 81833, holotype), *Uchidella okamotoi* (Uchida, 1936) (G, KPM-NK 82073), and *Uchidella toichii* sp. nov. (H, KPM-NK 82011, holotype), females from Japan — A–H, propodeum, dorsal view.

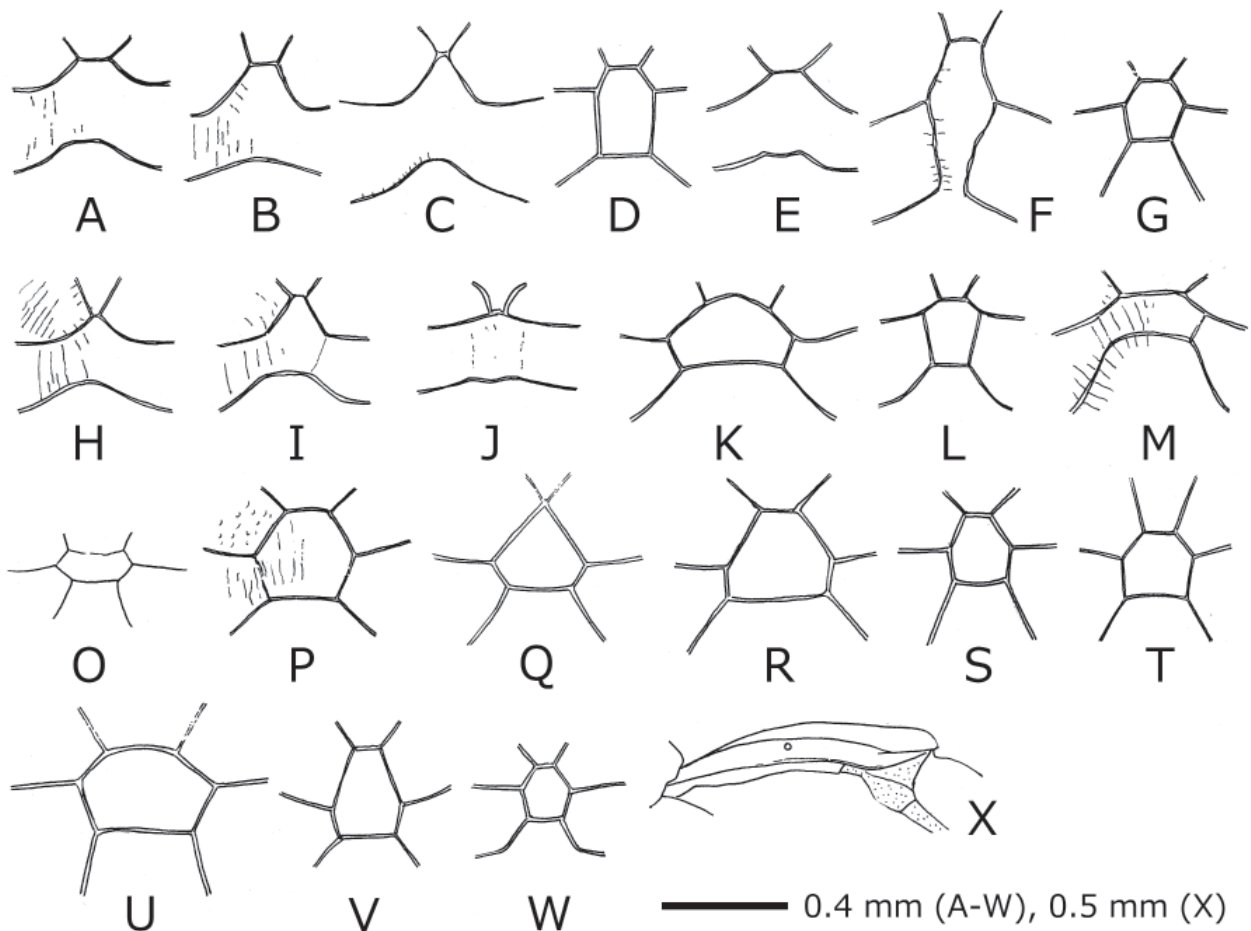


Fig. 65. *Acrolyta japonica* sp. nov. (A, KPM-NK 54996, holotype), *Diaglyptidea conformis* (Gmelin, 1790) (B, KPM-NK 81650), *Micraris ryukyuensis* sp. nov. (C, KPM-NK 81873, holotype), *Bathythrix kuwanai* Viereck, 1912 (D, KPM-NK 81718), *Bentyra ryukyuana* sp. nov. (E, KPM-NK 81887, holotype), *Chirotica matsukemushii* (Matsumura, 1926) (F, KPM-NK 81906), *Paraphylax politus* sp. nov. (G, KPM-NK 55079, holotype), *Pa. transstriatus* sp. nov. (H, KPM-NK 55080, holotype), *Pa. yakushimensis* sp. nov. (I, KPM-NK 55081, holotype), *Pa. yambarensis* sp. nov. (J, KPM-NK 55085, holotype), *Ethelurgus sodalis kumatai* Kusigemati, 1983 (K, KPM-NK 81938), *Aclastus etorofuensis* (Uchida, 1936) (L, KPM-NK 81976), *Hemiteles kuro* sp. nov. (M, KPM-NK 55024, holotype), *H. yamatonis* sp. nov. (O, KPM-NK 55033, paratype), *Isadelphus nigrus* sp. nov. (P, KPM-NK 82003, holotype), *Lochetica japonica* sp. nov. (Q, KPM-NK 81989, holotype), *Mastrus molestae* (Uchida, 1933) (R, KPM-NK 81987), *Ma. takadai* Momoi, 1970 (S, KPM-NK 81979), *Gnotus chionops* (Gravenhorst, 1829) (T, KPM-NK 82104), *Gn. striatus* (Uchida, 1930) (U, KPM-NK 82061), *Orthizema semanotae* Sheng & Sun, 2014 (V, KPM-NK 82047), *Nipponaetes haeussleri* (Uchida, 1933) (W, KPM-NK 81832), and *Surculus japonicus* sp. nov. (X, KPM-NK 81861, holotype), females from Japan — A-W, carinae around area superomedia of propodeum, dorsal view; X, T I, lateral view.

record some distribution records of *Stil. pavoniae* and *Stil. subzonulus* below.

***Stilpnus (Stilpnus) pavoniae* (Scopoli, 1763)**

(SJN: Hae-togari-himebachi)

(Figs 60A–D)

Ichneumon pavoniae Scopoli, 1763: 762.

Stilpnus agilis Förster, 1876: 39.

Stilpnus ambulatorius Förster, 1876: 40.

Stilpnus arridens Förster, 1876: 34.

Stilpnus conformatus Förster, 1876: 39.

Stilpnus declinis Förster, 1876: 38.

Stilpnus morionellus Förster, 1876: 40.

Stilpnus neglectus Förster, 1876: 41.

Stilpnus nigriceoxis Förster, 1876: 41.

Stilpnus politus Förster, 1876: 36.

Stilpnus providus Förster, 1876: 39.

Stilpnus retritrus Förster, 1876: 35.

Stilpnus subtilis Förster, 1876: 40.

Stilpnus tersus Förster, 1876: 36.

Stilpnus trivialis Förster, 1876: 36.

Stilpnus unctus Förster, 1876: 41.

Stilpnus xanthopus Förster, 1876: 39.

Stilpnus angustatus Thomson, 1884: 1027.

Description. See Jussila (1987, 1988).

Materials examined. JAPAN: KPM-NK 81750, M,

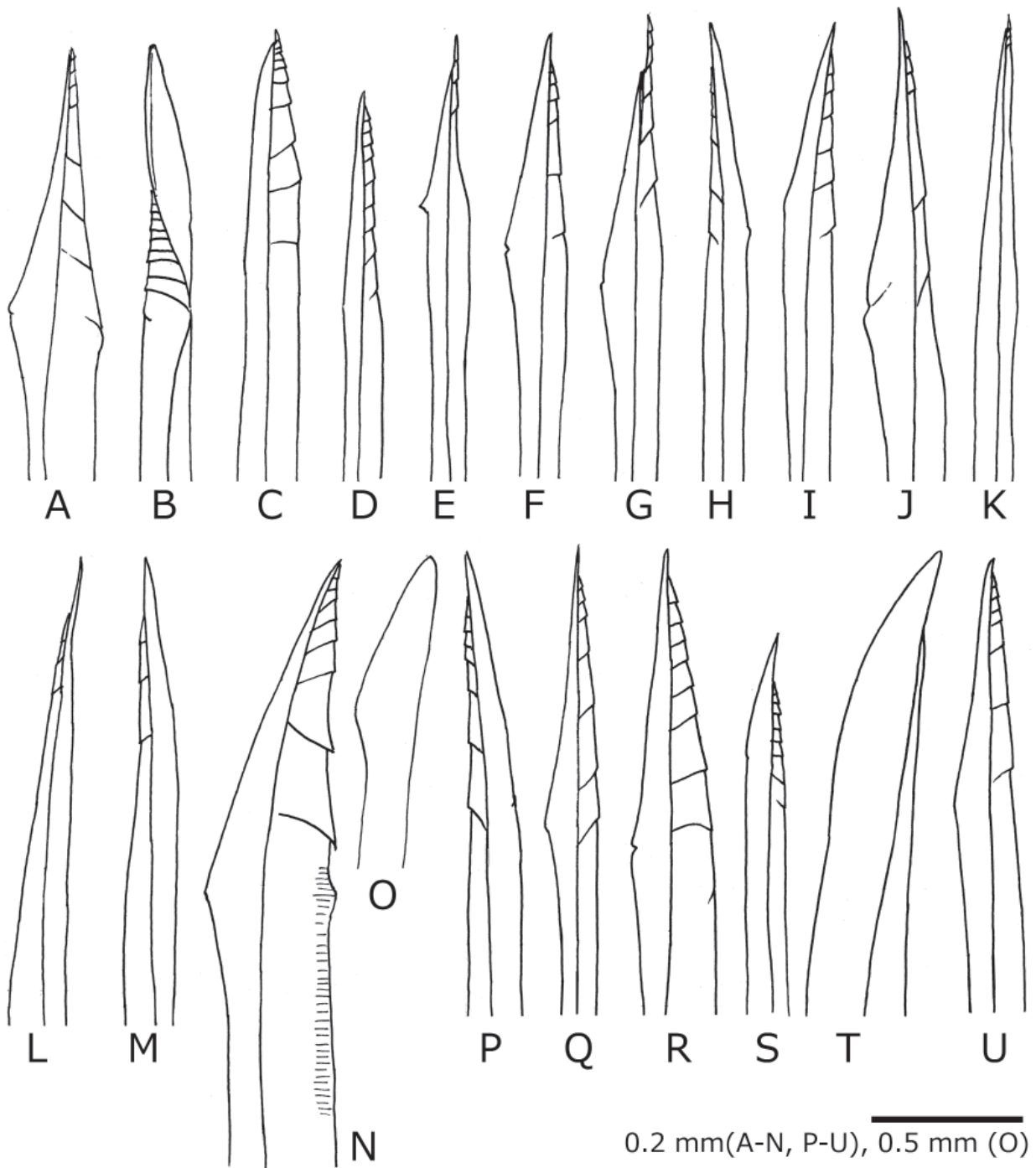


Fig. 66. *Acrolyta japonica* **sp. nov.** (A, KPM-NK 54996, holotype), *Micraris ryukyuensis* **sp. nov.** (B, KPM-NK 81873, holotype), *Surculus japonicus* **sp. nov.** (C, KPM-NK 81861, holotype), *Bentyra ryukyuana* **sp. nov.** (D, KPM-NK 81887, holotype), *Paraphylax elegans* **sp. nov.** (E, KPM-NK 55078, holotype), *Pa. politus* **sp. nov.** (F, KPM-NK 55079, holotype), *Pa. transstriatus* **sp. nov.** (G, KPM-NK 55080, holotype), *Pa. yakushimensis* **sp. nov.** (H, KPM-NK 55081, holotype), *Pa. yamabensis* **sp. nov.** (I, KPM-NK 55085, holotype), *Hemiteles japonicus* **sp. nov.** (J, KPM-NK 55021, holotype), *H. kuro* **sp. nov.** (K, KPM-NK 55024, holotype), *H. maculipterus* **sp. nov.** (L, KPM-NK 55025, holotype), *H. yamatonis* **sp. nov.** (M, KPM-NK 55032, holotype), *Brachypimpla latipetiolator* (Uchida, 1935) (N, O, KPM-NK 81973), *Isadelphus nigrus* **sp. nov.** (P, KPM-NK 82003, holotype), *Lochetica japonica* **sp. nov.** (Q, KPM-NK 81989, holotype), *Mastrus molestae* (Uchida, 1933) (R, KPM-NK 81987), *Megacara similis* Sheng, 1999 (S, KPM-NK 81835), *Tropistes shimizui* **sp. nov.** (T, KPM-NK 81833, holotype), and *Uchidella toichii* **sp. nov.** (U, KPM-NK 82011, holotype), females from Japan — A-N, P-U, apical part of ovipositor, lateral view (A, C-G, I-K, N, Q-U, left side; B, H, L, M, P, right side); O, apex of ovipositor sheath, lateral view.

Tokyo, Izuoshima, Motomachi, Ohmaruyama, 6. V. 2012, K. Tsujii leg.; KPM-NK 81749, M, Kanagawa Pref., Atsugi City, Nakaogino, 20. IV. 2008, H. Katahira leg. GERMANY: ZSM, F (det. Jussila), “D, Ostfriesische Inseln, Mellum - Memmert”, 16–23. IV. 1985, V. Haeseler leg.

Distribution. Japan (Hokkaido, Honshu, and Izuoshima Is.*); Taiwan and widely distributed in Holarctic region.

Bionomics. Unknown in Japan. *Saturnia pavonia* (Linnaeus, 1758) (Lepidoptera, Saturniidae) has been recorded from Europe (Scopoli, 1763). This host record is doubtful because the main host of *Stilpnus* is Diptera.

Remarks. This is the first record of this species from Izuoshima Island.

Stilpnus (Stilpnus) subzonulus Förster, 1876
(SJN: Chibi-hae-togari-himebachi)
(Figs 61A, B)

Stilpnus subzonulus Förster, 1876: 18.

Stilpnus canaliculatus Förster, 1876: 36.

Stilpnus concinnus Förster, 1876: 34.

Stilpnus diversus Förster, 1876: 39.

Stilpnus latens Förster, 1876: 35.

Stilpnus placitus Förster, 1876: 35.

Stilpnus tenuipes Thomson, 1884: 1028.

Description. See Jussila (1987, 1988).

Materials examined. JAPAN: KPM-NK 81748, M, Kanagawa Pref., Odawara City, Kuno, 31. V. 2014, K. Watanabe leg. GERMANY: ZSM, F (det. Jussila), Lübke Koog, Niebüll, A.u. gelb 18. IX. 1958.

Distribution. Japan (Honshu); Taiwan, widely distributed in Palearctic region.

Bionomics. Unknown.

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摘 要

Watanabe, K., 2021. Taxonomic and zoogeographic study of the Japanese Phygadeuontinae (Hymenoptera, Ichneumonidae), with descriptions of 17 new species. *Bull. Kanagawa Pref. Mus. (Nat. Sci)*, (50): 55–136. [渡辺恭平, 2021. 日本産チビトガリヒメバチ亜科 (ハチ目、ヒメバチ科) の 17 新種の記載を伴う分類学および動物地理学的研究. 神奈川県立博物館研究報告 (自然科学), (50): 55–136.]

日本産のチビトガリヒメバチ亜科の 28 属 61 種について、分類学および動物地理学的研究をおこなった。7 日本新産属、*Diaglyptidea* Viereck, 1913、*Micraris* Townes, 1970、*Surculus* Townes, 1970、*Bentyra* Cameron, 1905、*Isadelphus* Förster, 1869、*Megacara* Townes, 1970、*Tropistes* Gravenhorst, 1829 を記録した。これらのうち、*Micraris* と *Surculus* は旧北区初記録でもある。17 新種、タテスジマメトガリヒメバチ *Acrolyta japonica* sp. nov.、リュウキュウマメトガリヒメバチ *Micraris ryukyuensis* sp. nov.、ホソミマメトガリヒメバチ *Surculus japonicus* sp. nov.、キマダラマメトガリヒメバチ *Bentyra ryukyuana* sp. nov.、イシガキスジトガリヒメバチ *Paraphylax elegans* sp. nov.、イズミノガトガリヒメバチ *Pa. politus* sp. nov.、ヨコスジトガリヒメバチ *Pa. transstriatus* sp. nov.、ヤクシマスジトガリヒメバチ *Pa. yakushimensis* sp. nov.、オキナワスジトガリヒメバチ *Pa. yamabensis* sp. nov.、ニホンマメトガリヒメバチ *Hemiteles japonicus* sp. nov.、スミイロマメトガリヒメバチ *H. kuro* sp. nov.、ハネモンマメトガリヒメバチ *H. maculipterus* sp. nov.、ハラアカマメトガリヒメバチ *H. yamatonis* sp. nov.、オマガリチビトガリヒメバチ *Isadelphus nigrus* sp. nov.、サメハダチビトガリヒメバチ *Lochetica japonica* sp. nov.、タチチビトガリヒメバチ *Tropistes shimizui* sp. nov.、ウチダチビトガリヒメバチ *Uchidella toichii* sp. nov. を記載し、学名と標準和名を命名した。9 日本新参種、ヒゲブトマメトガリヒメバチ *A. flavicoxis* Sheng & Sun, 2014、キムラマメトガリヒメバチ *A. rufocincta* (Gravenhorst, 1829)、フサヒゲマメトガリヒメバチ *Diaglyptidea conformis* (Gmelin, 1790)、ヨリメマメトガリヒメバチ *Bathythrix margaretae* Sawoniewicz, 1980、トムソンマメトガリヒメバチ *Ba. thomsoni* (Kerrich, 1942)、シェンクサカゲロウトガリヒメバチ *Dichrogaster nitida* Sheng & Sun, 2014、オオズチビトガリヒメバチ *Megacara similis* Sheng, 1999、カミキリチビトガリヒメバチ *Orthizema semanotae* Sheng & Sun, 2014、フトヒゲハラアカオナシヒメバチ *Mesoleptus laevigatus* (Gravenhorst, 1829) を記録し、標準和名を命名した。イネマメトガリヒメバチ *Bathythrix narangae* Uchida, 1930 をクワナマメトガリヒメバチ *Ba. kuwanae* Viereck, 1912 の新参異名とした。ツヤアブトガリヒメバチ *Ethelurgus politus* Townes, 1983 をホソヒラタアブトガリヒメバチ *E. episyrrhicola* Kusigemati, 1983 の新参異名とした。アブトガリヒメバチ *Ethelurgus sodalis fuscipes* Townes, 1983 をケヒラタアブトガリヒメバチ *E. kumatai* Kusigemati, 1983 の新参異名とし、さらにタイリクアブトガリヒメバチ *E. sodalis* (Taschenberg, 1865) の亜種とした。国内における新分布記録と、*Acrolyta*、*Bathythrix*、*Paraphylax*、*Ethelurgus*、*Rhembobius*、*Aclastus*、*Hemiteles*、*Isadelphus*、*Lochetica*、*Gnotus*、*Uchidella* の日本産種への検索表を提供した。

原著論文

神奈川県内の絶滅危惧種キバネツノトンボの現状

Current Situation of Endangered Species *Libelloides ramburi* (M'Lachlan, 1875) in Kanagawa Prefecture苧部治紀¹⁾・加賀玲子¹⁾Haruki KARUBE¹⁾ & Reiko KAGA¹⁾

Abstract. *Libelloides ramburi* (M'Lachlan, 1875) is a large insect of the order Neuroptera that inhabits good grasslands of Japan, and is a rapidly decreasing species in various places. It has been previously recorded from 12 points in Kanagawa Prefecture, but only a few records are known in recent years. Therefore, it has been regarded as an endangered species on the Kanagawa Prefecture Red List. Since confirming this species in 2017, the authors have intensively investigated distribution of this species in the prefecture. As a result, we found the species at 20 localities, mainly in the former Fujino Town area of Midori Ward, Sagami City in the northern part of the prefecture. Even in a similar grassland environment, the species could not be found and its distribution was limited. The environment in which this species is distributed is grassland where artificially mowing has been continued. Such distribution environment is diverse, but its habitat stability is fragile. Although the number of localities has increased, it has become clear that the distribution is localized and threatened with extinction.

Key words: Dormant status, Meadow, Population dynamics, Red list

はじめに

キバネツノトンボ *Libelloides ramburi* (M'Lachlan, 1875) (図 1、2) は、良好な草地環境に生息する種とされ、国内では本州、九州に分布するが (関本・吉澤, 2016)、その分布は局所的である。近年多くの地域で減少が顕著になっており、神奈川県に隣接する東京都では、絶滅判定される (東京都環境局, 2013) など、現在 15 都道府県で地域のレッドリストに掲載されている。神奈川県でも、最近の記録がほとんど無いことから、2006 年発行の神奈川県レッドデータ生物調査報告書 2006 では絶滅危惧 I 類に指定されている (脇, 2006)。

筆者らは、神奈川県における近年の本種の情報

がほとんどないことから現状に着目し、調査に着手した結果、2017 年に数年前から探索していた本種を新産地で発見、現存が確認できた (苧部, 2017)。そこから本種のさらなる生息実態を把握することを目的に調査に着手し、多くの分布上の新知見を得たので報告する。

方 法

神奈川県内での分布調査

本種の探索は、調査初期にはさまざまな環境の草地を網羅するように調査を行い、その後、県内での生息環境が把握できてからは、生息が見込める草地をあらかじめ Google マップ (<http://google.com.co/maps/>) や YAHOO! 地図 (<https://map.yahoo.co.jp/>) の衛星画像で絞り込み、その後に現地踏査を行う形で、調査を効率的に実施した。調査はともに本種の発生最盛期とされる 5 月に実施した。

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Fig. 1. *Libelloides ramburi*, male.
図 1. キバネツノトンボ オス.



Fig. 2. *Libelloides ramburi*, female.
図 2. キバネツノトンボ メス.

神奈川県内の本種の過去の記録

神奈川県内でも、本目（アミメカゲロウ目）の研究者や愛好者が少ないこともあって、記録は表 1 のように少数しか残されていない。古い記録が多く、詳細が確認できないものがあるが、県

内の分布は、県西部の小田原市、箱根町仙石原と、県北部の旧藤野町、旧相模湖町エリアに二分され、12 地点の記録があった。

結 果

本種は希少種かつ美麗種で、分布も局限され、標本販売もされる種であることから、保全上の観点から字以上の詳細な産地の記述は避けた。産地が点在する地域では、それぞれ A, B, のように記述した。

1 ♂ 1 ♀, 11. V . 2018, 相模原市緑区奥牧野, 荇部・加賀採集 (KPM-NK 82570–82571); 2 ♂ 1 ♀, 11. V . 2018, 相模原市緑区青山, 荇部・加賀採集 (KPM-NK 82572–82574); 1 ♂ 1 ♀, 16. V . 2018, 相模原市緑区牧野 A, 荇部採集 (KPM-NK 82575–82576); 1 ♂ 1 ♀, 16. V . 2018, 相模原市緑区牧野 B, 荇部採集 (KPM-NK 82577–82578); 2 ♂, 16. V . 2018, 相模原市緑区牧野 C, 荇部採集 (KPM-NK 82579–82580); 1 ♂, 16. V . 2018, 相模原市緑区牧野 C, 荇部採集 (KPM-NK 82581) 1 ♀, 16. V . 2018, 相模原市緑区青野原, 荇部採集 (KPM-NK 82506); 1 ♂, 16. V . 2018, 相模原市緑区牧野 D, 加賀採集 (KPM-NK 82507); 4 ♂ 1 ♀, 16. V . 2018, 相模原市緑区牧野 E, 荇部・加賀採集 (KPM-NK 82508–82512); 1 ♂, 9. V . 2019, 相模原市緑区牧野 D, 加賀採集 (KPM-NK 82513); 1 ♂, 19. V . 2019, 相模原市緑区牧野 D, 荇部採集 (KPM-NK 82514); 2 ♂, 19. V . 2019, 相模原市緑区牧野 B, 荇部・加賀採集 (KPM-NK 82515–82516); 1 ♂, 24. V . 2019, 相模原市緑区寸沢嵐, 荇部採集 (KPM-NK 82517); 2 ♂, 23. V . 2019, 相模原市緑区名倉, 荇部採集 (KPM-NK 82518–82519); 1 ♂ 2

Table 1. Past records of *Libellodes ramburi*, in Kanagawa Prefecture

表 1. 神奈川県内のキバネツノトンボの過去の記録

採集場所	日付	採集個体数	採集・目撃者	備 考
小田原市城山	1951年			*標本は紛失し詳細データ不詳(牧林, 1951)
藤野町	7. VI. 1978	1 ex.	原 聖樹	佐藤 (1981)
箱根仙石原				*標本は紛失し詳細データ不詳(平野, 1984)
藤野町奥牧野休耕畑	7. VI. 1978	1 ex.	原 聖樹	*佐藤 (1981) の記録の補遺(原, 1986)
津久井町原替戸	27. V . 1984	3 exs.	原 聖樹	雑木林に囲まれた窪地状の未成のクリ・ウメ畑で確認(原, 1986)
相模湖町道志	10. VI. 1984	1 ex.	原 聖樹	道志川沿岸の水田地帯の荒地(原, 1986)
津久井町青野原	18. VI. 1986	1 ♂	神部昭夫	県営青年の家の道志川右岸河川敷、ススキ草地で確認(神部, 1986)
津久井郡藤野町名倉芝田	28. V . 1990	1 ex. 目撃	岸 一弘	脇 (1995)
相模原市藤野町	31. V . 2006		脇 一郎撮影	*筆者・撮影者とも逝去のため産地詳細不明。神奈川県報表紙写真(高桑, 2008)
相模原市藤野町奥牧野	8. VI. 2003	2 exs. 他数頭目撃	河合秀樹	河合 (2009)
相模原市緑区青根道志川河川敷	2. V . 2017	1 ♂	荇部治紀	荇部 (2017)
相模原市緑区牧野	8. V . 2017	3 ♂	荇部治紀	荇部 (2017)
相模原市緑区名倉A地点	1. V . 2018	2 ♀, 多数目撃	小池 徹	岸・小池 (2019)
同地	6. V . 2018	2 ♂ 1 ♀, 多数目撃	岸・小池	岸・小池 (2019)
同地	16. V . 2019	少数目撃	小池 徹	岸・小池 (2019)
相模原市緑区名倉B地点	1. V . 2018	多数目撃	小池 徹	岸・小池 (2019)
相模原市緑区名倉C地点	6. V . 2018	1 ♂ 1 ♀ 3 exs. 目撃	岸 一弘	岸・小池 (2019)

♀, 23. V. 2019, 相模原市緑区日連, 苧部・加賀採集 (KPM-NK 82521–82523); 1 ♂, 27. V. 2019, 相模原市緑区名倉, 苧部採集 (KPM-NK 82520); 1 ♀, 8. V. 2020, 相模原市緑区小渕, 苧部採集 (KPM-NK 82527); 3 ♂, 8. V. 2020, 相模原市緑区青山 A, 苧部・加賀採集 (KPM-NK 82524–82526); 1 ♂ 1 ♀, 8. V. 2020, 相模原市緑区青山 B, 苧部・加賀採集 (KPM-NK 82528–82529); 1 ♂, 11. V. 2020, 相模原市緑区沢井, 苧部採集 (KPM-NK 82530); 2 ♂, 11. V. 2020, 相模原市緑区佐野川 A, 苧部・加賀採集 (KPM-NK 82531–82532); 2 ♀, 11. V. 2020, 相模原市緑区鳥屋渡戸, 苧部・加賀採集 (KPM-NK 82533–82534); 2 ♂ 1 ♀, 11. V. 2020, 相模原市緑区日連, 苧部・加賀採集 (KPM-NK 82535–82537); 3 ♂ 2 ♀, 11. V. 2020, 相模原市緑区佐野川 B, 苧部・加賀採集 (KPM-NK 82538–82541); 4 ♂ 1 ex., 11. V. 2020, 相模原市緑区牧野 F, 苧部・加賀採集 (KPM-NK 82542–82543, 82468–82469) * (内 1 ex. はクモによって捕食された腹部を失った個体) (KPM-NK 82470); 1 ♂ 1 ♀, 17. V. 2020, 相模原市緑区牧野 E, 苧部・加賀採集 (KPM-NK 82471–82472); 2 ♂, 17. V. 2020, 相模原市緑区牧野 E, 苧部・加賀採集 (KPM-NK 82473) * (内 1 ♂ はクモによって捕食された個体) (KPM-NK 82474); 1 ♂ 1 ♀, 29. V. 2020, 相模原市緑区牧野 E, 苧部・加賀採集 (KPM-NK 82575–82576).

筆者らの調査では、上記の確認地域以外にも同時期に生息環境が類似している草地の調査を県内各所で継続しているが、これまでのところ確認できた地点はない。

出現時期の変遷

2000 年代初頭までの過去の記録と近年の記録を比較すると、出現時期に関する過去の記録は、

最も早いもので 5 月 27 日、最も遅いもので 6 月 10 日となっており、5 月末から 6 月中旬ころが出現時期であった可能性が高い。一方 2010 年代後半以降の近年の記録は、たとえば、2020 年の記録では、5 月 1 日にはすでに多数が確認されており、多く産地では 5 月下旬には没姿している。この 20 年間で出現時期がヶ月近く早まっている。

生息環境の類型

上記の調査結果から、神奈川県における本種の生息環境としては、以下であった。

- ・河川敷とその隣接地：ススキなどの背丈の高い草地とチガヤ類などの草丈の低い草地が混生する環境（図 3）。
- ・畑に隣接した放棄耕作地：畑に隣接するためか、定期的に草刈が実施される草地（図 4）。
- ・クリ畑の中の草地：クリ畑は、クリの収穫のために、林床を一定頻度で草刈を実施する。また、クリの植栽された周辺の草地も同様に草刈がなされている（図 5）。
- ・丘陵の住宅開発が中止されて残された草地：多くは放置されて、本種の生息にも不適になるが、住宅に隣接した草地は定期的な草刈が行われる場所がある（図 6）。
- ・ワラビ畑：ワラビの育成のために定期的な草刈が実施される（図 7）。
- ・土砂埋め立て後の草地：貧栄養な立地のためか、アカマツを交えた乾燥草地が成立するが、遷移のスピードが遅く、草刈は実施されていなくても草丈が多様な空間が維持される（図 8）。

本種の現存生息環境は、定期的な環境攪乱（人為の草刈が主となる）が生じる立地であるという共通点がある。この中で河川敷は原生的な生息環



Fig. 3. Habitat of riverbed. Disturbance due to flooding is important for maintaining the grassland.

図 3. 河川敷の生息環境。前年の大規模出水で草地は荒廃したが、このような攪乱は草地環境の維持に重要。



Fig. 4. Habitat of field slope. This environment has been kept by the frequent mowing.

図 4. 畑法面の生息環境。頻繁に草刈がなされる。



Fig. 5. Habitat of chestnut field. This environment has been kept regularly mowing including on the forest floor, to grow chestnuts.

図 5. クリ畑の生息環境. クリの育成のため、林床を含めて定期的に草刈がなされる.



Fig. 6. Habitat of abandoned housing development. This environment has been kept regularly mowing because it is adjacent to a residential area.

図 6. 住宅開発放棄地の生息環境. 宅地に隣接するため定期的に草刈がなされる.

境に近いものといえ、そこでの植生遷移は徐々に進行するが、不定期の大規模出水で環境が更新される。他の草地環境は多様な立地であるが、宅地や畑地に隣接するため、定期的な草刈が継続されることで、草地として維持されてきた環境ということができる。

考 察

今回の調査で、本種は、上記のように県北部の相模原市緑区の旧藤野町一帯において現在も広く分布していることが確認できた。一方、確認地域に近接するエリアで良好な環境があっても確認できず、分布の制限要因が草地環境だけではない可能性（土質など）も視野にいれるべきかもしれない。近接地で発生時期がほぼ同一と考えら



Fig. 7. Habitat of bracken field. Frequent mowing is done to grow bracken.

図 7. ワラビ畑の生息環境. ワラビの育成のため、頻繁に草刈がなされる.



Fig. 8. Environment of the filled ground. This environment succession is slow due to oligotrophic environment.

図 8. 土砂埋め立て地の生息環境. 貧栄養のため遷移の進行は遅く長期にわたり草地が維持される.

れる地域で、確認地域以外で発見できていない調査地が多くあるが、これは本種の発生時期が短いことにより調査適期を逃している可能性もある。個体数が少ない産地ではとくにその傾向が強いので、引き続き県北・県西部地域などでの調査を継続したい。

本種が生息する草地環境は多様であったが、そのほとんどは定期的な草刈によって樹林への遷移が抑制される立地にあった。生産物が市場価値のあるワラビ畑やクリ畑の例を除くと、景観や慣習、害虫管理の観点などから草刈が継続されてきたと考えられる場所がほとんどである。今後これまで継続されてきた草刈管理が変化すると、こうした草地は樹林への遷移が急速に生じ、本種の生息状況も一気に悪化する可能性が高い。

また、今回の調査結果から、生息地の中では

一度に数十頭と多数が確認できる比較的規模の大きい産地があると、その周辺では小規模な産地が散在することが見て取れる（例えば、牧野 E・F とその周辺）。本種は、飛翔能力が高い種であり、攪乱環境下の植生遷移で一時的に生じる草地環境を渡り歩くことで個体群が維持されてきたと考えられる。コアとなる産地と周辺のサテライト産地を行き来して維持されているメタ個体群構造をもつ種とってよいだろう。この特徴を持つ種は、コア産地が健全な間は多数の小規模産地が散在する、県内のキバネツノトンボの現状のような状況を見せるが、いったんコア産地が崩壊すると、周囲の小規模産地も崩壊する例が知られており、本種の存続には、コア産地の草地環境の継続管理が重要となるだろう。

なお、レッドリストの選定基準（または評価基準）から判断すると、本種の現状は、現存産地が数地点しかないような、すぐに県内からの絶滅が心配される絶滅危惧 IA 類（CR）相当の状況ではないことが明らかになった。一方、生息する草地の維持管理は中長期的にはその存続に懸念が高く、管理放棄が始まると一気に崩壊するリスクも抱えている。今後の継続調査が必要な段階ではあるが、コア産地の数や産地群の実態が半径数キロ規模のものが数地点である実情から判断すると、そのランクは現状の絶滅危惧 I 類の中での、EN 相当に該当すると考えられる。なお、今後調査が進展し、県西部など離れた産地の確認や、分布地がさらに追加されれば、ランクの再検討も検討すべきであろう。

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摘 要

荻部治紀・加賀玲子, 2021. 神奈川県内の絶滅危惧種キバネツノトンボの現状. 神奈川県立博物館研究報告 (自然科学), (50): 137–141. [Karube, H. & R. Kaga, 2021. Current situation of endangered species *Libelloides ramburi* (M'Lachlan, 1875) in Kanagawa Prefecture. *Bull. Kanagawa Pref. Mus. (Nat. Sci)*, (50): 137–141.]

キバネツノトンボは、良好な草地に生息するアミメカゲロウ目の大型の昆虫で、各地で激減している種である。神奈川県内では過去に 12 地点から記録があるが、近年の記録がごくわずかしかなことから、神奈川県レッドデータ生物調査報告書 2006 では絶滅危惧 I 類に選定されている。筆者らは 2017 年に本種を確認以降、県内各所で本種の現状について集中的に調査を行ってきた。その結果、県北部の相模原市緑区旧藤野町地域を中心に 20 か所で確認することができた。一方、類似の環境があっても確認できない地域がほとんどであり、その分布は局限されていた。本県における本種の現存環境は人為的な草刈りが継続されている草地で、その環境は多様であるが、産地の安定性は脆弱で、産地数は増えたものの、分布の局所性ととも、絶滅危惧度は依然高いものと判断された。

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