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Taxonomic Notes on *Brinckochrysa kintoki* (OKAMOTO) (Neuroptera: Chrysopidae)

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Synopsis *Chrysopa kintoki* OKAMOTO is revised. The species is newly transferred to *Brinckochrysa*. The descriptions are given of the egg, larva and adult of the species, with brief notes on its biology.

Chrysopa kintoki was originally described by OKAMOTO in 1919 from two examples, taken at Osaka, Japan. Unfortunately, the type-series is no longer extant. Recently I have obtained some specimens of a chrysopid species from Osaka and its neighbourhood. Judging from OKAMOTO's description, I have come to the conclusion that the species may be identified as *C. kintoki*. Having examined the adult terminalia, I have found that *kintoki* should be transferred from *Chrysopa* LEACH to *Brinckochrysa* TJEDER. At present the genus *Brinckochrysa* contains six species, two of which—*kintoki* (OKAMOTO) and *scelestes* (BANKS)—occur in Japan. The egg of the genus has hitherto been unknown. In the larva, only *scelestes* was briefly described by ADAMS in 1959.

In the present paper the egg and larva of *B. kintoki* are described in detail, the adult is redescribed, and a brief account is given of its biology.

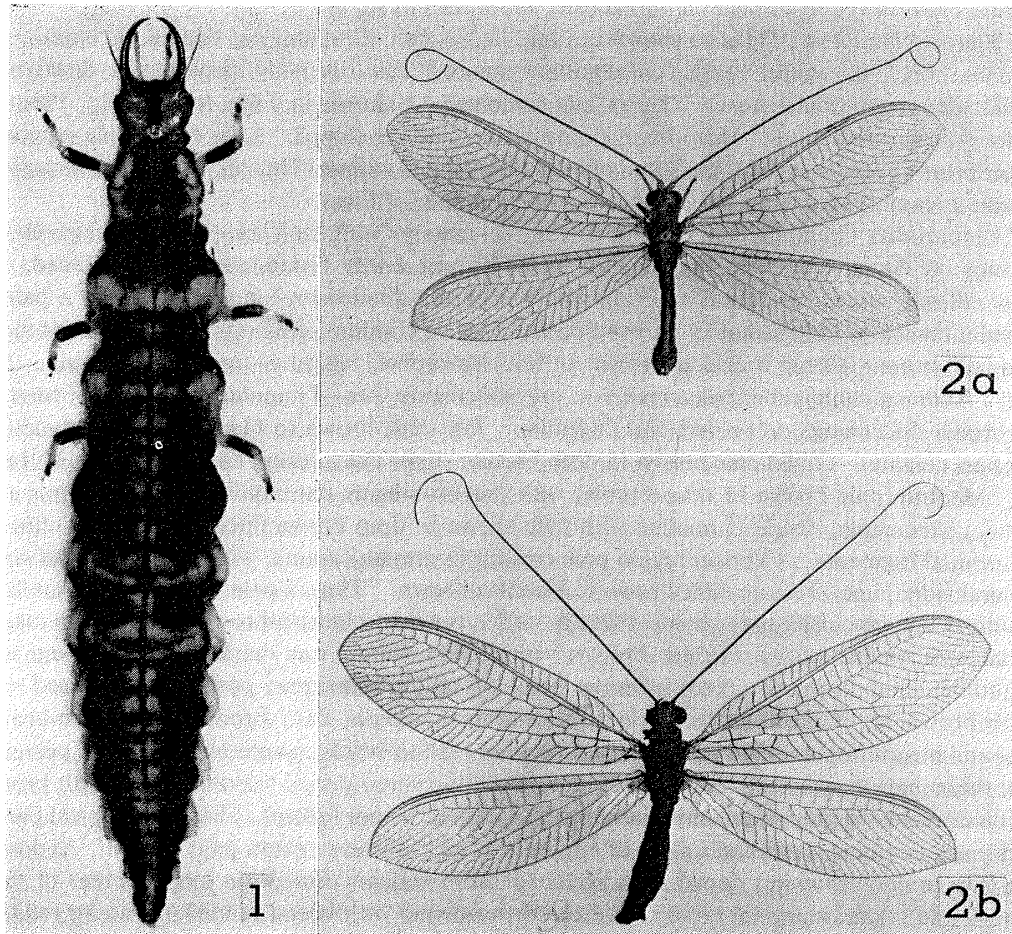
The descriptions of the colouration are made from the living insects. In the larval description, the nomenclature used for the cranial setae is that of ROUSSET (1966), and for the sake of convenience, the cranial markings and the thoracic and abdominal setae are named, as shown in Fig. 7.

Comments on Characters of Egg and Larva of *Brinckochrysa* TJEDER

On the basis of *B. kintoki*, the egg and larva of the genus *Brinckochrysa* may be characterized as follows:

Egg: Footstalk with pedestal at top.

Larva: In all instars, body elongate and flattened; head strongly flattened; antenna shorter than jaw; legs short; abdomen not humped; debris not carried; tubercles undeveloped or rudimentary; setae very short, consisting of two kinds: one is truncated setae mainly distributed on the dorsal side (the setae gradually dilated apically, the top being weakly concave and armed with microscopic spines, as shown in Fig. 4f), and the other is simply pointed setae largely found on the ventral side; cranial setae S12 present. In primary setae, lateral setae of thorax and latero-dorsal setae of 2nd to 5th abdominal segments rather remote to each other and not closely situated on one tubercle; 1st abdominal segment without subdorsal seta (which is placed between the sub-



Figs. 1-2. *Brinckochrysa kintoki* (OKAMOTO). — 1. 3rd instar larva, dorsal view, $\times 10$. — 2. Adult, $\times 2.5$: (a) male; (b) female.

median seta and latero-dorsal setae in other genera), with one latero-dorsal seta and with one lateral seta. In 2nd and 3rd instars, secondary setae of epicranium relatively developed; tubercles without secondary setae, except that the lateral tubercles bear one to four on the 3rd to 8th abdominal segments.

Brinckochrysa kintoki (OKAMOTO) n. comb.

Chrysopa kintoki OKAMOTO, 1919a, p. 62-63, pl. 5, fig. 6. — OKAMOTO, 1919b, p. 9-10. — TOSAWA, 1932, p. 26. — KUWAYAMA, 1962, p. 364.

Brinckochrysa scelestes: TSUKAGUCHI (not BANKS, 1911), 1977, p. 180-184, fig. 9.

Egg (Fig. 3).

Length of egg about 1.0 mm, and of its footstalk 3.0-4.5 mm. Egg elongate-elliptical, becoming slightly narrower toward anti-micropylar pole; when first laid, light green to green, except at white micropylar projection. Footstalk short.

Larva (Figs. 1, 4-7).

Third instar larva (Figs. 1, 4). General features: Length 9.5-12.5 mm. Head width 0.80-0.95 mm. Elongate and flattened; thorax and abdomen pale white to greyish-white, marked with

reddish-brown to reddish-black on dorsal side, as shown in Fig. 1.

External characters: Head as shown in Figs. 4a and 4b. Cranium not dilated in central area. Antenna short, the pedicel being considerably reduced. Jaw distinctly curved near distal part. Labial palpus somewhat short. Thorax and abdomen as shown in Figs. 4c and 4d. Pronotal median sclerite not found. Mesothoracic postnotum well developed. Legs with tibiae especially reduced; claws evenly curved, simple and not squarely dilated at base (Fig. 4e). Neumerous secondary setae present, except that the legs bear a small number of them.

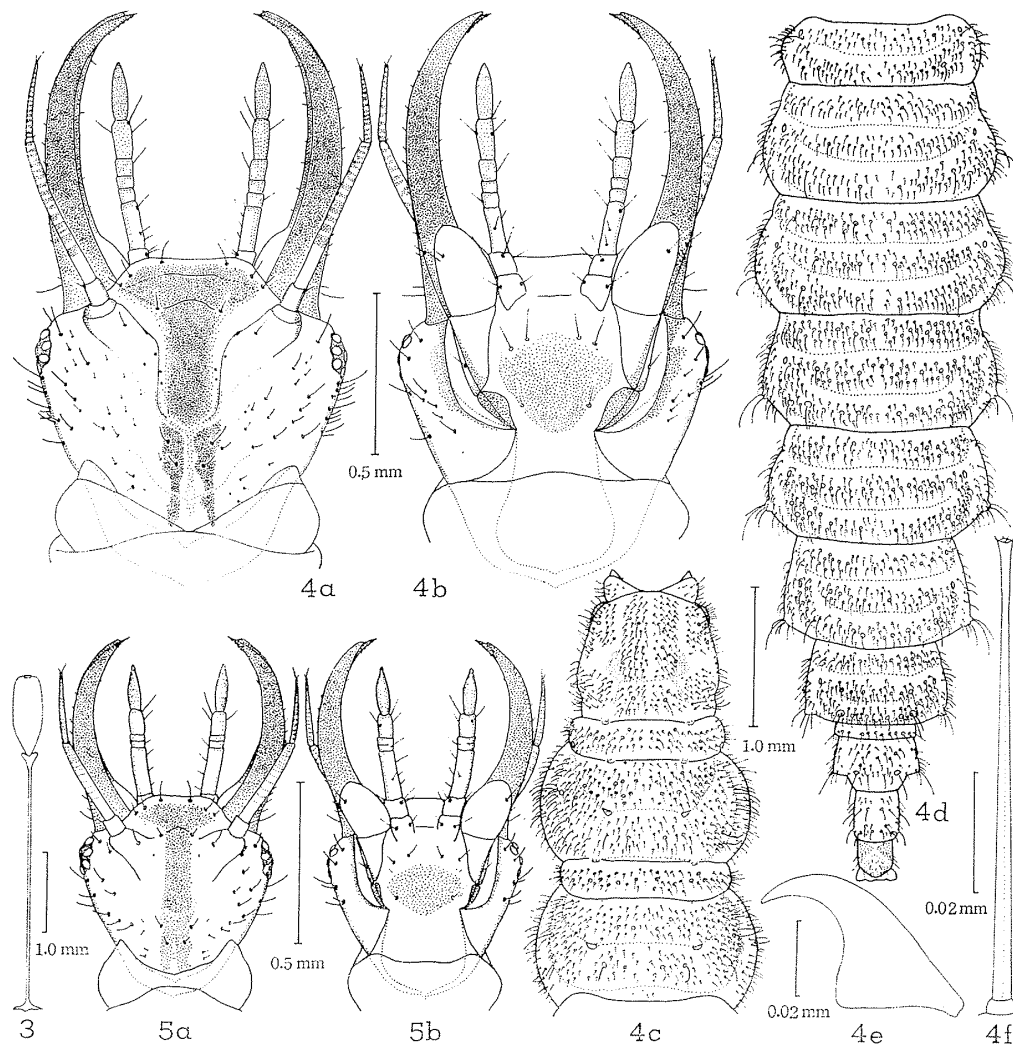
Colouration: Cranium pale creamy to greyish-creamy, with dark brown to blackish-brown markings on dorsal side (Fig. 4a); clypeal marking transversely broad, more or less faded, and almost entirely united to frontal marking which is hardly divided on longitudinal axis; a pair of epicranial markings longitudinally narrow; central area of cranium often pigmented with red along epicranial suture. Genal marking brown to blackish-brown, placed along lateral margin. Eye black. Antenna subhyaline, pale creamy to greyish-creamy, nearly annulated with pale brown to deep brown thickenings on pedicel and flagellum. Jaw dark brown to blackish-brown; maxillary basal part creamy. Cardo pale brown to deep brown; stipes pale creamy except at brownish basal part. Mentum pale brown to deep brown, with greyish-creamy anterior half; labial palpus subhyaline, pale creamy, nearly annulated with pale brown to deep brown thickenings on penultimate and terminal segments. Cervical region pale creamy to greyish-creamy, with reddish-brown stripe on lateral side; lateral sclerite dark brown to blackish-brown. Thorax pale white to greyish-white; mid-dorsal line blackish-grey; pleural sclerites dark brown to blackish-brown; lateral side largely marked with reddish-brown to dark brown; ventral side without any markings. Pronotum with longitudinal light brown to reddish-brown band on submedian area; postnotum suffused with reddish-brown to reddish-black marking; latero-dorsal sclerites dark brown to blackish-brown. Meso- and metathorax marked with reddish-brown to reddish-black on anterior halves and posterior parts; these markings entirely united to lateral markings; latero-dorsal sclerites tinged with brown. Legs pale creamy to greyish-creamy; basal parts of coxae, femora (except at basal and apical parts), apical parts of tibiae, tarsi and apices of empodia blackish-brown; claws pale brown. Abdomen pale white to greyish-white; dorsal sides of 1st to 10th segments (except on median areas of these segments and lateral marginal areas of 3rd to 8th segments) with broad reddish-brown to reddish-black markings, which are faded or interrupted on the 3rd and 4th segments; mid-dorsal line blackish-grey, usually extending from 1st to 9th segments; ventro-lateral areas of 1st to 8th segments with continuous reddish-brown to reddish-black markings, which are entirely united to the dorsal markings on the 1st and 2nd segments and are partially connected with them on the 3rd and 4th segments. All setae subhyaline, not pigmented.

Second instar larva (Figs. 5, 6). Length 6.5–8.0 mm. Head width 0.6 mm or so. Similar to, but differs from the 3rd instar larva in the following points: Secondary setae considerably decreased in number (Figs. 5, 6). Cranial markings slightly faded; thoracic and abdominal markings rather lighter and somewhat reduced.

First instar larva (Fig. 7). Length 4.0–4.5 mm. Head width about 0.4 mm. Differs from the 3rd instar larva as follows: Setae exceedingly decreased in number; only primary setae provided, as shown in Fig. 7. Cranial markings faded, reduced and somewhat indistinct (Fig. 7a); frontal marking usually divided; jaw pale brown; in some specimens cardo, stipes and mentum wholly pale creamy to greyish-creamy; thoracic and abdominal markings very pale, much reduced; pronotal latero-dorsal sclerite and pleural sclerites faded; meso- and metathoracic latero-dorsal sclerites subhyaline, not pigmented; basal parts of coxae, femora, apical parts of tibiae and tarsi faded, nearly pale creamy to greyish-creamy.

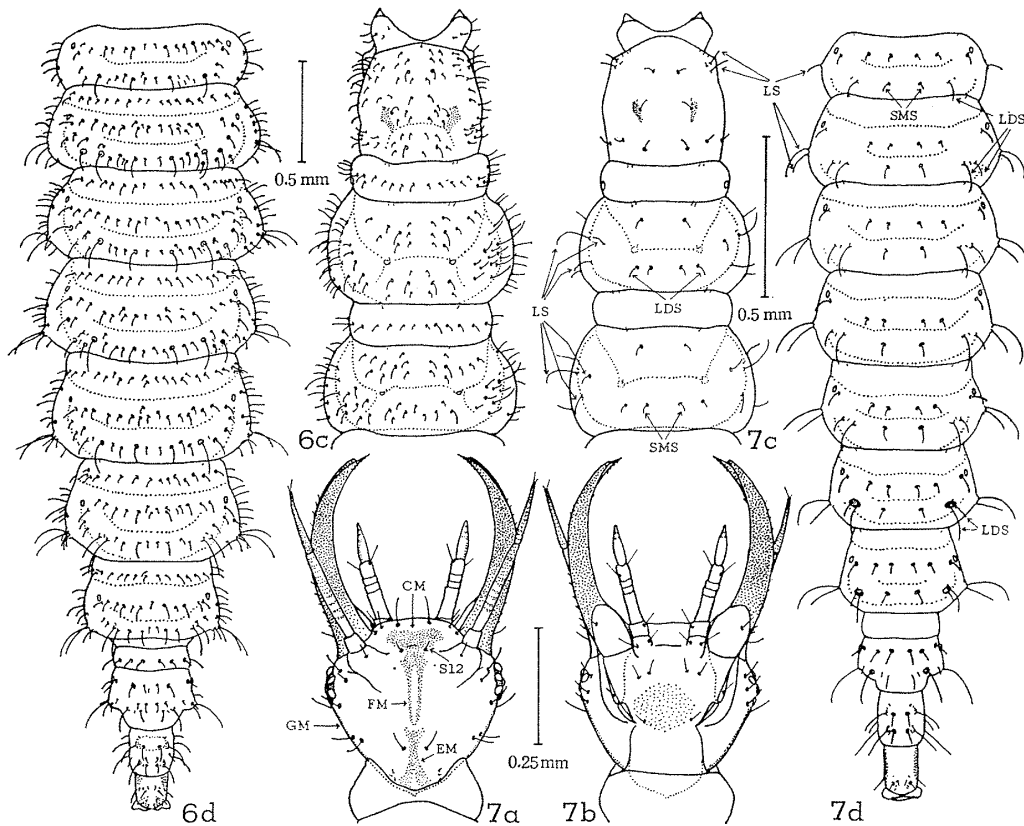
Adult (Figs. 2, 8–16).

♂. Length of body 9.0 mm or so, of antenna 16.0–17.0 mm, of forewing 12.0–13.0 mm, of hindwing 10.5–11.5 mm. ♀. Length of body 10.0–11.0 mm, of antenna 18.0–19.0 mm, of forewing 13.5–14.5 mm, of hindwing 11.5–12.5 mm.



Figs. 3–5. Egg and larva of *Brinckochrysa kintoki* (OKAMOTO). — 3. Egg, lateral view. — 4. 3rd instar larva: (a) head, dorsal view; (b) head, ventral view; (c) thorax, dorsal view; (d) abdomen, dorsal view; (e) claw, lateral view; (f) truncated seta, lateral view. — 5. 2nd instar larva, lettering as in Fig. 4.

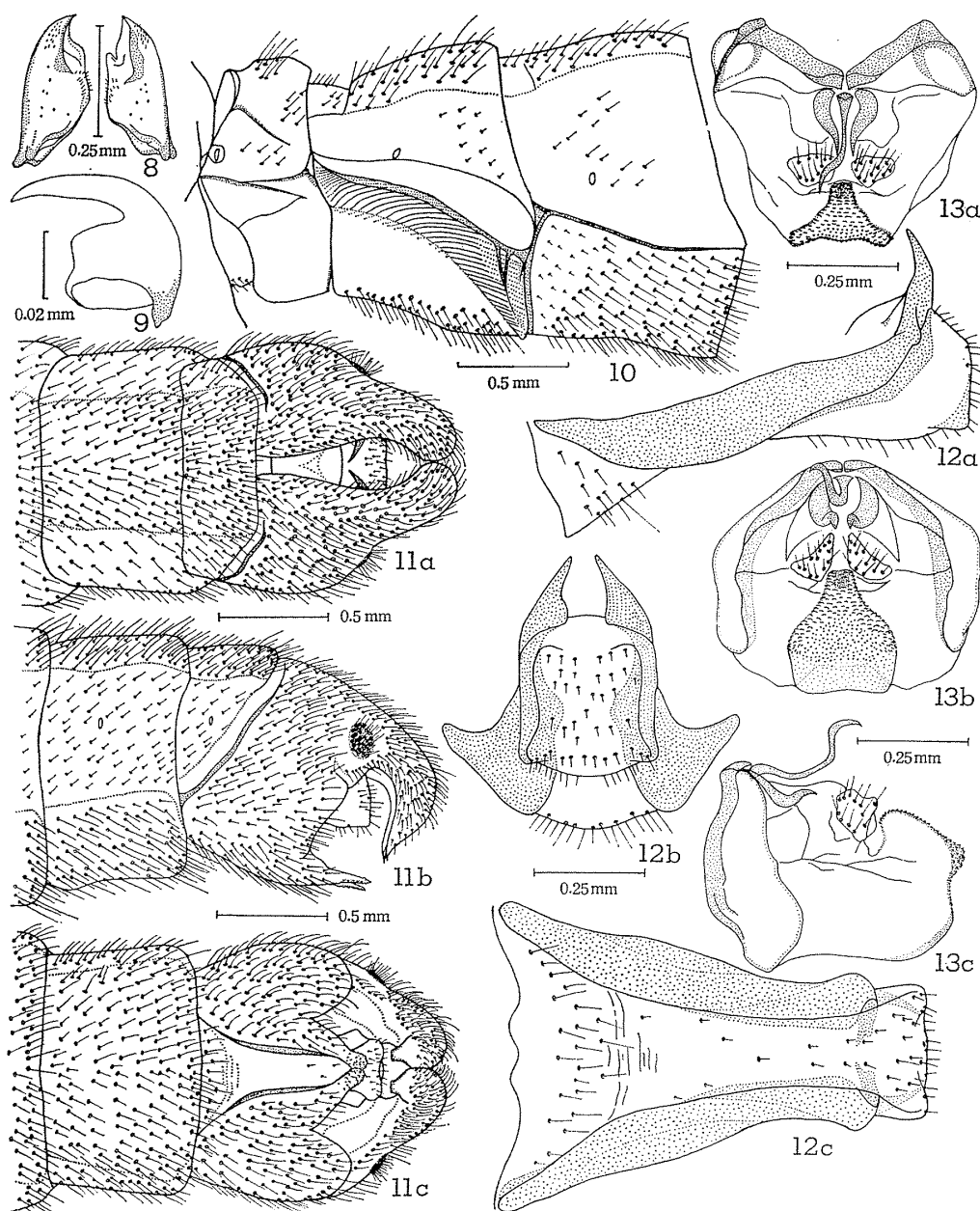
Head yellowish-green; in female frontal and clypeal regions mottled with reddish-pink, but in male not mottled. Antenna longer than forewing, a little stout; scape slightly longer than broad, yellowish-green; pedicel tinged with pale ochre; flagellum ochreous to pale brown. Mandibles asymmetrical (Fig. 8), dark brown. Thorax light green to green on dorsal side, and pale green on lateral and ventral sides; longitudinal mid-dorsal vitta light yellow, but more or less indistinct on prothorax; prothoracic antero-lateral angle with reddish-brown spot. Wings hyaline, without spots or shadings and with green pterostigma; most veins green; in forewing some basal crossveins and gradate crossveins somewhat infuscated; tip of cell *im* beyond 1st radio-medial crossvein; number of gradates in male 5–8/9–11 in forewing and 4–6/8–9 in hindwing, and in female 6–9/9–11 in forewing and 4–7/7–11 in hindwing. Legs faintly tinged with pale green; claws brown, strongly curved and squarely dilated at base (Fig. 9). Abdomen green on dorsal side, light green to green on lateral



Figs. 6-7. Larva of *Brinckochrysa kintoki* (OKAMOTO). — 6. 2nd instar larva, dorsal view; (c) thorax; (d) abdomen. — 7. 1st instar larva: (a) head, dorsal view, (b) head, ventral view, (c) & (d), lettering as in Fig. 6. (CM, clypeal marking; FM, frontal marking; EM, epicranial marking; GM, genal marking, S12, seta S12; SMS, submedian setae; LDS, latero-dorsal setae; LS, lateral setae).

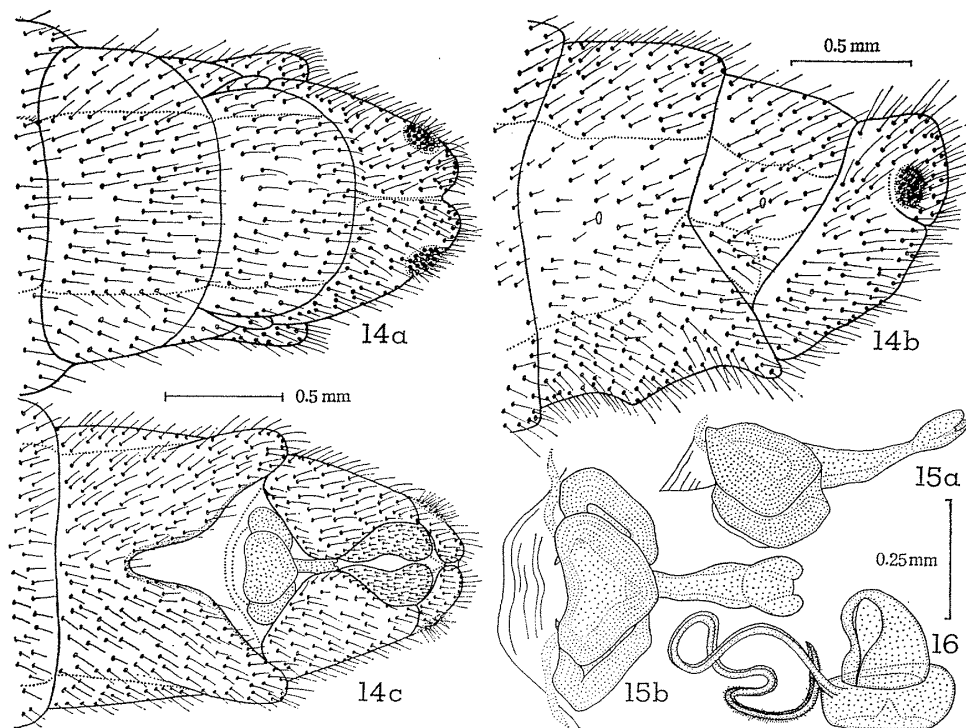
side and greenish-yellow on ventral side; longitudinal mid-dorsal vitta light yellow; lateral side of 2nd abdominal segment with file-like structure which obliquely extends from the mid-anterior margin to the lower posterior end, and which is well developed and somewhat projects at the lower posterior end in male (Fig. 10), instead of weak development and of no projection in female. Setae consisting of following three kinds in colour; subhyaline setae (largely on body throughout), brown setae (on flagellum, and in female on dorsal and ventral sides of abdomen), and dark brown setae (on latero-dorsal area of pronotum, veins and marginal fringes of wings, apical parts of femora, tibiae, tarsi, dorsal and lateral areas of tergite 9+ectoproct, and in female posterior parts of 5th to 7th sternites).

Terminalia: ♂. Tergite 9+ectoproct distinctly separated dorsally (Fig. 11a), and enlarged downward beyond 8th and 9th sternites (Figs. 11b, 11c), with short groove extending from hind margin below callus cerci; dorsal posterior part with a pair of distinct, ventrally curved horn-like arms, which are exceedingly flattened at the serrated apex (Fig. 11b); ventral part forming into thigh of bird (seen from below), with a pair of distinct, narrow, inwardly and posteriorly projected arms set with many microscopic spines on distal part (Fig. 11c); apodeme of 9th tergite running along anterior margin from latero-anterior angle to dorsal side, with a short branch near latero-anterior angle. Eighth and 9th sternites almost entirely united to each other, faintly separated by wrinkles



Figs. 8–13. Male of *Brinckochrysa kintoki* (OKAMOTO). — 8. Mandibles, ventral view. — 9. Claw, lateral view. — 10. 1st to 3rd abdominal segments, lateral view. — 11. 7th to terminal segments of abdomen: (a) dorsal view; (b) lateral view; (c) ventral view. — 12. 8th to 9th sternites: (a) lateral view; (b) posterior view; (c) ventral view. — 13. Genital armatures: (a) dorsal view; (b) posterior view; (c) lateral view.

(Fig. 12c); 8th sternite narrow, transversely broad; 9th sternite longitudinally prolonged, and dilated on posterior part, which has a concavity at the median portion of the ventral apical end; solimere projecting beyond upper side near apex of 9th sternite (Fig. 12a), without lateral plate-like extension, and tip of solimere with small rounded projection on inside, without teeth on outside (Fig. 12b).



Figs. 14–16. Female of *Brinckochrysa kintoki* (OKAMOTO). — 14. 7th to terminal segments of abdomen: (a) dorsal view; (b) lateral view; (c) ventral view. — 15. Subgenitale: (a) lateral view; (b) ventral view. — 16. Spermatheca, lateral view.

Genital armatures as shown in Fig. 13. Tignum, pseudopenis and gonapsis absent. Gonarcus divided into two parts on membranously jointed median top; entoprocessus situated around arcessus, nearly crescent-shaped, with claw-shaped projection on distal end; arcessus very fine, long, with exceedingly and ventrally curved part; number of gonosetae about 12 in one side; spinellae well developed, dentate on upper and lateral marginal areas, microscopically spinescent on lower median area, under which a sclerotized plate is provided; gonocristae absent. ♀. Tergite 9+ectoproct faintly divided dorsally by a shallow groove (Fig. 14a). Seventh sternite with a deep incision on ventral hind margin (Fig. 14c), distinctly projecting downward at latero-ventral hind angle, and somewhat dilated downward at tip of the above incision (Fig. 14b). Subgenitale extraordinarily developed, consisting of two parts, viz., a large basal swelling and a narrow distal projection (Fig. 15). Spermatheca with ventral shallow incision; duct moderate in length (Fig. 16).

Specimens examined. Eggs: 10 exs. in laboratory deposited lots (F_1 generation) from females collected at Sakai, Osaka Pref., 29. VIII. 1977 (S. TSUKAGUCHI); 10 exs. in laboratory deposited lots (F_1 generation) from a female collected at Kobe, Hyogo Pref., 4. IX. 1977 (S. TSUKAGUCHI).

Larvae: 9 exs. in laboratory reared lots (F_1 generation) from females collected at Sakai, Osaka Pref., 29. VIII. 1977 (S. TSUKAGUCHI); 6 exs. in laboratory reared lots (F_1 generation) from a female collected at Kobe, Hyogo Pref., 1. IX. 1973 (S. TSUKAGUCHI); 15 exs., in laboratory reared lots (F_1 generation) from a female collected at Kobe, Hyogo Pref., 14. IX. 1975 (S. TSUKAGUCHI); 6 exs. in laboratory reared lots (F_1 generation) from a female collected at Kobe, Hyogo Pref., 4. IX. 1977 (S. TSUKAGUCHI).

Adults: 1 ♀, Sakata, Yamagata Pref., 27. VI. 1956 (K. SHIRAHATA); 1 ♀, Yawatacho, Kyoto Pref., 19. VII. 1973 (M. OWADA); 1 ♀, Tondabayashi, Osaka Pref., 5. X. 1964 (I. HIURA); 4 ♂, 5 ♀,

Sakai, Osaka Pref., 29. VIII-1. IX. 1977 (S. TSUKAGUCHI); 1 ♀, Kobe, Hyogo Pref., 5. VIII. 1973 (S. TSUKAGUCHI); 1 ♀, Kobe, Hyogo Pref., 1. IX. 1973 (S. TSUKAGUCHI); 1 ♀, Kobe, Hyogo Pref., 14. IX. 1975 (S. TSUKAGUCHI); 1 ♀, Kobe, Hyogo Pref., 4. IX. 1977 (S. TSUKAGUCHI).

Distribution. Japan (Honshu).

Biological notes. This species occurs on plains and mountainous regions, but is fairly rare. In Osaka and its vicinities, the adults were chiefly found from late August to mid-September, and attracted to light at night. Although the habitat of the species was unknown, the adults were found resting on the undersides of the leaves of *Catalpa bignonioides* WALTER, along with other chrysopid species, viz., *Chrysopa septempunctata* WESMAEL, *C. formosa* BRAUER, *Anisochrysa* (*Anisochrysa*) *boninensis* (OKAMOTO), *A. (A.) formosana* (MATSUMURA) and *A. (Chrysoperla) nipponensis* (OKAMOTO). In laboratory conditions, the eggs were laid singly, or in widely spaced groups of 7 to 14. The larvae do not carry debris on their backs. Judging from the flattened form, it is supposed that the larvae usually hide out under shelters. For the larval diets, the following aphids were supplied: *Aphis gossypii* GLOVER and *Macchiatella itadori* SHINJI, but the growth of the larvae was inhibited on the late 3rd instar, without spinning the cocoons. The adults, which were reared by supply of honey solution, seem not to be aphid-feeders, and give off the same stink as that of *Chrysopa* species.

Remarks. This species is quite distinct in the adult male from any other described *Brinckochrysa* species by the following points: Larger in size; the tergite 9+ectoproct with the large horn-like dorsal arms instead of the short, apically rounded arms, and with the distinct ventral arms, which are absent in the others of the genus; the solimere without the lateral plate-like extension, which is present in the others. This species is characterized by the file-like structure of 2nd abdominal segment, and, as far as I know, the presence of the structure has not previously been reported in any other chrysopid species.

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