

**A NEW SPECIES OF *TETRAMESA* WALKER
(INSECTA: HYMENOPTERA: EURYTOMIDAE)
ASSOCIATED WITH BAMBOO IN WEST MALAYSIA**

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ABSTRACT. - *Tetramesa gigantochloae*, new species, an eurytomid associated with bamboo in West Malaysia, is described. A brief account on the biology of the new species and on the damage caused by the phytophagous larvae is given.

INTRODUCTION

Tetramesa is an exclusively phytophagous genus of the predominantly parasitic family Eurytomidae (superfamily Chalcidoidea). The larvae of *Tetramesa* are associated with grasses (Gramineae). In many species they live in the central cavity of the internodes and feed on the inner tissues of the wall. They may cause swellings at the places attacked resulting in the growth of characteristic galls. Larvae of other species feed on seeds or form galls on stems or flowers. Some are causing stunted growth of the grass stem above the place of attack, the reduction of the productivity of the flowering head or the prevention of flowering and are regarded as serious pests of cereal crops (Claridge, 1961; Boucek, 1988). Most species of *Tetramesa* occur in the temperate zone of the northern hemisphere (about 120 species, Boucek, 1988). In the Oriental Region 12 valid species have been described (Narendran, 1994).

Tetramesa gigantochloae, new species, was discovered during an ongoing investigation on the arthropod fauna of bamboo in West Malaysia, Selangor Darul Ehsan, Ulu Gombak Field Studies Centre (Kovac, 1994; Kovac & Streit, in press). Prior to this investigation two *Tetramesa*-species, both from the temperate region, were known to be associated with bamboo: *Tetramesa phyllostachitis* (Gahan), which develops in stems of bamboo of the genus *Phyllostachis* in China, Japan, Europe and in North America (Gahan, 1922; Zerova, 1987) and *T. bambusae* Phillips, which attacks the stems of *Phyllostachis* in North America (Phillips, 1936). In the following the tropical species *T. gigantochloae*, new species will be described and a brief account of its biology will be given.

SYSTEMATICS

FAMILY EURYTOMIDAE

Tetramesa gigantochloae, new species

(Figs. 1-11)

Material examined. - Holotype - female (Accession No DZCU-6091), Ulu Gombak, West Malaysia, coll. Damir Kovac, 24 Aug.1993.

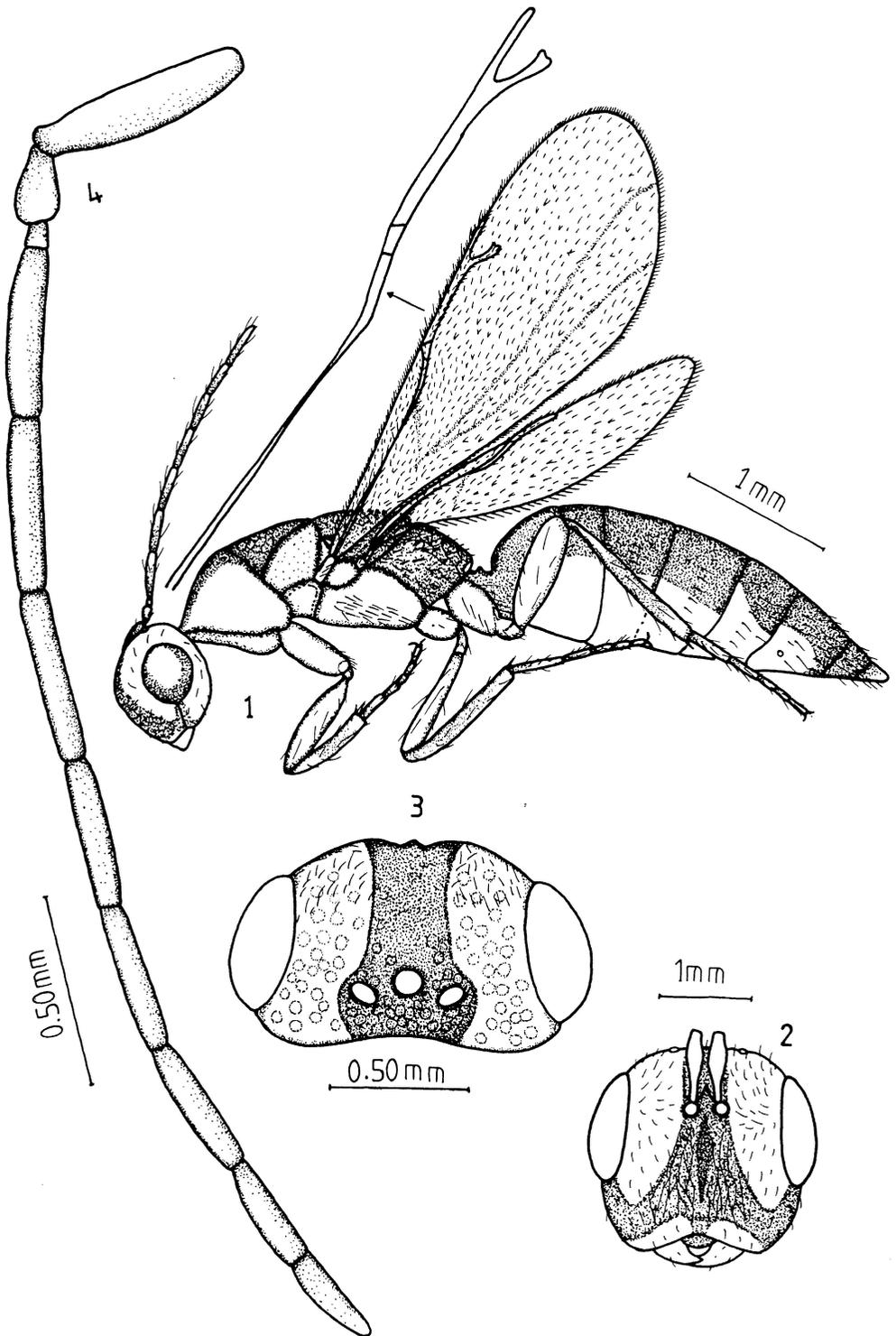
Paratypes - 7 females (Accession numbers DZCU-6092 to 6098), 2 males (Accession numbers DZCU-6099, 6100), 4 females (SMFH 2345 a-d) data same as holotype. The type material is deposited in the Department of Zoology, University of Calicut (DZCU) and Senckenberg Museum, Frankfurt a. M. (SMF).

Diagnosis. - Head and body with characteristic patterns of black and yellow colour patches; antennal formula of female and male 11162. Propodeum coarsely sculptured with deep irregular pits and a median furrow containing longitudinal row of irregular pits.

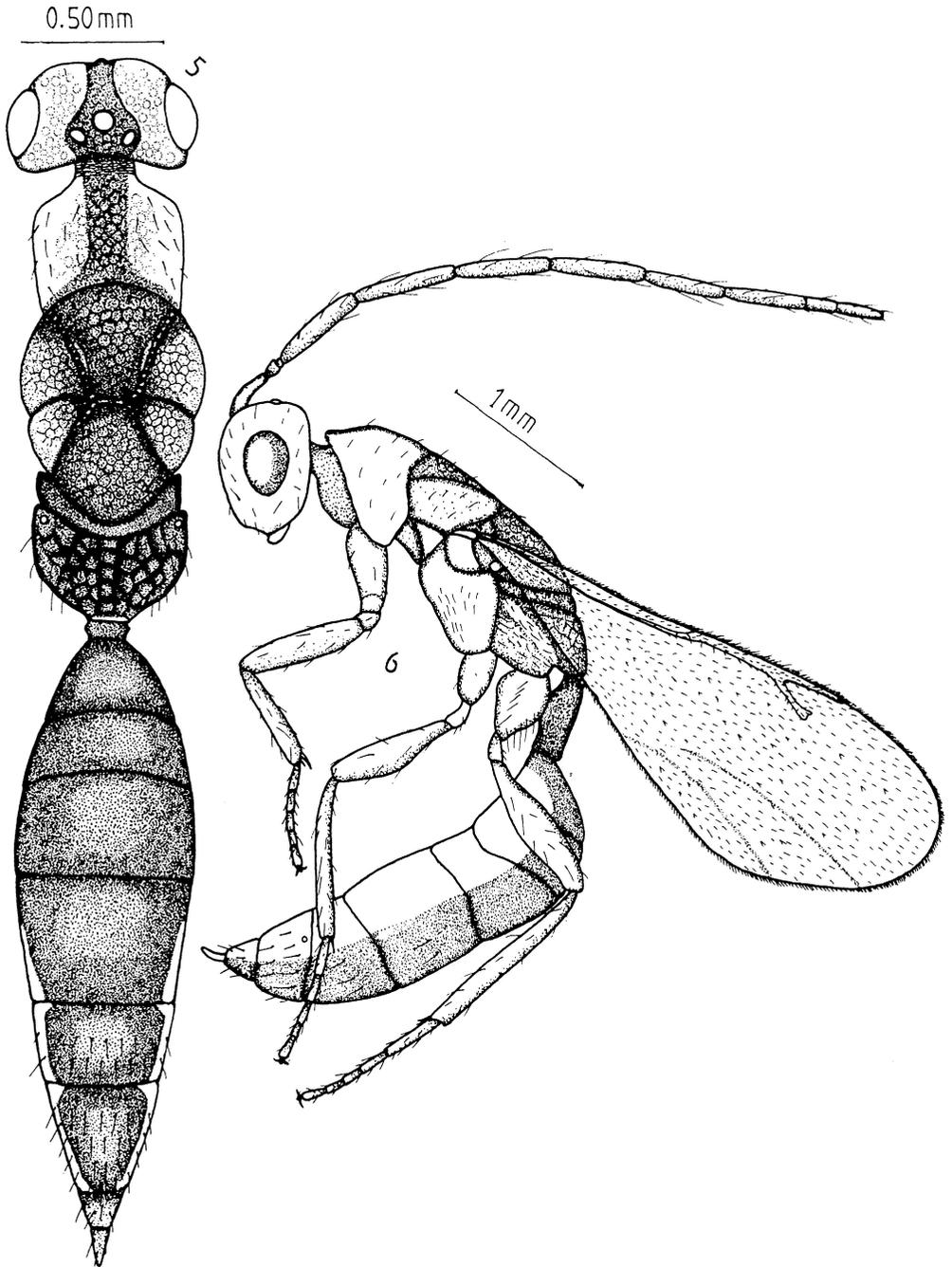
Description. - Holotype female: Length 9.3 mm. Black and yellow; antennal scape, apex and base of pedicel and ring segment honey yellow; remaining segments of antenna, scrobe, POL (post ocellar distance) area, median area posterior to POL, clypeus, part of malar space, lower part of genae, middle portion of pronotum, mesoscutum (except thin yellowish strip near notauli), notauli, scutellum and propodeum brownish black; anterior margin of head on either side of clypeus and base of mandibles reddish yellow; scapula and axilla mostly yellowish brown; region around eye (except part of malar space), sides of thorax, legs and ventral part of gaster pale brownish yellow; eyes and dorsal part of gaster black as in figure 5; mesoscutum and scutellum laterally with a yellow tint; wings hyaline with a brownish tint, veins brown, wing pubescence pale brown; body pubescence silvery.

Head: with shallow, sparse punctures, interstices wide, rugulose; black subtriangular area on face coarsely striate and reticulate; relative measurements of head: dorsal length: width 45:82; anterior length : width 46:52. Frons convex; lower margin of clypeus medially concave (Fig. 2); mouth opening wide; scrobe moderately deep, its inner surface smooth; margins ecarinate, its maximum width distinctly less than width of prescrobial space; toruli situated well above half distance between front ocellus and lower clypeal margin; interantennal projection moderately short and narrow; pre and post orbital carinae absent; relative measurements of eye length : width 13:11; eye length : malar space 13:6; POL:OOL (ocellocular distance):OD (hind ocellar diameter) 13:15:7; malar groove distinct; posterior margin of gena ecarinate. Antennal formula 11162 (with flagellum not distinctly demarcated into funicle and club).

Thorax: with dorsum faintly but distinctly rugoso-reticulate and shallowly punctate (Fig. 5). Relative measurements of dorsal length : width 111:44; pronotum large, anteriorly collum horizontally striate; posterior margin of pronotum smooth, concave; median width 1.1x its median length including collum. Mesoscutum with notauli complete, deeply grooved, groove set with deep row of pits; mesopleuron with epicnemial area sloping; scutellum length subequal to length of mesoscutum; scutellum dorsally in same plane as mesoscutum and pronotum, posteriorly laminated. Propodeum with irregular deep pits and a median furrow containing longitudinal row of irregular, deep pits; callus with long hairs (Fig. 5). Relative measurements of forewing length: width 30:10; m:pm:st as 40:19:15.



Figs. 1-4. *Tetramesa gigantochloae*, new species, female. 1, side view; 2, head, front view; 3, head, dorsal view; 4, antenna.



Figs. 5-6. *Tetramesa gigantochloae*, new species. 5, female, dorsal view of body; 6, male, side view of body.

Gaster: subsessile with a very short petiole, longer than head and thorax combined, gradually pointed towards apex (Fig. 5).

Male: Length 7.7 mm. Similar to female except following: colour more yellowish on head and thorax; antenna and body as in figure 6.

Etymology. - The species name refers to the genus name of the host plant.

Remarks. - *Tetramesa gigantochloae* does not fit to the description of any of the known species of *Tetramesa* and does not come to any couplet of the key to species of *Tetramesa* by Narendran (1994), Zerova (1978, 1987) and Nikolskaya (1952).

The new species differs from *T. phyllostachitis* in having the stigmal vein distinctly shorter than half of the marginal vein (in *T. phyllostachitis* stigmal vein is definitely longer than half of marginal vein), in having the antennal segments quite different in proportions and in having head and body with yellow and black patterns (in *T. phyllostachitis* head and body are black). *Tetramesa bambusae* differs from *T. gigantochloae* in having five funicular segments (in *T. gigantochloae* six funicular segments are present), body length less than 5 mm (in *T. gigantochloae* body length is much more than 5 mm) and in having head and body mostly black (in *T. gigantochloae* head and body with large yellow and black patches).

BIOLOGY

Tetramesa gigantochloae develops in shoots of the bamboo *Gigantochloa scortechinii* Gamble (Fig. 7), *G. latifolia* Ridl., *Dendrocalamus* sp. and probably other bamboo species. This eurytomid is common during the bamboo sprouting season and seems to be widespread in Peninsular Malaysia (collected in Ulu Gombak, Selangor, near Kuala Lumpur and in Perak, Gerik region). The occurrence and frequency of ovipositing females is closely correlated with the occurrence of bamboo shoots. In Ulu Gombak the first scattered new shoots of *G. scortechinii* were seen in June, the main sprouting season was August/September and the latest scattered (thick) shoots appeared in December. The shoots grew at a rate of c. 20 cm per day and reached their final length of c. 20 m after approximately 3-4 months. Only then branches and leaves developed and the culm sheaths began to fall off successively. Corresponding to the occurrence of the first shoots the first ovipositing female was observed in Ulu Gombak in the end of June. Large numbers of ovipositing females occurred in August/September. Some females were still observed in November, and scattered individuals may possibly occur as late as December.

The eggs are inserted into the bamboo wall close to the base of an internode, which is protected by the coarse culm sheaths (Figs. 7, 8). During oviposition the head of the female points downward (Fig. 7). Oviposition takes place both day and night. During the main sprouting season, when the population density of *T. gigantochloae* is high, more than 10 females standing abreast of each other may deposit their eggs at the same time. When disturbed *T. gigantochloae* will briefly fly away and then return. When a female has already inserted its ovipositor it will drive away potential enemies or other females by buzzing its wings. In two cases ovipositing *Tetramesa* were attacked and torn apart by ants of the genus *Crematogaster* (see Kovac, 1994: 128).

In *T. gigantochloae* and also in *T. phyllostachitis* (Gallowa, cited after Gahan, 1922) the eggs are deposited close to the base of the septum. The reason for this choice of oviposition site may be the fact that the relatively soft light green elongation zone is found in the lower part of the internode. It is likely a better food resource for the larvae than the relatively hard dark green upper part of the internode wall, even though the latter is not protected by the culm sheaths. Strikingly, the region preferred by *T. gigantochloae* for oviposition is also selected by the phytophagous bug *Notobitus affinis* for sucking on the shoot (Fig. 7).

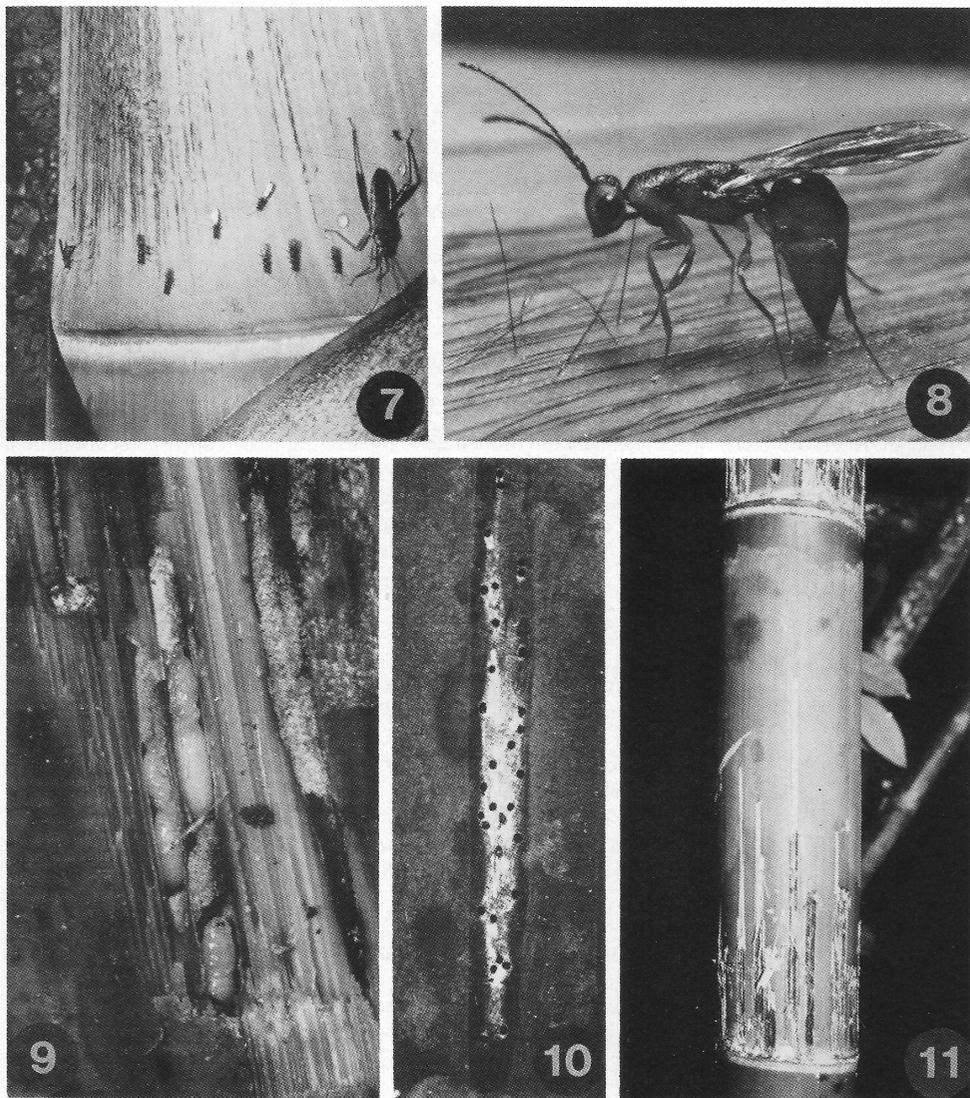
The yellowish-white cylindrical larvae of *T. gigantochloae* are phytophagous and feed on the wall substance of the bamboo shoots. The larval galleries extend only a few millimeters below the surface even though the wall thickness of the shoot in the lower part of the culm may be more than 10-15 mm. The short larval tunnels, which extend parallel to the bamboo surface, are arranged in groups and together form an elongately-oval pattern (Fig. 10). The larvae from these different tunnels certainly originated from the same batch of eggs.

As suggested by regular checks during the first four months after oviposition, the larvae seem to grow rapidly at first, but later on apparently enter a state of diapause which lasts several months. This may be concluded from the fact that at the beginning of the next bamboo sprouting season only a few pupae (Fig. 9) but many larvae are found. The exit hole, which is plugged up with sawdust, is probably constructed by the larvae before pupation. *Tetramesa gigantochloae* appears to be univoltine species. The exit holes, which like the tunnels are arranged in groups, are circular with a diameter of c. 0.7 to 1.2 mm (Figs. 9 and 10). Exit holes of *Tetramesa* are found only in internodes situated in the lower region of bamboo culms (up to a height of 3-4 m). This is the case because oviposition takes place only in low, still young shoots. After *T. gigantochloae* has emerged the abandoned larval tunnels are colonized by other animals, e. g. ants, which may enlarge the exit holes in some cases. The tissue above the larval galleries eventually decomposes (Fig. 10). This leads to the creation of larger openings in the bamboo surface, allowing larger animals, e. g. earwigs, to enter the cavities. Eventually the larval tunnels are completely open, and the resulting grooved surface is utilized, for example, by some spiders as base for the construction of cocoons.

Frequently the sites attacked by *Tetramesa* are found to be torn open longitudinally and badly damaged (Fig. 11). This is the work of the bamboo rat, *Rhizomys sumatranus*, which belongs to a well distinguished separate family of rodents restricted to forested areas of Southeast Asia. Lord Medway (1969) states that these usually subterranean bamboo-root eating animals sometimes climb bamboo, straddling the stem which is gripped between the legs, and with their teeth cut out regular sections of stem wall which are then taken to the burrow. We have also observed bamboo rats climbing bamboo culms at night to gnaw the culm surface (also observed by Steghaus-Kovac, pers. comm.).

A detailed investigation of the feeding damage (Fig. 11) showed that only internodes attacked by *Tetramesa* had been gnawed upon. The traces of gnawing accordingly were found only on the lower part of internodes and only on the lower internodes of the culms. In between the spots where pieces of wood had been torn off occasional *Tetramesa* exit holes and open larval galleries were clearly recognizable. Furthermore, in all cases observed so far the bamboo rats fed only on young culms that had sprouted in the preceding year. These observations suggest that bamboo rats climb the culms at night to feed on the larvae and pupae of *Tetramesa*. This conclusion is further supported by the fact that in captivity bamboo rats readily consume bones and meat (Lord Medway, 1969; own observations).

According to S. Sasser (cited by Gahan, 1922) the damage caused by *T. phyllostachitis* (Gahan) leads to the death of the attacked bamboo shoots. In *T. gigantochloae* this is not the case, at least not in the bamboo species studied so far. Except for the primary and secondary damage to the bamboo surface mentioned above, there is no recognizable negative effect on the culm as a whole. This is true for both shoots and older culms several years of age with numerous *Tetramesa* exit holes.



Figs. 7-11. *Tetramesa gigantochloae*, new species. 7, eight females laying eggs into the bamboo shoot of *G. scortechinii* (Ulu Gombak Field Studies Centre, West Malaysia, diameter of the shoot c. 9 cm). The large bug *Notobitus affinis* (to the right) selects the same site for sucking on the shoot; 8, female laying eggs (length c. 9 mm); 9, exposed larval galleries with 3 pupae. One exit hole is visible in the upper left; 10, openings of old, abandoned larval galleries leading to the outside, diameter of the holes c. 1 mm. The surrounding zone has begun to decompose (pale part of the bamboo surface). 11, *Tetramesa*-infested internodes whose surface has been ripped open in the lower part of the internode by the bamboo rat *R. sumatranus* (old traces). Diameter of the internode c. 8 cm.

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