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DEVELOPMENTAL STAGES OF *BRACHYNEMA* AND  
ITS ALLIED GENUS OF JAPAN (Pentatomidae)  
(The developmental stages of some species of the  
Japanese Pentatomoidea XV)

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The genus *Brachynema* is represented in Japan by only one species, *Brachynema ishiharai* Linnavuori which was recently described from Japan. In the present paper, the diagnoses of the developmental stages of this species and its allied genus *Plautia* are given, together with brief bionomics of this species. Prior to entering the subject, I wish to express my sincere thanks to Professor Dr. T. Ishihara, Mr. H. Hasegawa and Professor Dr. S. Miyamoto who kindly advised me during all the time of the present work.

Diagnosis of the genus *Brachynema*

*Brachynema ishiharai* Linnavuori [Nom. Jap.: *Ishihara-kamemushi*]

1961 *Brachynema ishiharai* Linnavuori, Ann. Ent. Fenn. 27 (2) : 85-86, f. 1.

1962 *Brachynema ishiharai* Ishihara, Rostria, 3 : 9, f. 1.

1965 *Brachynema ishiharai* Miyamoto, Genshoku-Konchu-Daizukan, Hokuryukan, Tokyo, 3 : 79, pl. 40, f. 7.

The present species which has rather rarely been collected in some mountainous regions in the vicinity of Tokyo and in Shikoku and the Tohoku district has one generation a year. The hibernated adults deposit the eggs on the leaves of the host plant, *Staphylea Bumalda* (Thunb.) DC. from the middle of July to the end of August. The larvae have an interesting habit that the 2nd or the 3rd instar larvae usually enter by a hole perforated by a bird or insects into the bag-shaped seed room and develop within the seed room until the room becoming narrow to keep them.

A. The egg [Fig. 1 : A~E]

Cylindrical, length about 1.0 mm, diameter about 0.7 mm, pale yellowish white at first, light reddish brown later, and reddish eye spots appear beneath chorion before hatching. Chorion light brown, furnished with minute verrucae which are arranged rather regularly. Micropylar projections capitate, strongly bended inward, white, very short, about 33  $\mu$ , about 20~25 in number. Egg-opener T-shaped, vertically about 0.20 mm, transversely about 0.38 mm, mostly pale yellowish brown, centrally thick brown, with transparent membranous appendages. The eggs are deposited on the undersurface of leaf of the host plant, making two to four rows or a mass of about 14 eggs.

The egg of the present species is similar to that of the genus *Plautia*, however, these

are discernible each other, by the shape which is cylindrical in *Brachynema* and short elliptical in *Plautia*. Further, the egg of this species is easily distinguishable from that of the genus *Menida*, by the structure of egg-surface which is laevigate in *Menida* (Kobayashi 1953).

B. *The larvae* [Fig. 1: F~N]

a. Key to the instars

- 1 (6) Wing-pads unrecognizable.
- 2 (3) Eyes not prominent ..... The 1st instar
- 3 (2) Eyes spherically protruding.
- 4 (5) Metanotum a little narrower than mesonotum ..... The 2nd instar
- 5 (4) Metanotum conspicuously narrower than mesonotum ..... The 3rd instar
- 6 (1) Anterior wing-pads recognizable.
- 7 (8) Posterior wing-pads undeveloped ..... The 4th instar
- 8 (7) Posterior wing-pads conspicuously developed ..... The 5th instar

b. The diagnoses of each instar larva

*The first instar* [Fig. 1: F]

Body elliptical, not depressed, about 1.2 mm in length. Stigmata black, opening inside the connexiva from the 2nd to the 8th (through all the instars). Body above with a lustre and scarcely furnished with short hairs (through all the instars). Head, thorax, dorsal abdominal plates and connexiva black. Head roundish triangular; median lobe longer than lateral lobes (in the 1st and 2nd instars); anterior margin of median lobe and antero-lateral margins of lateral lobes each gently arched (through all the instars). Thorax with laevigate lateral margins; mesonotum wider than pronotum (through all the instars); metanotum wider than mesonotum. No dorsal abdominal plate presents on the 1st and 2nd abdominal segments, although the plate which is often indistinct is present on the segmental suture between the 6th and the 7th abdominal segments, besides three dorsal abdominal plates possessing odoriferous gland orifices (through all the instars). Of dorsal abdominal plates having odoriferous gland orifices, the anterior one the widest, spindle shaped, conspicuously constricted medially, the middle one rather elliptical, the posterior one narrowest, elliptical of which fore-margin is almost straight and hind margin is convex. Connexiva comparatively small, semi-circular, each with laevigate outer margin (through all the instars). Abdomen mostly dark reddish brown, the anterior part and the surrounding areas of two dorsal abdominal plates having the middle and the posterior odoriferous gland orifices somewhat paler in hue, and with three white markings in the middle and the lateral portions of the 1st to the 3rd segments (in the 1st and 2nd instars) without punctures (through all the instars). Eyes not prominent, darkish red. Antennae light reddish brown, with whitish junctions. Legs light reddish brown; tarsi mostly pale yellow, apically fuscous. Claws pale yellow, apically dark (through all the instars). The ratio of pro-: meso-: metanotum about 5.3: 3.2: 1. The ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1: 2.3. The ratio of the antennal segments about I: II: III: IV = 1: 1.5: 1.3: 2.9.

*The second instar* [Fig. 1: G]

Body rather long elliptical, not depressed (through all the instars), about 2.4 mm

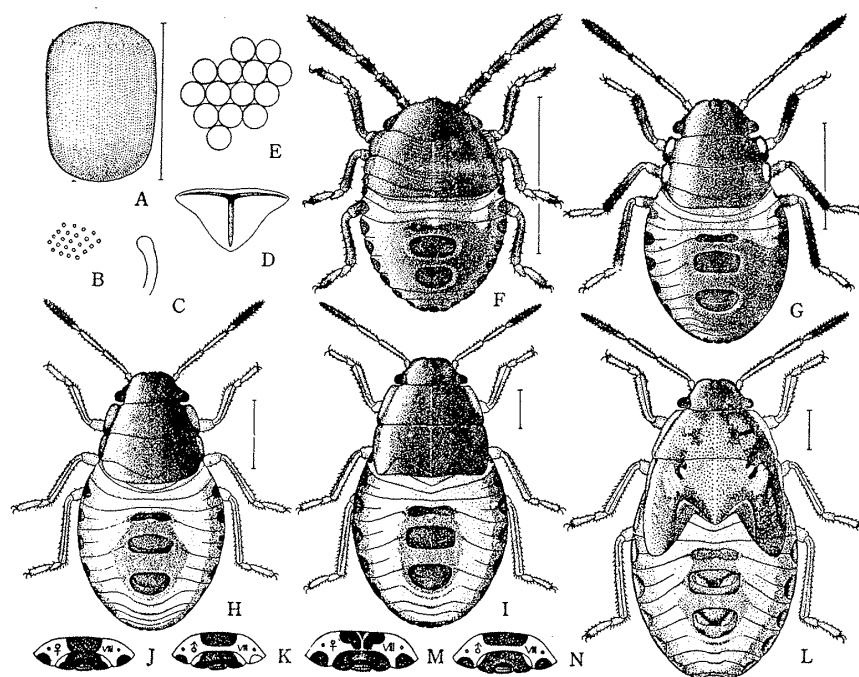


Fig. 1. *Brachynema ishiharai* Linnavuori [*Ishihara-kamemushi*].  
 A. egg, B. verrucae on chorion, C. micropylar projection, D. egg-opener,  
 E. egg-mass, F. the 1st instar, G. the 2nd instar, H. the 3rd instar, I.  
 the 4th instar, J. female character on distal sterna of the fourth instar  
 larva, K. male character in the same instar larva, L. the fifth instar, M.  
 female character on distal sterna of the fifth instar larva, N. male character  
 in the same instar larva. (calibration 1 mm).

in length. Head trapezoidal (in the 2nd~5th instars), piceous (in the 2nd~4th instars), sparsely furnished with punctures. Thorax comparatively long, piceous except pale yellowish markings on lateral parts of pronotum and of mesonotum, sparsely furnished with punctures; lateral margins of pronotum and of mesonotum considerably serrated; metanotum somewhat narrower than mesonotum and with roundly pointed lateral margins. Dorsal abdominal plates with odoriferous gland orifices piceous except the orifices which are yellowish brown, sparsely furnished with punctures (in the 2nd~4th instars); the anterior one spindle shaped, constricted medially, as wide as the posterior one (in the 2nd~5th instars); the middle one the largest, rather quadrate (in the 2nd~5th instars). Connexiva piceous, sparsely furnished with punctures (in the 2nd~5th instars). Eyes protruding, reddish black (in the 2nd~5th instars). Of antennal segments the 1st segment mostly pale yellow, proximally dark, the 2nd and the 3rd segments pale yellow except the apex of the 2nd segment, both ends of the 3rd segment and the anterior margins of both segments which are all darkish red, the 4th segment mostly black, proximally reddish. Legs: femora basally dark, apically pale yellow; tibiae mostly blackish or darkish red, proximally dark yellowish red; tarsi pale yellow, apically fuscous. The ratio of pro-: meso-: metanotum about 4.5 :

4.3: 1. The ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1 : 1.42. The ratio of the antennal segments about I : II : III : IV = 1 : 1.9 : 1.9 : 3.1.

*The third instar* [Fig. 1 : H]

Body length about 3.6 mm. Head piceous, furnished with massive punctures (in the 3rd~5th instars), median lobe as long as lateral lobes. Thorax comparatively long, piceous except light reddish yellow markings on lateral parts of pronotum and of mesonotum, furnished with massive punctures (in the 3rd~5th instars); lateral margins of pronotum and of mesonotum almost laevigate; metanotum extremely narrower than mesonotum and with lateral margins which are pungent and indistinguishable from the hind margin. Abdomen mostly yellowish, centrally and marginally darkish red, with darkish red segmental sutures (in the 3rd and 4th instars). Of antennal segments the 1st to the 3rd segments mostly pale yellow, apical portions and the anterior (and the posterior) margins of the 2nd and of the 3rd segments reddish, the 4th segment mostly blackish, proximally yellowish red (in the 3rd~5th instars). Legs mostly pale yellowish, the middle of tibiae yellowish red, the apices of tibiae and of tarsi grayish or darkish (in the 3rd and 4th instars). The ratio of pro-: meso-: metanotum about 5.7 : 6.6 : 1. The ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1 : 1.2. The ratio of the antennal segments about I : II : III : IV = 1 : 2.3 : 2.0 : 3.4.

*The fourth instar* [Fig. 1 : I~K]

Body length about 5.4 mm. Median lobe rather small and narrower than lateral lobes (in the 4th and 5th instars). Thorax comparatively long, with laevigate and gently arched lateral margins, mostly piceous except pale yellowish brown portions on lateral parts of pronotum, sometimes brownish spots appear on mesonotum; anterior wing-pads developed, but posterior wing-pads undeveloped yet. Connexiva mostly piceous, sometimes the outer portion of each brownish. External sexual character is recognizable in the present instar and the final instar larvae. Namely, the female larva with an indistinct triangular concavity in the middle of posterior margin of the 8th sternite, but the male larva without this structure. The ratio of pro-: meso-: metanotum about 7.8 : 10.0 : 1. The ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1 : 1.2. The ratio of the antennal segments about I : II : III : IV = 1 : 2.5 : 2.2 : 3.4.

*The fifth instar* [Fig. 1 : L~N]

Body length about 7.8 mm. Of two ventral abdominal trichobothria, the outer one placed right posterior to the stigma of each segment from the 3rd to the 7th, and the inner one situated almost right interior to the outer one (in the 3rd to the 5th instars). Head, thorax and dorsal abdominal plates with odoriferous gland orifices piceous or mottled with black and amber colour as figured, with a pitch-like or amber-like lustre, furnished with massive punctures. Thorax long; anterior and posterior wing-pads conspicuously developed. Abdomen mostly pale yellowish brown, centrally and marginally darkish red, with dark reddish segmental sutures. Connexiva whole piceous or the inner part of each black, the outer part yellowish brown. Of antennal segments the 1st and the 2nd segments amber-like, pale yellowish brown, the 3rd segment mostly piceous, proximally yellowish dark brown,

the 4th segment piceous, or similarly coloured to those of the 3rd and the 4th instars. Legs amber-like, pale yellowish brown except fuscous apices of tarsi. The female larva with a distinct and a rather indistinct triangular concavities, each in the middle of posterior margin of the 8th sternite and of anterior margin of the 9th sternite. The male larva without such structure. The ratio of pro- : meso- : metanotum about 1 : 1.43 : 0. The ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1 : 1.1. The ratio of the antennal segments about I : II : III : IV = 1 : 2.6 : 2.3 : 3.3.

The larva of the present species resemble that of the genus *Plautia*, however, those are discernible each other by the body shape which is long elliptical in *Brachynema* and short elliptical in *Plautia*. Further the larva of this species is easily distinguishable from that of the genus *Menida* by that the body of *Menida* which is not only short elliptical, but furnished with massive black punctures throughout the body surface, inclusive of abdomen (Kobayashi 1953).

#### Diagnosis of the genus *Plautia*

The genus *Plautia* is represented in Japan by two species, *Plautia stali* Scott which is distributed in Honshu, Shikoku and Kyushu of Japan, and injures various latifoliate trees and forbs, and *P. splendens* Distant. The developmental stages and brief bionomics of the former have already been reported by me (1956), although those of the latter have not been studied yet.

##### A. The egg

Short elliptical. Chorion light brown, furnished with minute verrucae, as in *Brachynema*. Micropylar projections white, short, clavate. Egg-opener T-shaped, with hyaline membranous appendages. The eggs are deposited on the under surfaces of leaves of the host plants, making two or three rows or a mass of about 11 eggs.

The egg of the present species is distinguishable from those of the genera *Brachynema* and *Menida* by the shape of *Brachynema* which is rather cylindrical and also by the egg-surface of *Menida* which is laevigate.

##### B. The larvae

Body short elliptical, not depressed. Stigmata black in the 1st to the 3rd instars, light greenish brown in the 4th and 5th instars, opening inside the connexiva from the 2nd to the 8th. Two trichobothria placed abreast right posterior to the stigma of each segment from the 3rd to the 7th (in the 3rd~5th instars). Body above with a lustre and scarcely furnished with short hairs. Head roundish triangular in the 1st instar, rather trapezoidal in the 2nd to the 5th instars, with gently arched antero-lateral margins, furnished with punctures; median lobe longer than lateral lobes in the 1st and 2nd instars, as wide as in the 3rd and 4th instars, shorter in the 5th instar. Thorax wide; mesonotum wider than pronotum in all the instars; metanotum wider than mesonotum in the 1st instar, shorter than mesonotum and the lateral margins not pungent in the 2nd instar; metanotum shorter than mesonotum and the lateral margins pungent and indistinguishable from the posterior margin in the 3rd instar; anterior wing-pads considerably developed, but the posterior ones undeveloped in the 4th instar; both wing-pads conspicuously developed in the 5th instar; lateral

margins of pronotum and of mesonotum serrated in the 2nd and 3rd instars. Abdomen semi-circular, without punctures. No dorsal abdominal plate present on the 1st and 2nd abdominal segments, although that is present on the segmental suture between the 6th and the 7th abdominal segments, besides three dorsal abdominal plates having odoriferous gland orifices. Of dorsal abdominal plates possessing odoriferous gland orifices, the anterior one the widest in the 1st instar, spindle shaped, medially constricted through all the instars; the middle one the widest in the 2nd to 5th instars, rather quadrate through all the instars; the posterior one the smallest and rather elliptical of which the anterior margin is almost straight, the posterior margin is convex through all the instars. Connexiva comparatively small, semi-circular, each with laevigate outer margin. The female larva of the 4th instar with an indistinct triangular concavity, that of the 5th instar with a distinct triangular concavity, each in the middle of posterior margin of the 8th sternite. The male larvae of the 4th and the 5th instars without such structures. In *Plautia stali* Scott, the ratio of the thoracic median length and the thoracic width at anterior margin of mesonotum about 1 : 2.3 in the 1st instar, about 1 : 1.5 in the 2nd~4th instars, about 1 : 1.6 in the 5th instar.

The larva of the present species is discernible that of the genus *Brachynema* by the body shape which is short elliptical in *Plautia* and long elliptical in *Brachynema*. Further, the larva of this species is easily distinguishable from that of the genus *Menida*, by the abdomen which is furnished with massive black punctures in *Menida*.

#### Literature cited

1. Ishihara, T. (1962): The distribution of *Brachynema ishiharai* Linnavuori. Rostria No. 3 : 9 (in Japanese).
2. Kobayashi, T. (1953): The developmental stages of six species of Japanese Pentatomoidea (Hemiptera). Sci. Rep. Matsuyama Agr. Col., No. 11 : 73-89.
3. — (1956): The developmental stages of some species of the Japanese Pentatomoidea (Hemiptera). V. Trans. Shikoku Ent. Soc., 4 (8) : 120-130.

#### ツヤアシブトコバチの寄主

立 川 哲 三 郎

愛媛県立果樹試験場鬼北分場の久保信吉氏は、愛媛県北宇和郡広見町で採集したフタスジシマメイガ *Herculia glaucinalis* Linné の若干の繭から、1965年6月7日に2頭の寄生蜂を羽化させた。筆者が検した所、2頭ともツヤアシブトコバチ *Tainania hakonensis* Ashmead のみであつた。本種はわが国（本州・四国・九州）にのみ産する種類であるが、今まで寄主が不明であつたので、ここに記録しておく。材料を提供された久保氏に厚く御礼を申し上げる。