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Two new species of *Chrysomelobia* (Acari: Heterostigmata: Podapolipidae) parasitic on *Gonioctena rubripennis* Baly (Coleoptera: Chrysomelidae; Chrysomelinae) in Japan

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Abstract

Chrysomelobia matsuzawai **sp. nov.** and *Chrysomelobia nipponica* **sp. nov.** (Acari: Podapolipidae) are described from *Gonioctena rubripennis* Baly (Coleoptera: Chrysomelidae) collected in Japan. This is the first record of the genus *Chrysomelobia* Regenfuss, 1968 in Asia. Adult females of the type species for *Chrysomelobia, Chrysomelobia mahunkai* Regenfuss, 1968, were recollected from female specimens infesting a *Gonioctena* sp. in Germany. An updated key to all species of *Chrysomelobia* is provided.

Key words: insect parasites, *Chrysomelobia*, key, Acari, Japan, Podapolipidae

Introduction

Mites in the family Podapolipidae are common parasites of a number of families of Coleoptera, and less commonly on Blattodea and Orthoptera (e.g., Regenfuss 1968; Husband 1990; Husband & OConnor 2003). The family Podapolipidae is represented by one species each on Heteroptera (Kurosa & Husband 1994) and Hymenoptera (Husband & Sinha 1970) and has not been found on Diptera, Lepidoptera, Odonata or any aquatic insects. In most instances, each family of parasitized Coleoptera will have genera of Podapolipidae that are associated with that family only. A conspicuous exception is the genus *Podapolipus* Rovelli & Grassi, 1888 which is found on beetles in four families as well as on insects in the orders Blattodea and Orthoptera (e.g., Husband 1986). Previous reports of Podapolipidae on Chrysomelidae have been recorded as species in the genus *Chrysomelobia* Regenfuss, 1968 (*Parobia* Seeman & Nahrung, 2003) (Regenfuss 1968; Eickwort 1975; Drummond *et al.* 1984; Fain 1987; Haitlinger 1989; Houck 1992; Moraes *et al.* 1999; Husband & Moraes 1999; Seeman & Nahrung 2003, 2005, 2013; Husband & OConnor 2004; Seeman 2008). The single record of a podapolipid mite that is not a *Chrysomelobia* but is a parasite of a chrysomelid beetle is *Cassidopohpus physonotae* Husband & OConnor, 2014, a parasite of *Physonota alutacea* Beheman (Husband & OConnor 2014). Twenty-one species of *Chrysomelobia* have been reported from Australia (14), Africa (2), Europe (1), and the Americas (4) on leaf beetles belonging to the subfamily Chrysomelinae (Seeman & Nahrung 2013). The record of a single female specimen of *C. donati* Haitlinger, 1989 from a cercopid hemipteran is considered accidental. *Chrysomelobia nipponica* **sp. nov.** and *Chrysomelobia matsuzawai* **sp. nov.** are the first *Chrysomelobia* species described from Asia.

Materials and methods

Examination of chrysomelid beetles representing primarily the subfamily Chrysomelinae, by Kazuyoshi Kurosa over a number of years, yielded mites belonging to the genus *Chrysomelobia* (Podapolipidae). Mites were removed from the abdominal tergites and under the elytra. Mites mounted on slides in Hoyer's mounting medium were placed on a heated drying tray for five days and ringed with red insulating varnish.

Measurements were taken with a Zeiss compound phase contrast microscope with a stage micrometer. Measurements are given in micrometers (pm). Alveolar vestiges of setae are designated as v. Microsetae, designated as m, are no longer than the diameter of their setal alveoli. Other terminology is based on Lindquist (1986).

The holotypes are deposited in the National Museum of Nature and Science, Tsukuba, 306-0005, Japan (NSMT). Paratypes of males, larvae and females are housed with the holotypes excepting some female, male and larval paratypes that are placed in the following museums: the A.J. Cook Arthropod Research Collection, Michigan State University, East Lansing, Michigan (CARC); The Acarology Laboratory, Museum of Biodiversity, The Ohio State University, Columbus, Ohio (OSAL); United States National Museum of Natural History, Washington, D.C. (NMNH) (mite collection housed in the USDA Systematic Entomology Laboratory, Beltsville, Maryland); Queensland Museum, South Brisbane, Australia (QMBA); Tarbiat Modares University, Tehran, Iran (TMUI); University of Michigan Museum of Zoology, Ann Arbor, Michigan (UMMZ); Tyumen State University, Tyumen, Russia (TSUR) and Zoological Museum, University of Hamburg, Hamburg, Germany (ZMH).

Description of new species

***Chrysomelobia matsuzawai* Husband, Kurosa & Seeman sp. nov.**
(Figs. 1–5)

Diagnosis. All life stages. Tibia I with seta *k*, tarsus I with seven setae and one solenidion, setae *tc'* and *tc"* with blunt tips. Adult female: trachea shorter than setae v_1, setae v_1 slender, setae sc_2 bulbous, setae c_1 bulbous, setae c_2 long, slender, setae *e* shorter than v_1. Coxal setae *1a*, *2a* and *3b* bulbous, apodemes I, II meeting sternal apodeme. Leg I with one claw. Femur II with minute setae *d* and conspicuous *l'*. Tibia IV with a pair of long setae, tarsus IV with a single long seta. Adult male: shield C, D, EF with 4 pairs of setae, c_1, *d*, *e* minute, c_2 developed, 5 long; setae c_1 posterior to plane of setae c_2. Plate C, D, EF with row of setae *d* slightly anterior to row of setae *e*. Genital capsule posterodorsal, shield C, D, EF with broadly concave posterior margin, setae ps_1 not evident; tibiae I, II, III with spine-like setae, femur II with minute setae *d* and longer *l'*, leg IV enlarged basally, convex lateral margin, about 2/3 length of leg III, tibia III setae *v*" nearly 1/2 width of idiosoma, tibia IV setae *v*', *v*" shorter than seta *d*. Legs I, II, III with two claws. Three tarsus IV setae plus a curved claw. Larva: dorsal gnathosomal setae nearly 1/2 length of dorsal gnathosomal setae in adult females.

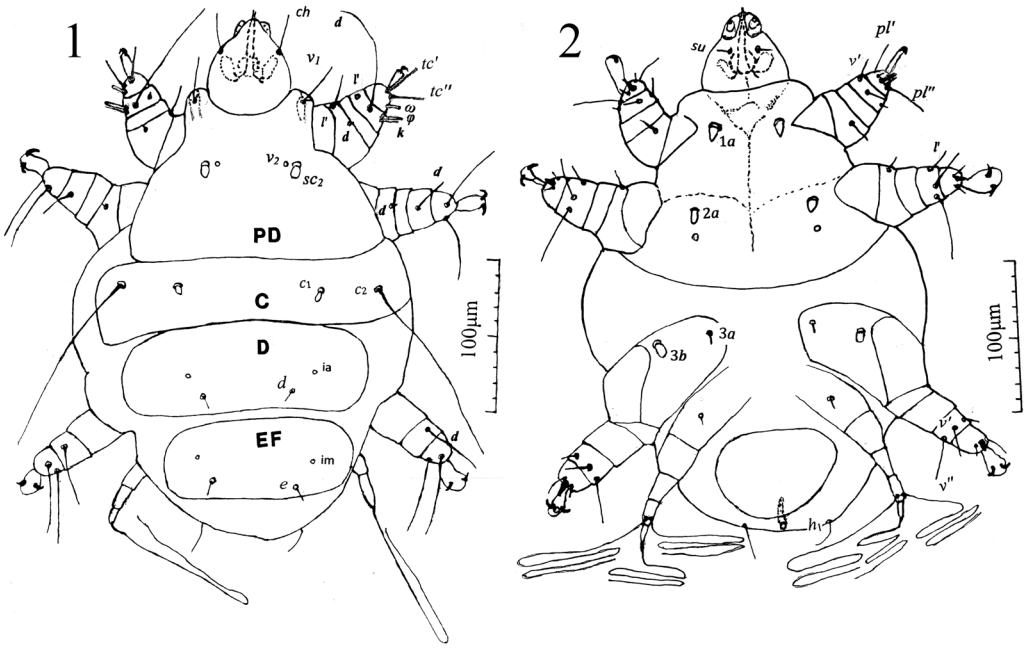
Description

Female (Figs. 1, 2, n=18)

Gnathosoma. Length 60–70, width 54–63 (Table 1). Cheliceral stylets 50–57 (one 46). Pharynx width 10–12. Setae *ch* 17–27, *su* 5–10. Palps longer than wide, three segmented, *su–su* 18–19.

Idiosoma. Length 258–319, width 208–240, setae v_1 24–30, positioned on narrowed anterolateral margin of prodorsal shield and immediately posterior to stigmata, v_2 v. Setae sc_2 bulbous, length 10–

12, width 7–9. Idiosomal plate lengths: PD 98, C 70, D 50–58, EF 45–52; widths PD 208, C 210–220, D 190, EF 103–123, setae c_1 bulbous, length 8–9, width 4–6, c_2 90–127, *d* 7–8 (one 12), *e* 7–10, h_1 15–25, h_1–h_1 53–56. Cupule *ia* anterolateral to setae *d*, cupule *im* anterolateral to setae *e*. Stigmata at anterolateral margin of prodorsal shield. Trachea length 25–28, width 5, branching not evident. Distance between setae v_1–v_1 70–82, sc_2–sc_2 43–54, c_1–c_1 86–93, c_1–c_2 31–37, v_1–sc_2 38–55, v_2–sc_2 8–10. Venter with apodemes II meeting sternal apodeme. Coxal setae *la* bulbous 12 long, 7 wide; *2a* bulbous, 10 long, 8 wide, *2b* v, *3a* 5–8, *3b* bulbous, 10 long, 6 wide; *4b* 6. Distance between setae *la*–*la* 41, *2a*–*2a* 72, *3a*–*3a* 82, *3b*–*3b* 129.



FIGURES 1–2. *Chrysomelobia matsuzawai* Husband, Kurosa & Seeman **sp. nov.,** adult female, 1. dorsal, 2.ventral.

Legs. Femur I setae *l'* thick 18–20, *d* m, *v"* 10–16, tibia I with setae *l'* m, *d* 65–75, φ 11–14, *k* thin 12–13. Tarsus I setae *tc', tc"* eupathidial (blunt), *tc'* 22–28, *tc"* 20–30, solenidion ω 9–11. Femur II setae *l'* 9–10, *d* 2. Tibia II *l'* 11–13, *d* 20–22, *v'* 28, *v"* 43. Tarsus II setae *pl'* 9–14, *tc'* 43–46, *pl"* 53, *u'* 10–12, *pv"* 8–9. Tibia III setae *l'* 7–10, *d* 42, *v'* 18, *v"* 30. Tarsus III setae *tc'* 48, *pl'* 11–14, *pl"* 50, *u'* 8–12, *pv"* 5–7. Femur and genu IV fused. Tibia IV setae *v', v"* and tarsi IV *tc'* exceed 200. Tibia and tarsus IV separate. Setation for femur, genu, tibia, tarsus I, II, III, IV: 30-6(+1)-7(+1), 2-0-4-5, 0-0-4-5, 0-0-2-1.

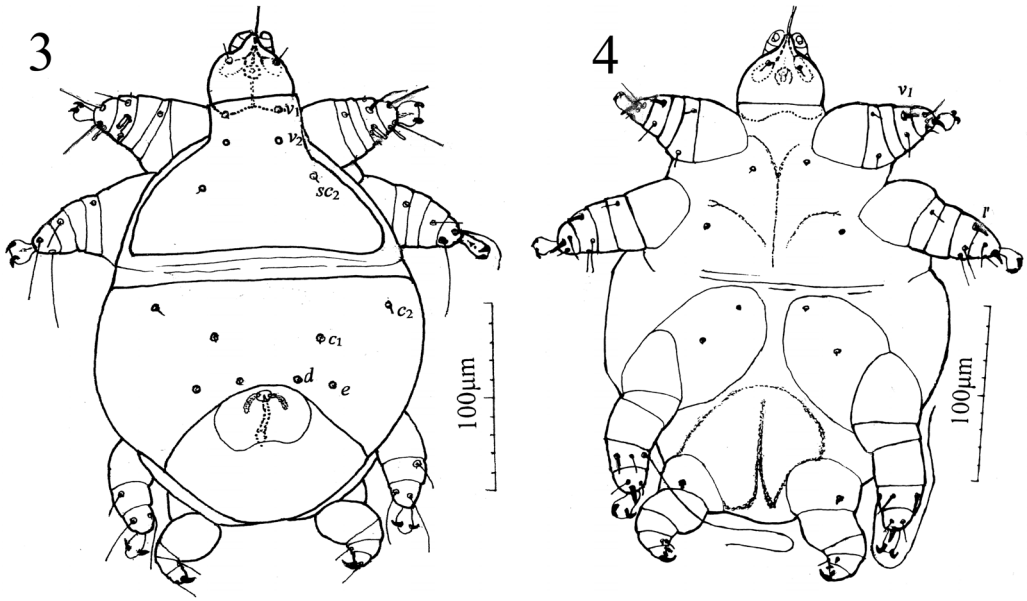
Male (Figs. 3, 4, n=1)

Gnathosoma. Length 50, width 51. Cheliceral stylets 33, pharynx width 10, setae *ch* 9, *su* 6, *su*–*su* 19, palp length 15.

Idiosoma. Length 250, width 207, setae v_1 2, v_2 m, setae sc_2 3, c_1 m, c_2 5, *d* m, distance between setae v_1–v_1 32, v_2–v_2 30, sc_2–sc_2 66, c_1–c_1 60, c_1–c_2 41, *d*–*d* 32, *e*–*e* 78. Genital capsule posterodorsal, length 35, width 50, two internal lobes interpreted as setae ps_2 length10, aedeagus small. Venter with apodemes II almost reaching sternal apodeme. Coxal setae minute.

TABLE 1. Maximum measurements in micrometers (μm) for *Chrysomelobia mahunkai* (*mah*), *C. nipponica* **sp. nov.** (*nip*), *C. matsuzawai* **sp. nov.** (*mat*), *C. gimlii* (*gim*), *C. pagurus* (*pag*), *C. orthagoriscus* (*ort*), *C. captivus* (*cap*), *C. alleni* (*all*), *C. lipsettae* (*lip*). Males and larvae of *C. mahunkai* have not been reported.

	mah	*nip*	*mat*	*gim*	*pag*	*ort*	*cap*	*all*	*lip*
FEMALE									
Idiosoma length	300	300	505	433	370	505	430	320	433
Idiosoma width	289	289	289	300	318	388	279	230	300
Gnathosoma width	70	76	63	82	85	79	69	50	83
Cheliceral stylets	74	66	55	44	60	60	55	47	67
Gnathosomal setae									
ch	46	41	27	50	40	40	44	26	63
su	16	17	9	21	19	23	21	17	28
Idiosomal setae									
v_1	34	35	30	29	24	18	15	8	61
sc_2 bulbous (b)	53	22	12b	10b	12b	7b	12	12b	143
c_1 bulbous (b)	7	10	9b	9b	10b	6b	12	80	10
c_2 bulbous (b)	142	140	127	155	145	135	136	11b	19
e	10	32	10	24	24	19	27	77	19
h	19	25	25	28	18	31	22	20	18
Coxal setae									
1a bulbous (b)	20	12	12b	7b	10b	7b	m	12b	20
2a bulbous (b)	6b	6b	10b	8b	10b	7b	7.5b	11b	24
3b bulbous (b)	6b	5b	10b	6b	9b	7b	7b	12	12
MALE									
Idiosoma length	–	200	250	290	223	255	228	215	260
Idiosoma width	–	187	207	235	215	238	187	155	235
Gnathosoma width	–	60	51	76	65	72	57	43	70
Cheliceral stylets	–	41	33	50	48	51	48	34	54
Gnathosomal setae									
ch	–	19	9	15	17	16	16	9	22
su	–	4	6	17	20	17	14	9	17
Dorsal plate setae									
v_1	–	m	2	m	2	m	m	m	2
sc_2	–	4	3	v	2	m	m	m	4
c_1	–	2	m	m	2	m	m	m	2
c_2	–	10	5	13	8	9	10	m	6
Genital capsule length	–	23	43	43	37	37	32	32	42
Genital capsule width	–	23	48	46	47	52	43	60	60
Tibia III, setae *v″*	–	16	140	160	38	220	120	120	130
LARVA									
Idiosomal length	–	300	310	275	330	265	231	223	158
Idiosomal width	–	230	212	198	268	210	193	187	117
Gnathosomal width	–	32	43	77	132	112	88	81	53
Cheliceral stylets	–	50	53	110	267	202	180	89	66
Gnathosomal setae									
ch	–	12	18	50	95	62	58	39	35
su	–	7	7	17	58	46	7	10	19
Dorsal plate setae									
v_1	–	m	m	63	39	15	22	3	32
sc_2	–	4	v	140	10	137	175	122	83
e	–	m	10	100	33	22	15	10	23
Seta h_1	–	-	55	240	396	283	230	407	145
Seta h_2	–	-	-	5	11	6	10	3	m
Seta tibia I *d*	–	17	7	43	44	38	36	43	67
Seta tibia III *v″*	–	16	17	150	38	130	120	70	190



FIGURES 3–4. *Chrysomelobia matsuzawai* Husband, Kurosa &Seeman **sp. nov.,** male, 3. dorsal, 4. ventral.

Legs. Femur I setae *l'* 6, *v"* 8, *d* m, femur II setae *l' 10*, *d* m, no femora III, IV setae. No genua I, II, III, IV setae. Tibia I solenidion φ 11, slender adjacent seta *k* 10. Tibia I setae *v'* spine-like, tibiae II, III setae *l'* spine-like 10, tibia I, II, III setae *d* 22, 18, 15. Tarsi I setae *pl'* 15, *tc'* 23, *tc"* 30, solenidion ω 10, setae *pl"* 22, *s* 12, *pv'* 3, *pv"* 8. Tibia III setae *v"* 140. Ambulacra I, II, III with two stout claws. Setation for femur, genu, tibia, tarsus of legs I, II, Ill, IV: 3-0-6 (+1)-7(+1), 2-0-4-5, 0-0-4-5, 0-0-3-3 + claw. Thickness of fused femur and genu IV 33.

Larval female (Fig. 5, n=5 exoskeletons containing adult females)

Gnathosoma. Length 43–52, width 37–48. Cheliceral stylets 45–53, pharynx width 8–10. Setae *ch* 9, *su* 9, *su–su* 15.

Idiosoma. Length 270–370, width 195–265, setae v_1 m, v_2 v, sc_2 3, c_1 m, c_2 3, h_1 55, distance setae v_1–$v_1$30, v_2– *v*2 40, sc_2–sc_2 63, v_2–sc_2 20. Distance between setae c_1–c_2 32, h_1–h_1 8.

Legs. Femur I setae *l'* 5, *d* m, *v"* 6, no genua I, II, III, IV setae. Tibia I solenidion φ 6, *k 2*, *v'* 5, *v"* 5, *d* 5. Tarsus I setae *tc'* 12, *tc"* 14, solenidion ω 5, setae *pl"* 6. Femur II setae *l'* 6, *d* 3. Tibia II setae *v"* 26, tibia III setae *v"* 70. Ambulacra I, II, III with two stout claws.

Etymology. The species is named for Dr. Haruo Matsuzawa, specialist in Chrysomelidae, who provided many potential host beetles that yielded *Chrysomelobia* mites for this study. The species name is a noun in the genitive case.

Type material. All specimens from *Gonioctena rubripennis* Baly (Coleoptera: Chrysomelidae). *Holotype*: adult female (Kurosa Collection No. 3321–3(3/7), Shiromana, Okutama, Tokyo, Japan, 3 May 1980, coll. K. Kurosa, deposited with the type host in the National Museum of Nature and Science, Tsukuba, Japan (NSMT). *Paratypes*: 5 females, 1 male, same data as holotype (KCN 3321-1 to 3321-8); 3 females, Mineoka, Kamogawa City, Chiba Pref., Japan, 4 June 1978, coll. J. Okuma; 2 females (1 slide), Mt. Odamiyama, Oda-cho, Ehime Pref., Japan**,** coll. E. Yamamoto; 5 females inside of exoskeletons of larval females, Kamafuga Dam, Miyaga Pref., Japan, 27 April 1995, coll. unknown; 2 females, Bizen-shi, Okayama Pref., Japan, 7–9 1989, coll. unknown. One female paratype each is deposited at CARC, OSAL, NMNH, QMBA, TMUI, TNAU, UMMZ

and ZMH. The balance of paratypes is deposited with the holotype (NSMT). The balance of type hosts is deposited in UMMZ.

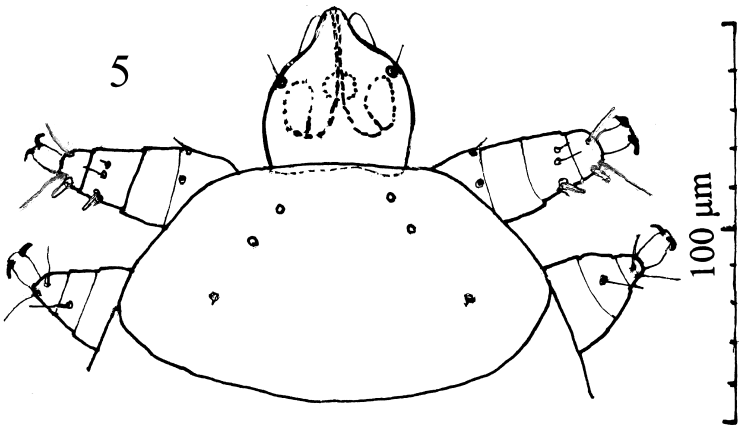


FIGURE 5. *Chrysomelobia matsuzawai* Husband, Kurosa & Seeman **sp. nov.,** larval female, dorsal, proterosoma.

Differential diagnosis. The new species appears closely related to *C. gimlii* (Seeman & Nahrung, 2005), but differs by having females with the alveolar vestige of seta v_2 situated close to seta sc_2 and setae *tc'–tc"* on tarsus I eupathidial (alveolar vestige of seta v_2 midway between setae v_1 and sc_2 and setae *tc'–tc"* with tapering tips in *C. gimlii*); and by having males without alveolar vestiges of setae sc_1 and lacking extremely long setae on tibia III (alveolar vestiges of setae sc_1 present and tarsus III with a very long attenuate seta in *C. gimlii*).

Remarks. The six species of *Chrysomelobia* from the Western Hemisphere (4 spp.) and Africa (2 spp.) all have setae on genua I–II, and of those six species, only *C. donati* lacks setae on genu III. These setal losses place *C. matsuzawai* **sp. nov.** within the radiation of 14 Australian species, plus the European species *C. mahunkai* Regenfuss 1968, that all lack setae on genua I–III. The distinctive bulbous setae present in several species of *Chrysomelobia* are expressed variously and help define species groups, as indicated in Seeman (2008). The bulbous setae in *C. matsuzawai* **sp. nov.** are sc_2, c_1, *la*, *2a* and *3b*, which is the same as mites in the *gimlii* species group (*C. gimlii*, *C. orthagoriscus* Seeman, 2008, *C. pagurus* Seeman, 2008). Thus, *C. matsuzawai* **sp. nov.** is similar to these species, but differs from the other species of the *gimlii* species group in the following features. In female *C. matsuzawai* **sp. nov.**, the vestige of seta v_2 is situated close to seta sc_2 and setae *tc'–tc"* on tarsus I are eupathidial, i.e., blunt-tipped. In species of the *gimlii* species group, seta v_2 is in a more typical position midway between setae v_1 and sc_2 and setae *tc'–tc"* are not eupathidial, having tapering tips.

Chrysomelobia matsuzawai **sp. nov.** also differs from all other Australian species, excepting *C. lipsettae* Seeman, 2008, by having broad tracheae (width 5). The thin trachea that do not anastomose may be a synapomorphy for species of *Chrysomelobia* that infest eucalypt-feeding Paropsini; the host of *C. lipsettae* feeds on *Acacia* (Fabaceae), and *C. lipsettae* was hypothesized by Seeman (2008) to be a species intermediate between the Australian (+*C. mahunkai*) and the American and African species of *Chrysomelobia.*

***Chrysomelobia nipponica* Husband, Kurosa & Seeman sp. nov.**
(Figs. 6–10)

Diagnosis. All life stages. Tibia I with seta *k*, tarsus I with seven setae and one solenidion, setae *tc′* and *tc″* with slender tips. Adult female: tracheae broad and long, anastomosing distally, setae c_1 slender, setae c_2 long, setae *e* as long as setae v_1. Coxal setae *la*, *4a* slender, *2a* and *3b* bulbous, femora I, II with seta *l′* and minute setae *d*. Tibia IV with a pair of long setae, tarsus IV with a single long seta. Adult male: setae v_1, v_2, *d*, *e* minute, setae sc_2, c_1, c_2 short, two times diameter of setal acetabulum. Genital capsule posterodorsal, wider than long, setae h_1, h_2 minute, setae ps_1 minute, setae ps_2 internal, lobular. Femur I setae *l′* 10, *d* m, *v″* 10, femur II setae *l′* 4, *d* m. Tibiae I, II, III without spine-like setae. Tibia III setae *l″* shorter than tibia III setae *d*. Legs I, II, III with two claws. Larva: gnathosomal setae *su* near 1/2 length setae *ch*. Setae v_1, v_2, c_1 minute, setae c_2, sc_2 short, two times diameter of setal acetabulum.

Description

Female (Figs. 6, 7, n=16)

Gnathosoma. Length 60–67, width 63–76 (Table 1). Cheliceral stylets 60–66. Pharynx width 12–13. Setae *ch* 37–41, *su* 12–17. Distance between setae *su–su* 19–24. Palps longer than wide, two segmented.

Idiosoma. Length 275–300, width 222–289, with prodorsal shield narrow anteriorly, setae v_1 25–35, v_2 v, sc_2 19–22, c_1 7–10, c_2 120–140, *d* 8–10, *e* 28–32, h_1 20–25. Idiosomal plate lengths: prodorsal plate 90–98, C 70–72, D 58–60, EF 40–60; widths PD 178–180, C 223–228, D 118–130, EF 112–130, setae c_1 in line with c_2. Stigmata at anterolateral prodorsal shield. Length of broad trachea leading from stigmata near 80 and anastomosing distally. Stigmata–stigmata 63–70, setae v_1–v_1 70–76, v_2– v_2 55–59, sc_2–sc_2 112–114, c_1–c_1 55–58, *d–d* 50–52, *e–e* 91–100, h_1–h_1 56–62. Venter with apodemes II not meeting sternal apodeme. Coxal setae *la* slender 8–12, *2a* bulbous 5–6, *3a* slender 10–16, *3b* bulbous 4–5, *4b* 10–17. Distance between *la–la* 62–66, *2a–2a* 106–110, *3a–3a* 50–53, *3b–3b* 104–112.

Legs. Femur I setae *l′* thick 19–22, *d* m, *v″* 20–29, tibia I *d* 82–90, φ 12–13, *k* 11–13. Tarsus I setae *tc′* 35–42, *tc″* 30–39, ω 10–12. Ambulacrum I with one claw. Femur II setae *l′* 10–13, *d* m, tibia II *l′* 11–20, *d* 39–48, *v′* 22–30, *v″* 34–36. Tarsus II setae *pl′* 13–14, *tc′* 45–53, *tc″* 30–37, *u′* 9–12, *pv″* 6–12. Tibia III setae *l′* 8–12, *d* 34–37, *v′* 20–30, *v″* 34–37, tarsus III setae *pl′* 14–19, *tc′* 39–48, *tc″* 30–40, *u′* 9–10, *pv″* 7–10. Tibia IV setae *v′*, *v″* and tarsus IV setae *tc′* exceed 250. Setation for femur, genu, tibia, tarsus I, II, III, IV: 3-0-6(+1)-7(+1), 2-0-4-5, 0-0-4-5, 0-0-2-1.

Male (Figs. 8, 9, n=1)

Gnathosoma. Length 50, width 60. Cheliceral stylets 41, pharynx width 10, setae *ch* 19, *su* 7, distance *su–su* 21, palp length 12.

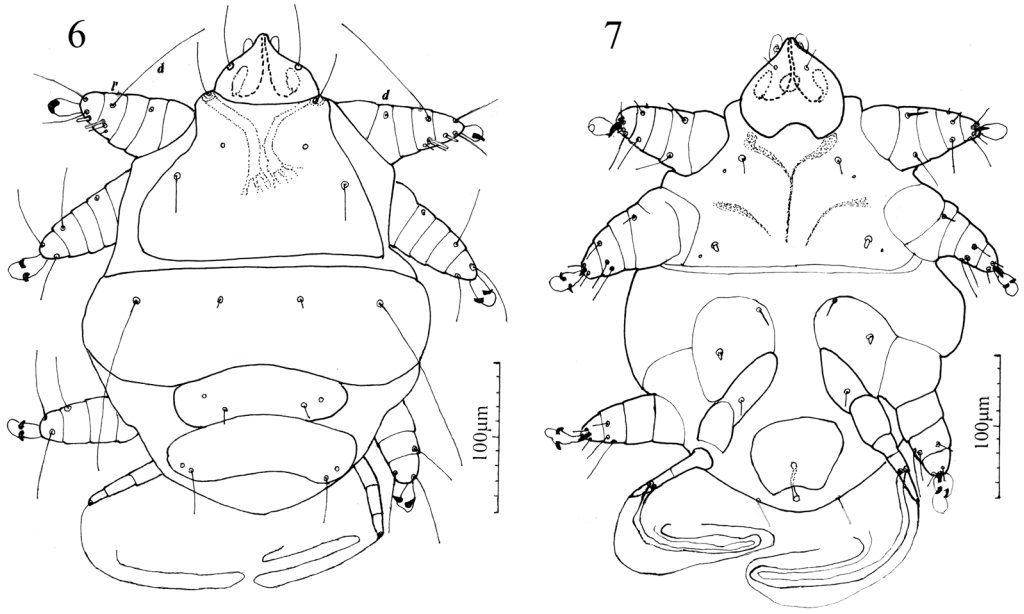
Idiosoma. Length 300, width 230, setae v_1 m, v_2 m, sc_2 4, c_1 3, c_2 10, *d*, *e*, *f* m. Distance between setae v_1– v_1 32, v_1–sc_2 49, sc_2–sc_2 75, c_1–c_1 33, c_2–c_2 114, c_1–c_2, *d–d* 18, *e–e* 63. Genital capsule posterodorsal, length 35, width 50.

Legs. Femur I setae *l′*, *d* m, *v″* 10, femur II setae *l′* 4, *d* m. No genua I, II, III, IV setae. Tibia I setae *l′* 3, *d* 30, φ 10, *k* 10, v_1 thick 6, *v″* 17, *l″* 3. Tarsus I setae *tc′* 27, *tc″* 31, ω 8, *pl′* 13, *pv′* 3, *s* 8, *pv″* 5, *pl″* 13. Femur II setae *l′* 4, *d* m, tibia II setae *l′* 6, *d* 19, v_1 18, *v″* 19, tarsus II setae *pl′* 8, *tc′* 34, *pl″* 25, *pv′ 2*, *u′* 6, *pv″* 6. Tibia III seta *l′* 16. Thickness of mid femur IV 20. Ambulacra I, II, III with two claws. Setation for femur, genu, tibia, tarsus I, II, III: 3-0-6(+1)-7(+1), 2-0-4-5, 0-0-4-5, 0-0-2-2+ claw.

Larval female (Figure 10, n=1, exoskeleton very pale)

Gnathosoma. Length 49, width 52. Cheliceral stylets 50, pharynx width 11. Setae *ch* 12, *su* 7, *su–su* 9.

Idiosoma. Length 300, width 230. Setae v_1 m, v_2 m, sc_2 4, c_1 m, c_2 4, h_1 m. Distance v_1–v_1 29, v_2–v_2 34, v_2–sc_2 25, sc_2–sc_2 58, c_1–c_2 20.

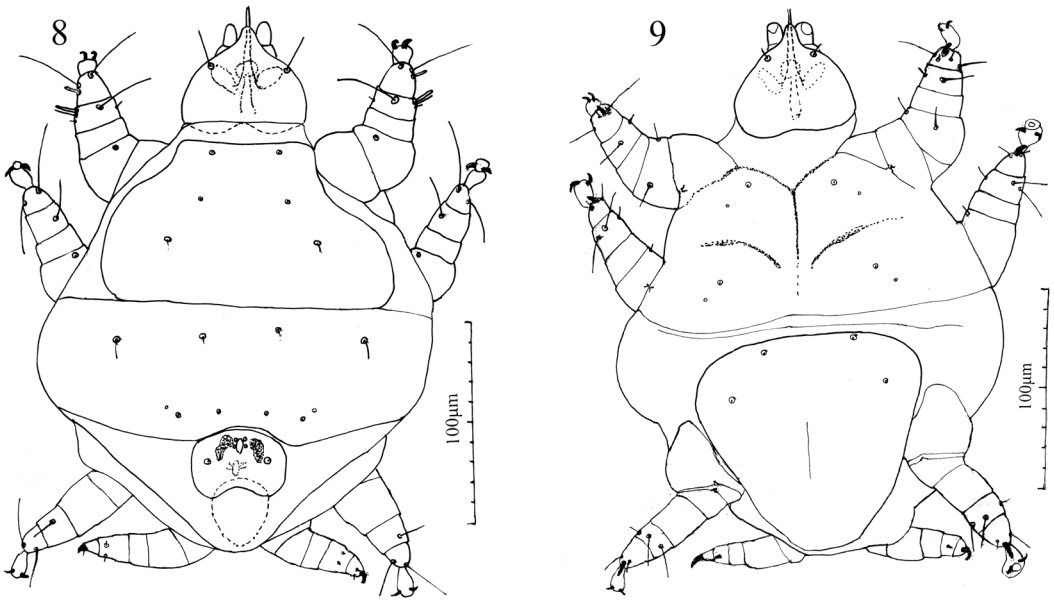


FIGURES 6–7. *Chrysomelobia nipponica* Husband, Kurosa &Seeman **sp. nov.,** adult female, 6. dorsal, 7. ventral.

Legs. Femur I seta *l'* 4, *d* m, *v"* 10. Tibia I *l'* m, *d* 28, φ 10, *k* 8, *v'* 4, *v"* 12, *l"* m. Tarsus I *tc'* 22, *tc"* 22, ω 9, *pl'* 9, *pv'* 3, *s* 5, *pv"* 3, *pl"* 8. Femur II seta *l'* 5, *d* m, Tibia II *l'* 3, *d 7*, *v'* 8, *v"* 14. Tarsus II *tc'* 16, *pl"* 23, *u'* 8, *pv"* 4. Tibia III *l'* 2, *v'* 12, *v"* 17. Tarsus III *pl' 10*, *pl"* 20, *tc'* 12, *u'* 5, *pv"* 3. Setation for femur, genu, tibia, tarsus I, II, III: 3-0-6(+1)-7(+1), 2-0-4-5, 0-0-4-5.

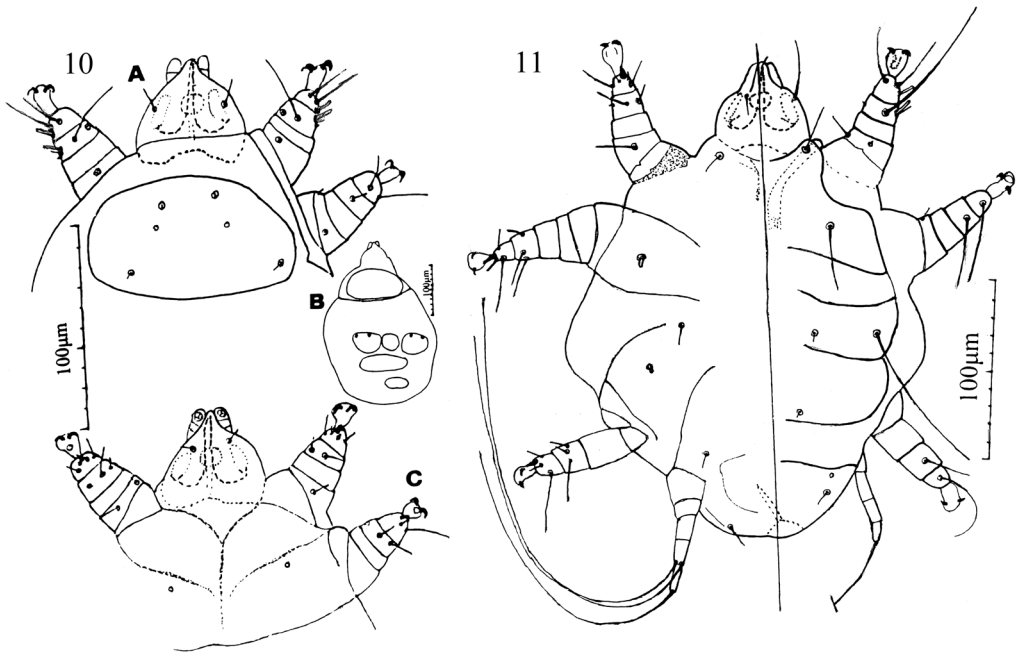
Etymology. The specific name *nipponica* is an adjective derived from the country of origin, Japan (Nippon).

Type material. All specimens from *Gonioctena rubripennis* Baly (Coleoptera: Chrysomelidae). *Holotype*: adult female (RWH25 VIII 2015-2), Katsuura, Chiba Pref., Japan, 22–24 IV 1989, coll. K. Kurosa, deposited with the type host in the National Museum of Nature and Science, Tsukuba, Japan. *Paratypes*: 1 male, 12 females, 1 larva, same data as holotype; 2 females, Hongo-Cho, Aizu-Wakamatsu, Fukushima Pref., Japan, 26–27 V 1999, coll. unknown; 1 male, Minakami-machi, Gunma Pref., Japan, 1 IV 1999, coll. unknown; 1 female, Fujikawachi, Umemachi, Saiki-shi, Oita Pref., Japan, 3 VI 2012, coll. S. Sasaki; 1 female, Nano-shi, Yamagata Pref. Japan, 23 VI 1999, coll. unknown. 1 female paratype is deposited at each of the following CARC, OSAL, NMNH, QMBA, TMUI, TNAU, TSUR, UMMZ, ZMH. Balance of paratypes is deposited with the holotype (NSMT). Balance of type hosts deposited in UMMZ.



FIGURES 8–9. *Chrysomelobia nipponica* Husband, Kurosa & Seeman **sp. nov.,** male, 8. dorsal, 9. ventral.

Differential diagnosis. The new species appears closely related to *C. mahunkai*, but differs by having females with one ambulacral claw (two in all other *Chrysomelobia*) and seta *d* on femur II (absent in *C. nipponica* **sp. nov.**).



FIGURES 10–11. 10. *Chrysomelobia nipponica* Husband, Kurosa & Seeman **sp. nov.,** larval female. A, dorsal, proterosoma; B, dorsal, idiosomal plates; C, ventral, proterosoma; 11. *Chrysomelobia mahunkai* Regenfuss 1968, holotype, adult female, ventrodorsal.

Remarks. The host genus for both new species, *Gonioctena* (Coleoptera: Chrysomelidae), is also a host for the type species of *Chrysomelobia, C. mahunkai*. New adult female specimens of *C. mahunkai* were collected from an unspecified locality in Germany from *Gonioctena* sp. and the holotype female was also examined. An illustration of the holotype female loaned by Dr. Hieronymus Dastych of the University of Hamburg, Germany is provided (Fig. 11). Previously, the species was recorded from a single female collected from Tansey beetle *Chrysolina graminis* (L., 1758) (= *Chrysomela graminis*). Of the two new species, *C. matsuzawai* **sp. nov.** is not closely related to *C. mahunkai,* but in contrast, *C. nipponica* **sp. nov.** shares several similar character states with *C. mahunkai.* These similarities are the bulbous coxal setae *2b* and *3b*, dorsal setae and seta *la* unmodified, the female tibia IV with two setae and tarsus IV with one terminal seta, and the broad tracheae that anastomose distally. With the exception of the last character state, these states are also shared with some Australian species, particularly the *husbandi* species group. Female *C. mahunkai* and *C. nipponica* **sp. nov.** are distinct from the *husbandi* species group by having well-developed setae *la* (they are minute in the *husbandi* species group). Male *C. nipponica* **sp. nov.** differ from the *husbandi* species group by their large leg IV that bears a terminal claw (leg IV is diminutive and lacks a claw in the *husbandi* species group). Female *C. nipponica* **sp. nov.** are distinguished from *C. mahunkai* by the presence of two ambulacral claws on leg I in *C. mahunkai* (one in all other *Chrysomelobia*) and the presence of seta *d* on femur II in *C. nipponica* **sp. nov.** (absent in *C. mahunkai*). The male and larval stages for *C. mahunkai* remain unknown, so cannot be compared with *C. nipponica* **sp. nov.**, but we anticipate males and larvae of *C. matsuzawai* **sp. nov.** and *C. nipponica* to be similar. The divided plate C in the larva is absent in all Australian species but is present in *C. eickworti* Husband & OConnor, 2004, *C. labidomerae* Eickwort, 1975 and *C. peruviensis* Husband and Moraes, 1999 and may be present in *C. nipponica* **sp. nov**.

Key to species of *Chrysomelobia*

1.	Female & male: at least 1 seta on genua I, II and IV and femur IV 2
–	Female & male: setae absent on genua I–IV and femur IV 7
2(1).	Female: genu I with 3 setae; femur II with 1 seta; femur III without setae. . . . . *C. donati* Haitlinger
–	Female & male: genu I with 4 setae; femur II with 3 setae; femur III with 2 setae 3
3(2).	Female: coxal seta *4b* absent. Male: tarsus I without setae *ft'* and *ft"* . . . . . *C. elytrosphaerae* Fain
–	Female: coxal seta *4b* present. Male: tarsus I with at least l *ft* seta 4
4(3).	Female: genu IV with 2 setae (*v"* present). Male: with 4 prodorsal setae or vestiges of setae (sc_1 present); post-genital shield posterior to genital capsule expansive; fused telofemur-genu IV with 2 setae . . . . . *C. eickworti* Husband & OConnor
–	Female: genu IV with 1 seta (*v"* absent). Male: with 3 prodorsal setae or vestiges of setae (sc_1 absent); post-genital shield posterior to genital shield elongate; fused telofemur-genu IV with 1 seta. 5
5(4).	Female: Cheliceral stylets 37–46. Male: idiosomal plates reticulate; tibia III, seta *v"* short (< 50). . . . . *C. oneili* Moraes, Husband & Lofego
–	Female: Cheliceral stylets > 50. Male: idiosomal plates smooth; tibia III, seta *v"* long (> 70) 6
6(5).	Female: seta h_1 30–40. Male: ventral gnathosomal setae 18–23; seta sc_2 close to margin of prodorsal shield; genu IV with 1 seta (*v'* present). . . . . *C. peruviensis* Husband & Moraes
–	Female: seta h_1 17–19. Male: ventral gnathosomal setae 10–13; seta sc_2 well within margin of prodorsal shield; genu IV without setae (*v'* absent) . . . . . *C. labidomerae* Eickwort
7(1).	Female: tarsus IV with 2 or 3 long terminal setae. Male: seta c_2 minute 8
–	Female: tarsus IV with 1 long terminal seta. Male: seta c_2 developed, > 3 long 14
8(7).	Female: seta sc_2, c_2, *la, 2a* and *3b* slender 9
–	Female: seta sc_2, c_2, *la, 2a* and *3b* bulbous 10
9(8).	Female & male: seta *3a* absent… . . . . . *C. vafer* Seeman
–	Female & male: seta *3a* present… . . . . . *C. verecundus* Seeman

10(8). Female & male: tibia II lacking seta *l'*. Female: tibia and tarsus IV partially or completely fused. Male: dorsal shield C-D-E divided or with folds marking a weak division; tarsus IV, setae *u'* and *pv"* absent… . . . . . *C. armstrongi* Seeman

– Female & male: tibia II with seta *l'*. Female: tibia and tarsus IV separate. Male: dorsal shield C-D-E entire; tarsus IV, setae *u'* and *pv"* present… 11

11(10). Female & male: tibia IV with 1 seta (*v"* present)…. . . . . *C. alipilus* (Seeman & Nahrung)

– Female & male: tibia IV without setae (*v"* absent)… 12

12(11). Female: tarsus IV with 3 terminal setae; setae *d* and *e* < 40… . . . . . *C. nahrungae* Seeman

– Female: tarsus IV with 2 terminal setae; setae *d* and *e* > 45…. 13

13(12). Female: intercoxal setae further apart *(la–la* 37, *2a* 62–65). Male: tarsus IV with claw, *u',* and 3 setae (minute seta *pv'* absent). Larva: setae sc_2 27–31 and c_2 25–29 long…. . . . *C. alleni* Seeman & Nahrung

– Female: intercoxal setae closer together (*la–la* 26–31, *2a* 47–51). Male: tarsus IV with claw, *u',* and 4 setae (minute seta *pv'* present). Larva: setae sc_2 13–18 and c_2 13–18 long… . . . . . *C. aquariolus* Seeman

14(7). Female: coxal setae *2a* and *3b* slender… . . . . . *C. lipsettae* Seeman

– Female: coxal setae *2a* and *3b* bulbous or minute… 15

15(14). Female: seta *la* slender; tracheae broad, anastomosing distally…. 16

– Female: seta *la* minute or bulbous; tracheae narrow, not anastomosing distally… 17

16(15). Female: ambulacra with 2 claws; femur II without seta *d*… . . . . . *C. mahunkai* Regenfuss

– Female: ambulacra with 1 claw; femur II with seta *d* . . . . . …*C. nipponica* **sp. nov.**

17(15). Female: seta sc_2, c_1 and *la* bulbous. Male: tarsus IV with terminal claw, with 3–4 setae… 18

– Female: seta sc_2 and c_1 slender; seta *la* minute. Male: tarsus IV lacking terminal claw, with 1–2 setae… 21

18(17). Female: vestigial seta v_2 closely associated with seta sc_2; tarsus I setae *tc'–tc"* eupathidial (blunt-tipped). Male: plate C-D-EF with 5 pairs of setae; post-sternal apodeme well-developed . . . . . *C. matsuzawai* **sp. nov.**

– Female: vestigial seta v_2 not closely associated with seta sc_2, about half way between setae *v'* and sc_2; tarsus I setae *tc'–tc"* not eupathidial (tips tapered). Male: plate C-D-EF with 4 pairs of setae; post-sternal apodeme developed or absent…. 19

19(18). Female: seta sc_2 and c_1 5–7 long, 4–5 wide, with mediolateral projection 4–5 long (if broken then obvious stub present). Male: tibia II, seta *v"* 54–58, tarsus III, seta *tc'* 43–47 . *C. orthagoriscus* Seeman

– Female: seta sc_2 8–12 long, 5–6 wide; seta c_1 7–10 long, 5.5–7 wide, mediolateral projection absent or a minute stub. Male: tibia II, seta *v"* either < 40 or > 80 long, tarsus III, seta *tc'* either < 35 or > 50 long…. 20

20(19). Female: distance between setae v_1–sc_2 52–60, v_2–sc_2 26–31. Male: seta c_2 10–13; tibia II, seta *v"* 34–39; tarsus III, seta *tc'* 50–56… . . . . . *C. gimlii* (Seeman & Nahrung)

– Female: distance between setae v_1–sc_2 40–44, v_2–sc_2 12–21. Male: seta c_2 5–9; tibia II, seta *v"* 80–140; tarsus III, seta *tc'* 31–34… . . . . . *C. pagurus* Seeman

21(17). Female: setae *2a* and *3b* bulbous… 22

– Female: no coxal setae bulbous… 23

22(21). Female: setae *2a* and *3b* 5–6 long, 3–4 wide; distance between h_1–h_1 31–41. Male: tarsus II, seta *tc"* < 50… . . . . . *C. husbandi* (Seeman & Nahrung)

– Female: setae *2a* and *3b* 6–7.5 long, 4.5–5 wide; distance between h_1–h_1 22–29. Male: tarsus II, seta *tc"* > 80… . . . . . *C. captivus* (Seeman & Nahrung)

23(21). Female & male: femur II without setae… . . . . . *C. cubile* Seeman

– Female & male: femur II with minute seta 24

24(23). Female: seta v_2 vestigial but distinct; setae h_1 length 33–43. . . . . *C. intrusus* Seeman & Nahrung

– Female: seta v_2 absent; setae h_1 length 15–19 . . . . . *C. lawsoni* (Seeman & Nahrung)

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