

CONTRIBUTION TO THE KNOWLEDGE OF NEW OR LITTLE KNOWN  
LAST NYMPHAL INSTARS OF SOME TINGID-BUGS  
(HEMIPTERA-HETEROPTERA, TINGIDAE)

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Nymphs of the family Tingidæ are, as a rule, very interesting in their external morphology, and in many species they differ considerably in the appearance of imago. While in the majority of other families of Heteroptera the appearance of the imago may be quite well distinguished by the appearance of the last nymphal instar, in majority of Tingid-species, especially in these nymphs which have the imaginifugal spinose processes on body, the determination of the species is very difficult.

In this paper are described the fifth (last) nymphal instars of some species of the family Tingidæ. They are as follows.

*Agramma intermedia* (Wag.) which is very similar in its general appearance to the nymphs of the other *Agramma*-species. Although the nymph of the fifth instar of the *Agramma* (*læta* Fall.?) was figured by Wagner (1940), his figure is unfortunately too schematic, so that the distinguishing characters between both species could not be found.

The last nymphal instar of the species *Tingis reticulata* (H.—S.) is also described. This nymph has been hitherto unknown.

Also described is the fifth nymphal instar of the species *Tingis buddleix* Drake from Philippine Islands. This nymph is very interesting by reason of its long, ramified, spinose body processes and by its characteristic stellate hairs.

Also given is the description of the last nymphal instar of the species *Galeatus scrophicus* Saunders. Compared with the known nymph of *Galeatus maculatus* (H.-S.), described and figured by ordan (1933), the nymph of *Galeatus scrophicus* Saund. differs in having two long spinose processes, near each other, situated on the mesonotum.

The nymphs of *Stephanitis pyri* (F.) has been long ago observed (e. g. Balachowsky et Mesnil, 1935—36) but no good description and figure of it has been published. For this reason this nymph is redescribed by the author.

All the material of nymphs studied is from the collections of the National Museum in Prague.

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The author expresses his sincere thanks to Dr. Ludvík Hoberlandt who was kind enough to provide him with this material.

***Agramma intermedia* (Wag.)**

(5th nymphal instar, fig. 1)

Longish oval, flat, yellowish-ochreous in colour.

Measurements: (average based on five specimens). Total length of body 2.017 mm., maximal width of body 0.931 mm., width of head 0.441 mm., length of antenna 0.582 mm. (I: II: III: IV = 0.112 mm.: 0.078 mm.: 0.198 mm.: 0.194 mm.), length of tibia of hind leg 0.296 mm., length of tarsus of hind leg 0.129 mm.

Head: Head ochreous coloured. There are on the head only two pairs of processes: The paired anterior frontal processes are very short and thin, pressed to the head. Their distal ends (tips) reach the level of the base of the antenna only. But they never reach the anterior margin of the head (anteclypeus). In size they are approximatively equal, as they are in future in the imago (but distinguished by their colour). The occipital processes are also very short (approximatively as long as the paired frontal processes),

on their distal ends (tips) often blackish. In comparison with nymphs of the other genera of Tingidae they grow up relatively near each other. The distal ends of these occipital processes hardly reach the level of the posterior margin of the eyes. The occipital processes are imaginifugal. Eyes ochreous-red coloured. Antenniferous tubercles in their outer corners pointed. Antennae light yellowish-ochreous in colour, only the fourth antennal joint becomes dark distally. Tip of rostrum dark brown, it slightly overreaches the coxae of the first pair of legs.

Thorax: Pronotum five-angular, approximatively 1.6 times (0.755 mm.: 0.467 mm.) as wide as its median length. In front the pronotum is deeply concave so that anterior margin is arch-shaped. Lateral margins of pronotum almost straight. Posterior margin of pronotum produced into a triangular projection. In the posterolateral angles of pronotum there are very small moderate bulges coloured dark brown. Very near to these bulges, in the direction of the median-line of the body there are, on the posterior margin of the pro-

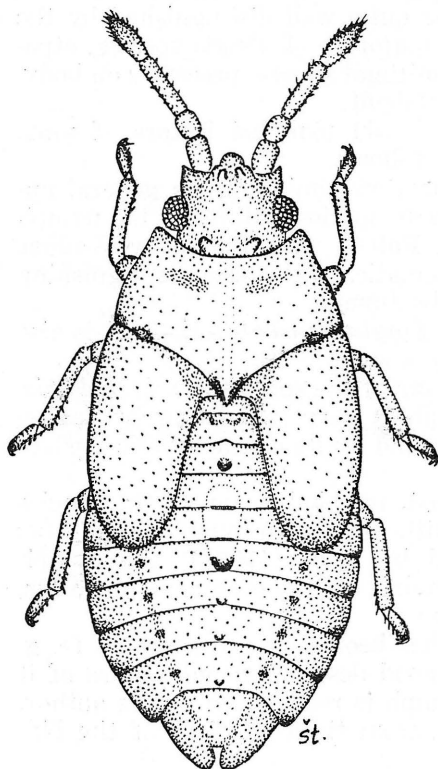


Fig. 1. *Agramma intermedia* (Wag.).  
5th instar nymph.

notum, two moderate bulges, dark-brown in colour, one on each side. On the hind triangular projection of the posterior pronotal margin there are two blackish spots situated alongside each other.

Mesonotum projecting into the hemelytral lobes; they reach the fifth abdominal tergite. On their distal ends they are usually blackish. Metathoracic alar lobes are also very long and they also reach the fifth abdominal tergite.

Abdomen: There are situated on the abdominal tergites in the median-line of the body, tubercles varied in size, as follows: On the second abdominal tergite marked tubercle black in colour, on the fifth tergite a very large tubercle, also blackish. Each of the 6th, 7th and 8th tergites is armed with one very small tubercle. These small tubercles are either ochreous or sometimes dark brown or blackish. The posterolateral angles of abdominal segments may be usually black-brown spots. The ninth abdominal segment (termination of body) is narrowly but deeply excised on its posterior margin. Dorsal abdominal glands are relatively very large, the anterior gland is orange.

The whole body surface (except legs and antennæ), especially the dorsal parts of the pronotum, mesonotum with hemelytral lobes and of the abdominal tergites is covered with very characteristic "structures" which look like tiny, usually three-tipped (but sometimes two- or four-tipped) little stars (fig. 4). By observing the body surface from above in transmitted light, are visible in these little stars small inscribed double circles, i.e. the places where these little stars grow out of the body. Among the "structures" of little stars are very small and fine glandulous hairs, staff- or club-shaped (fig. 7). Only a portion of the tergites in the region of the dorsal abdominal glands is bald and without this characteristic "structure".

On the antennæ and legs there are hairs, usually setti-form; the longest ones are on the distal end of the fourth antennal joint.

Material examined is in the collections of the National Museum in Praha. Nymphs of this species were taken by the National Museum in Praha expedition: Anat. Moğan gölü, 5. VII. 1947.

### *Tingis reticulata* (H.-S.)

(5th nymphal instar, fig. 2)

Oval, dorsoventral flat. General colour brown-ochreous, only the distal ends of the fourth antennal joints and of the second tarsal joints are blackish-brown. The body is armed with long spinose processes, partially ramified (fig. 11).

Measurements: Total length of body (without spinose processes) 3.304 mm. (length with spinose processes 4.004 mm.), maximal width of body (without spinose processes) 1.960 mm. (width of body with spinose processes 2.580 mm.), width of head 0.728 mm., length of antenna 1.374 mm. (I: II: III: IV = 0.184 mm.: 0.136 mm.: 0.629 mm.: 0.425 mm.), length of tibia of the hind leg 1.008 mm., length of tarsus of the hind leg 0.308 mm.

Head: Five long spinose processes are situated on the head. They are as follows: Paired anterior frontal processes projecting beyond the ante-

clypeus by at least half the length of one spine. They project forward and reach approximately to the base of the third antennal joint. The unpaired central frontal process projects obliquely upwards and frontally, also projecting beyond the anteclypeus. It is approximatively equal in size to the pair of anterior frontal processes. The longest of the head processes are the occipital ones, situated on the sides of the head near the posterior margins of the eyes and projecting obliquely to the sides. Antenniferous tubercles pointed into spines. They reach approximatively to the level of the anteclypeus. Eyes reddish-brown. Head margins and antennæ covered with hairs, club- or pestle-shaped. Rostrum reaches the anterior margin of the coxæ of the hind legs, approximatively as wide as tibiæ of legs, brown with only its tip blackish.

Thorax: Pronotum approximatively 1.83 times (1.540 mm. : 0.840 mm.) as wide as long in its median-line. On the anterior margin of the pronotum are two concavities side by side so that the middle of pronotal anterior margin is convex. The posterior margin of the pronotum forms a triangular projection reaching approximatively to the anterior margin of the metanotum. The lateral margins of the pronotum are convex, arch-like, curved and each of them armed with four large spinose processes. Caudally they become longer. Two pairs of similar, long, spinose processes in the median-line of pronotum. Two processes are always situated near each other in case of each pair. The anterior pair of these spinose processes are placed near the anterior margin of the pronotum, approximatively in the middle of the moderate bulge which is, as a matter of fact, the foundation of a vesicula which is later found in imago. The second pair of spinose processes is situated approximatively in the middle of the pronotal disc.

In the median-line of the mesonotum there is one pair of long spinose processes which are almost contiguous. Between them reaches the posterior projection of the pronotum. The hemelytral lobes, relatively long, reach the fifth abdominal tergite. On the outer lateral margins of each hemelytral lobe there are situated four long spinose processes. These processes become longer in the caudally (the first of them is the shortest).

Median-line of the metanotum with one pair of spinose processes which are approximately half the size of the similar processes on the mesonotum. The metathoracic alar lobes are very long, they reach approximately the same level as the hemelytral lobes, i.e. the fifth abdominal tergite.

Abdomen: In the median-line of the first abdominal tergite are two spinose processes, situated near each other, similar to the metanotal ones, but larger in size. The posterior margin of the first abdominal tergite is moderately excised (concave). In the median-line of the body near the posterior margins of tergites II, V, VI and VIII there is one unpaired long spinose process on each tergite. In the posterolateral angles of abdominal segments IV, V, VI, VII and VIII there is also one unpaired long spinose process in each angle. Only the ninth abdominal segment (end of body) terminates in two such processes. Summed up, there are on each lateral margin of the abdomen 6 spinose processes.

The whole surface of the body (including legs and antennæ) and especially the dorsal side, is covered with tiny conical tubercles. On these tubercles



are placed the club- or pestle-shaped glandular hairs. The largest ones are the tubercles and hairs on the body margins. By observing the body surface from above in transmitted light, the impression is given of the "structure of small double circles". This "structure" is caused by the ground-plan of

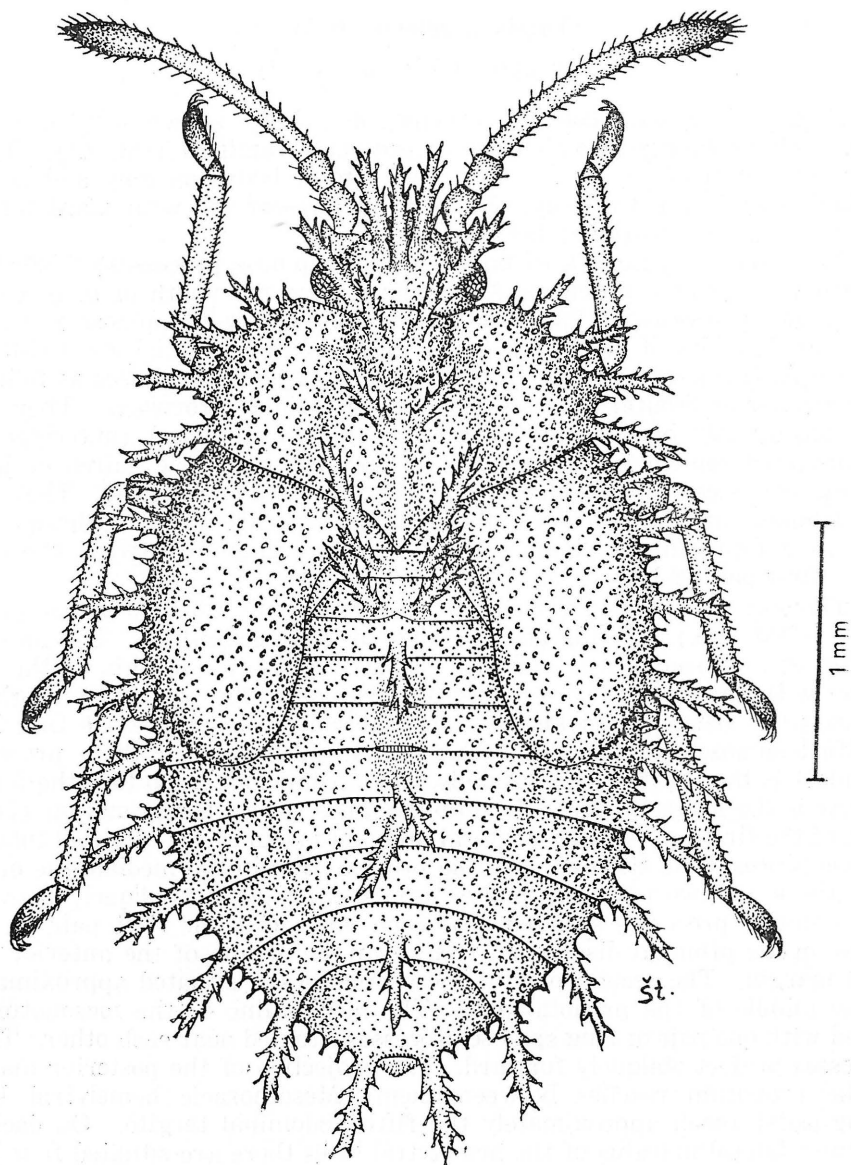


Fig. 2. *Tingis reticulata* (H.-S.). 5th instar nymph.

small tubercles, as it is in nymphs of other species of the genus *Tingis* F. (Štusák 1957, 1959).

Material examined: Two specimens of nymphs of *Tingis reticulata* (H.-S.) in collection of National Museum in Prague, leg. L. Duda, 5. VI. 1889.

### *Tingis buddleiae* Drake

(5th nymphal instar, fig. 3)

Flat, oval, general colour ochreous-grey. Body armed with long and robust spinose processes which are considerably ramified (fig. 12). These processes are situated on the head, the lateral body margins and in the median dorsal line of the body. The body surface covered with characteristic stellate hairs (as mentioned below).

Measurements: Length of body (without spinose processes) 2.520 mm. (length with spinose processes 3.052 mm.), maximal width of body (without spinose processes) 1.288 mm. (width of body with spinose processes 1.960 mm.), width of head 0.476 mm., length of tibia of hind leg 0.516 mm.

Head: Head armed with five long ramified spinose processes as follows: Paired anterior frontal processes projecting obliquely forward. They project considerably beyond the anterior margin of the head (anteclypeus); one unpaired central frontal process is also very long; the paired occipital spinose processes are the longest of all the processes of the head. They project obliquely and laterally over the eyes, and much beyond the head. The eyes are red-brown. Rostrum approximately reaches to between the coxae of the first pair of legs.

Thorax: Pronotum five-angular, approximately 1.5—1.6 times (1.092 mm. : 0.700 mm.) as wide as it is long in the median-line. The anterior margin of the pronotum is archedly concave. Posterior margin of the pronotum with the projection reaching approximately the posterior margin of mesonotum. Lateral margins of pronotum convex and there are four long ramified spinose processes on each margin. The first of these processes (cranial) is the shortest one, caudally they become longer, so that the fourth process is the longest. On each anterolateral angle of the pronotum (i.e. in front of the first process of the lateral pronotal margin) one ramified tubercle ("little process") is situated. On the pronotal disc in the median-line of the body there are two pairs of spinose processes projecting obliquely forward. Two anterior processes situated near each other (i.e. the first pair of processes on the pronotal disc) stem from near the middle of the anterior pronotal margin. The second pair of these processes is situated approximately in the middle of the pronotal disc. The median-line of the mesonotum is armed with one pair of long spinose processes situated near each other. These processes project obliquely forward. The projection of the posterior margin of the pronotum reaches between them. Mesothoracic hemelytral lobes (wing-pads) reach approximately the fifth abdominal tergite. On each of the outer lateral margins of the hemelytral lobes there are situated four long spinose processes. The first is the smallest, caudally they become longer and more robust.

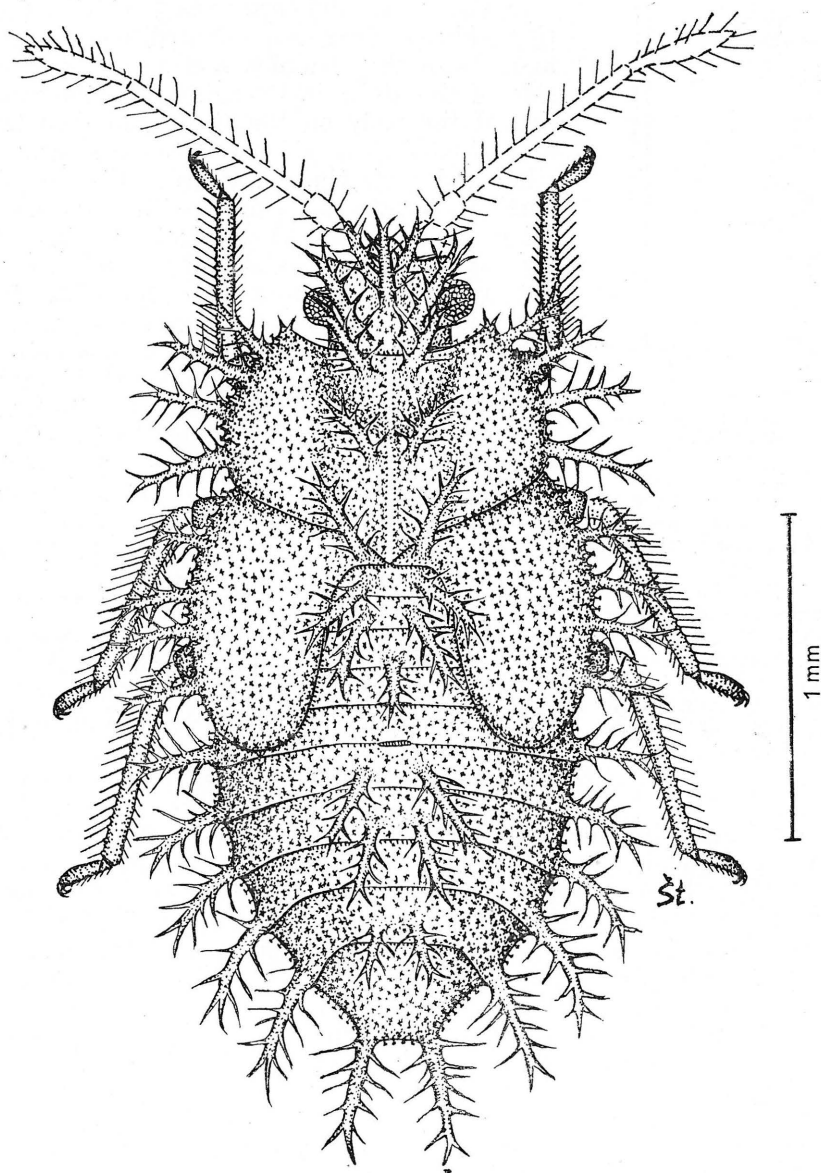


Fig. 3. *Tingis buddleiæ* Drake. 5<sup>th</sup> instar nymph.

Metanotum with alar lobes. In the median-line of the body there are two spinose processes situated near each other, on the metanotum. They project obliquely to the sides in a posterior direction.

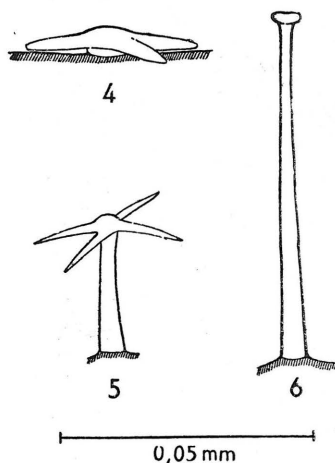


Fig. 4. Stellate "structure" of the body surface of the 5th nymphal instar of *Agramma intermedia* (Wag.). (Lateral view.)

Fig. 5. Stellate "hair" of the body surface of the 5th nymphal instar of *Tingis buddleiae* Drake. (Lateral view.)

Fig. 6. Pestle-shaped hair of the body surface of the 5th nymphal instar of *Galeatus scrophicus* Saund.

**Abdomen:** Abdomen armed with long ramified spinose processes situated on the lateral margins of the abdomen and also on the dorsal side of the abdominal tergites. In the median-line of the body on the first abdominal tergite are situated two spinose processes near each other and projecting backward. The second abdominal tergite is armed with one unpaired spinose process near the posterior margin. This process is relatively small, projecting moderately upwards and backward. The third and fourth abdominal tergites have no processes. The fifth and sixth tergites are armed with one pair (two processes situated near each other) of long spinose processes (on each of these tergites) which project obliquely upwards and backward. The seventh tergite has no process. The eighth is armed with one pair of long spinose processes (two processes situated near each other).

On the lateral margins of the abdomen the processes are situated as follows: In each of the posterolateral angles of segments IV, V, VI, VII and VIII there is one long spinose process. Only the posterior margin of the ninth abdominal segment (end of the body) is terminated with two such processes. There are, then, on each side of abdomen, 6 long spinose processes.

The dorsal side of the whole body surface (the head too) is very densely covered with very interesting and characteristic hairs. (Except the legs, spinose processes and the portion of tergites where the dorsal glands are situated.) These "hairs" seem to be little four-tipped stars (or may be three- or five-tipped) with very long narrow tips and being fixed on longish stalks (stems) (fig. 5). By observing these "hairs" in transmitted light the whole dorsal body surface seems to be "structured". The "structure" gives an impression of little stars with their centres with inscribed little circles. (In fact the little circles are the ground-plans of the parts where the stars are connected with the stalks of these very interesting hairs.)

The formation of one spinose process is very interesting. As a rule, it is once or several times ramified and covered with numerous relatively high conical tubercles. From these tubercles proceed very thick, robust and long, stick-shaped hairs which are relatively large. The above mentioned stellate hairs which correspond with those on the dorsal surface of the body, are only on the base of the spinose process (fig. 12).

A portion of the abdominal tergites where the dorsal glands are situated are naked. Legs, tibiae especially on their outer margins covered with very long and thick hairs which are longer than the width of tibiae. On the inner margins of tibiae the hairs are much shorter.

Material examined: 1 specimen in the collections of National Museum in Praha. Locality: Philippine Islands, Los Baños, P.T. Elev. 50 meters, 2. V. 1934, leg. V. J. Madrid. The description was given from one specimen which had the antennæ knocked off. In figure 3 the antennæ are reconstructed according to imago.

**Galeatus scrophicus**  
(Saunders)

(5th nymphal instar, fig. 9)

Oval, general colour dark brown, antennæ and legs darker. Only a portion of the second abdominal tergite and the tergites III and IV lightly yellow-ochreous in colour. Body armed with very long spinose processes (fig. 13).

Measurements: Total length (without spinose processes) 1.652 mm. (length with spinose processes 1.876 mm.), maximal width of body (without processes) 1.036 mm. (with processes 1.316 mm.), width of head 0.392 mm., length of antenna 1.036 mm. (I:II:III:IV = 0.112 mm. : 0.084 mm. : 0.560 mm. : 0.280 mm.), length of tibia of hind leg 0.672 mm., length of tarsus of hind leg 0.156 mm.

Head: On the head there are five long spinose processes as follows: One pair of anterior frontal processes projecting far beyond the anteclypeus, unpaired central frontal process and one pair of occipital processes projecting obliquely to the sides. The occipital ones are the longest of all the head processes. Antenniferous tubercles very small, obtuse, approximately half the second antennal joint in size. Eyes red-brown in colour. Rostrum relatively long and reaching between coxæ of hind legs.

Thorax: Pronotum approximately 1.7 times (0.840 mm. : 0.504 mm.) as wide as it is long in its median-line. The anterior margin of the pronotum

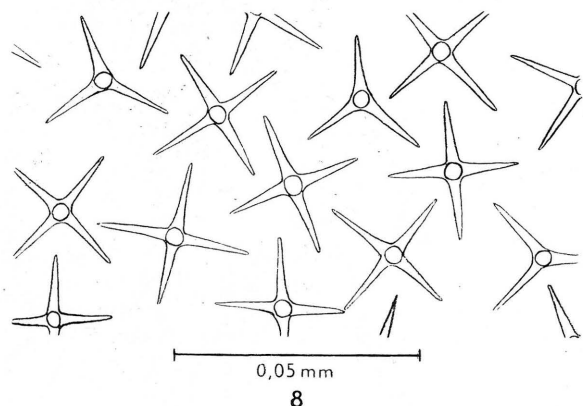
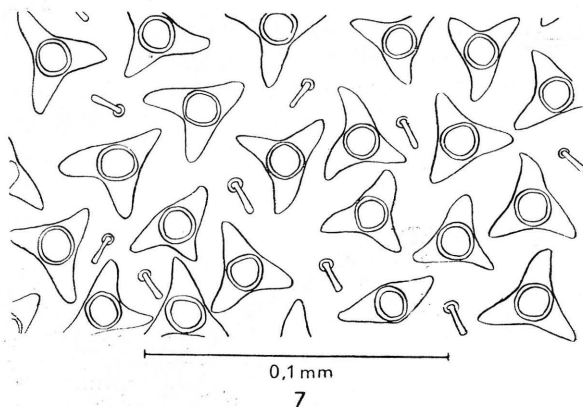


Fig. 7. The "structure" of the body surface of the 5th nymphal instar of *Agramma intermedia* (Wag.). (Dorsal view.)

Fig. 8. The "structure" of the body surface of the 5th nymphal instar of *Tingis buddleix* Drake. (Dorsal view.)

concave. The anterolateral angles of pronotum prolonged forward: they reach approximately to the middle of the eyes. The lateral margins of pronotum approximately in their anterior third moderate concave. The posterior margin of pronotum with projection reaches approximately the anterior

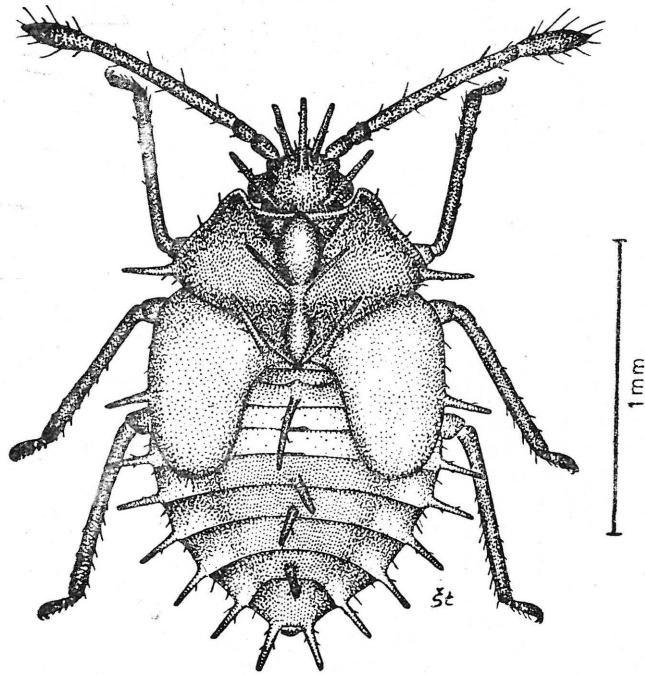


Fig. 9. *Galeatus scrophicus* Saund. 5<sup>th</sup> instar nymph.

margin of the first abdominal tergite. One long spinose process is situated in each posterolateral angle of the pronotum. In the median-line of pronotal disc there are two characteristic egg-shaped bulges connected with each other. From them, later arise the characteristic membraneous formations, found in the imago. The anterior bulge is much larger than the posterior one and it extends from the anterior margin of the pronotum to the middle of the pronotal disc at least. The anterior bulge is connected to the posterior one. This is much smaller and its caudal end reaches the end of the posterior projection of the pronotum: In the portion where both bulges touch (i.e. approximately in the middle of the pronotal disc), two long spinose processes are situated near each other, projecting divergently upwards. Pronotum moderately waved as shown in figure 9.



Mesonotum in the median-line of the body armed with two long spinose processes situated near each other. Between them reaches the projection of the posterior pronotal margin. Hemelytral lobes of mesonotum reach approximately the middle of the fifth abdominal tergite. On the outer margin of each hemelytral lobe (a little behind the middle of the margins) there is situated one long spinose process.

Abdomen: General colour of abdomen dark brown but a portion of the second abdominal tergite and tergites III and IV yellowish-ochreous. Long spinose processes issue from the abdominal segments as follows: The posterolateral angles of abdominal segments IV, V, VI, VII and VIII are provided with one long spinose process in each angle. The ninth abdominal segment terminates in two such processes. Then, each lateral margin of the abdomen is armed with 6 spinose processes. The tergites in the median-line of body are also armed with such long processes. On the second tergite there is one unpaired, very long, and relatively thin, spinose process. Tergites V, VI and VIII are also armed with one unpaired process on each (these are relatively shorter and thicker than the process on the second tergite); they are the thickest of all spinose processes of the body. Dorsal glands very indistinct.

Surface of body, especially the dorsal body side, very sparsely covered with very long hairs, yellowish-white in colour. These hairs (probably glandular) have on their tips pestles or flat discs (fig. 6). They too grow out of the spinose processes. The hairs of the antennae and legs are normal setti-form.

Material examined: 1 specimen in the collections of National Museum in Praha. Taken by Nat. Mus. in Praha expedition: Anat. Karataş 2.—5. VIII. 1947.

### *Stephanitis pyri* (F.)

(5th nymphal instar, fig. 10)

Oval, dorsoventrally flat, body armed with simple long spinose processes. General colour yellowish (some portions of body are brown, e.g. head, centre of the dorsal surface of abdomen, distal ends of hemelytral lobes, distal ends of the 4th antennal joints and of the second tarsal joints). Antennae relatively long.

Measurements: Length of body (without processes) 1.792 mm. (length with processes 2.128 mm.), maximal width of body (without processes) 0.980 mm. (width of body with processes 1.232 mm.), width of head 0.392 mm., length of antenna 1.331 mm. (I: II: III: IV = 0.122 mm. : 0.088 mm. : 0.812 mm. : 0.309 mm.), length of tibia of hind leg 0.660 mm., length of tarsus of hind leg 0.134 mm.

Head: Brown, armed with five long robust spinose processes as follows: One pair of anterior frontal processes, one unpaired central frontal process and one pair of occipital processes. The pair of anterior frontal processes is very long, projecting beyond the anteclypeus by more than half of its length and reaching approximately the base of the third antennal joint. The unpaired central frontal process also projects far beyond the anteclypeus and it is approximately as long as the head (with eyes) is wide. Even longer

are the occipital processes. Antenniferous tubercles very small (approximately  $\frac{1}{2}$  of the second antennal joint). Eyes red. Rostrum reaches the level of the anterior margins of hind coxæ, its tip darkened.

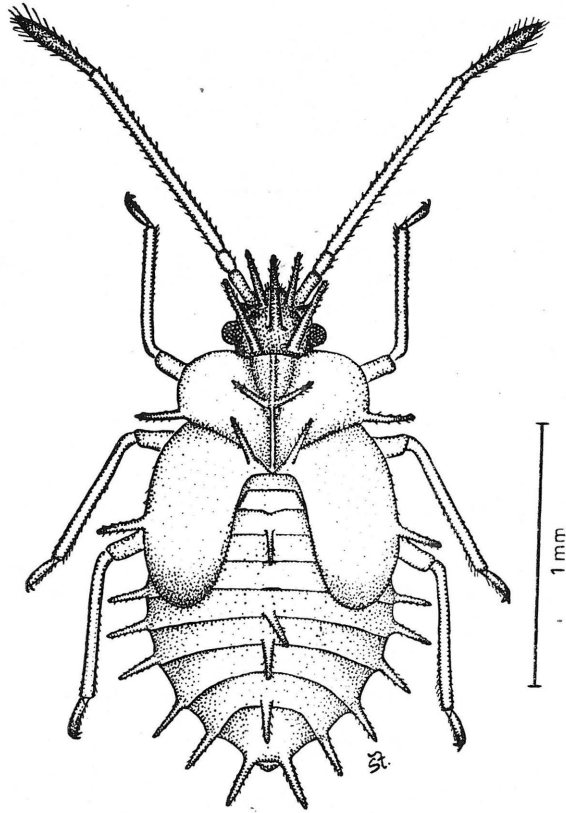


Fig. 10. *Stephanitis pyri* (F.). 5th instar nymph.

Thorax: Pronotum transverse, approximately 1.8 times (0.784 mm. : 0.428 mm.) as wide as its medio-dorsal length. The lateral margins of the pronotum are broadly curved in an arch. The posterior margin of the pronotum with a projection reaching the anterior margin of the metanotum. In the posterolateral angles of the pronotum there is one long spinose process situated on each side. In front, in the median-line of the pronotal disc is situated a high and large convex bulge (i.e. the foundation of vesicula in imago) extending approximately from the anterior margin of the pronotum to the middle of the pronotal disc. A very high carina in the median-line of the pronotum runs out from this bulge and extends to the end of hind pronotal projection. In the region where the bulge runs into the carina

(i.e. approximately in the middle of pronotal disc) two close set spinose processes issue from these elevated structures and project obliquely and divergently to the sides.

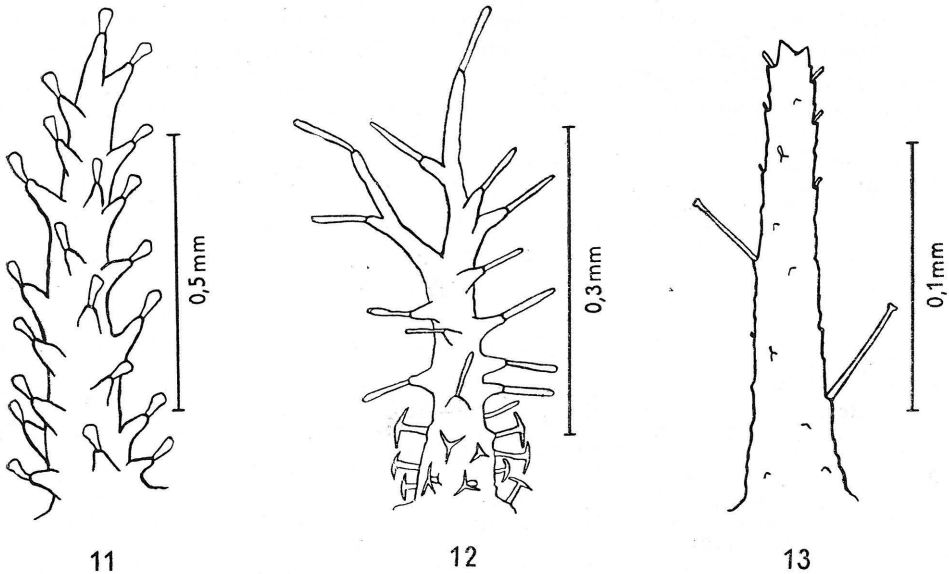


Fig. 11. The spinose process of the body margin of the 5<sup>th</sup> nymphal instar of *Tingis reticulata* (H.-S.). — Fig. 12. The ramified spinose process of the body margin of the 5<sup>th</sup> nymphal instar of *Tingis buddleiae* Drake. — Fig. 13. The spinose process of the body margin of the 5<sup>th</sup> nymphal instar of *Galeatus scrophicus* Saund.

Mesonotum in the median-line of the body armed with two long, close set, spinose processes, between which the hind pronotal projection is placed. They project divergently upwards. Hemelytral lobes reaching at least the middle of the fifth abdominal tergite and their distal ends are dark brown. On each of the outer margins of the hemelytral lobes one long spinose process is situated, somewhat posterior to the middle of the margin. Metathoracal alar lobes relatively very long, they also reach approximately the fifth abdominal tergite.

Abdomen: General colour yellowish, but in the middle of the dorsal surface of the abdomen (from the third to the seventh tergite) brown. Abdominal segments armed with long spinose processes as follows: In the median-line of the body near the posterior margins of tergites II, V, VI and VIII there is one spinose process situated on each tergite. Similar spinose processes are also present in the posterolateral angles of abdominal segments IV, V, VI, VII and VIII (in each angle one process). The ninth segment distally terminated in two such processes. There are therefore 6 spinose processes on each side of the abdomen. There is one very small tubercle in each of the posterolateral angles of abdominal segments II and III. A small club-shaped glandular hair grows out of each tubercle. These

small tubercles are in fact the rudiments of long spinose processes developed in the earlier nymphal instars on these segments. Thus, this fact is similar to that one in the other nymphs of Tingidæ which have spinose processes on the body (Štusák et Štys, 1959).

Body surface without any remarkable structure, almost smooth. Hairs developed especially on legs, antennæ, on all spinose processes and on the anteclypeus. The other portions of the body are almost bald. The shape of the hairs is setti-form, only exceptionally pestle-like. Club-shaped hairs on the tubercles in the posterolateral angles of segments II and III (as mentioned above) are exceptional.

Material examined: Locality: Anat. Tapan Gyaour dağ, 17. VIII. 1947. Taken by National Museum in Praha expedition.

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