

The larval description of *Tinea steueri* Petersen, 1966 and *Tinea svenssoni* Opheim, 1965 (Lepidoptera, Tineidae)

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Fourteen larvae of *Tinea steueri* and six larvae of *T. svenssoni* were first forced out of their cases and then boiled for five minutes in 10 % potassium hydroxide. The body was opened from the right side and the inside was cleaned out. Heads were cut off and placed in 10 % potassium hydroxide for three days. After opening, the skins were kept in 70 %, 94 % and absolute alcohol for five minutes each before spreading open on a microscope slide. Euparal was used as the mountant medium.

Figures were drawn direct from a microscope with possible fold showing. Not all setae could be seen on every sample, but all details have been checked on more than one larva.

In *Tinea svenssoni* and *T. steueri* the distance between SD1 and XD2 is shorter than between XD1 and XD2. The clearest difference between *T. svenssoni* and *T. steueri* is the length of the cranial seta L1. In *T. svenssoni* L1 is as long as P2. In *T. steueri* L1 is the longest seta of the cranium being more than six times longer than P2. But many other differences were also found.

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1. Introduction

In the large, cosmopolitan family of the Tineidae there are species which cause damage of economic importance. Amongst domestic pest Lepidoptera, perhaps the most significant and best known is the clothes moth (*Tineola bisselliella*). Because of the economic reasons *T. bisselliella* is well studied, but the Tineidae family of is very wide and

far from thoroughly known. In the Palaearctic region alone 350 species have been described so far. Most of the Tineidae species are of only minor importance and seldom cause damage of economic significance, but it is essential to be able to distinguish them from similar species that are harmful (Carter 1984, Heath *et al.* 1985, Stehr 1987).

Tinea steueri, was first described in 1966 (Pe-

tersen 1966). The description of the adult is also given by Robinson (1979). *T. svenssoni* was described in 1965 by Ophem. These two *Tinea*-species belong to the Tineinae whose larvae live in owl nests feeding on hairs and feathers. The Tineidae are one of the few groups of animals who are able to digest keratin (Petersen 1969, Gozmany *et al.* 1973, Friedrich 1983, Heath *et al.* 1985, Stehr 1987, Labes 1993).

One of the problems in describing larvae is the huge variety in setal names. It seems that every researcher gave their own names before Hinton's (1946) nomenclature, which has since come into general use. Mackay (1963) criticizes the same thing, pointing out that even Hinton changed his own setal names later. For example in 1946 Hinton described the abdominal lateral setae to be: L2 the most dorsal, L1 below it and L3 the most ventral. Ten years later he changed it around: L1 the most dorsal, L3 below it and L2 the most ventral (Hinton 1956). Mackay (1963) has noticed also that homologies between setae are difficult or even impossible to establish based both on Hinton and Matuura (1956), whom she used as another example. In this work Hinton's (1946) nomenclature is used throughout.

A fully developed larva is from 6 to 14 mm in length and 1.2-2.0 mm in width. The three pairs of thoracic legs and five pairs of prolegs are well developed. The SV group is bisetose on the meso- and metathorax. On the 9th segment the SV group is unisetose. The larvae of the Tineinae, which build a case, make it out of material of animal origin (e.g. wool, feathers, fur). The cases are flattened and portable. These larvae form the genus *Tinea* (Hinton 1946, Zagulyaev 1964, Hannemann 1977, Carter 1984, Stehr 1987).

Colour pattern is not the most reliable guide for identification, especially with smaller species. The coloration of many species is very variable and tends to fade soon after death. There is rarely a clearly identifiable pattern and close family members like *T. steueri* and *T. svenssoni* often have exactly the same colours. Larvae may also have been subjected to cooking or preservation processes the either completely change or even completely remove the colour (Carter 1984).

2. Material and methods

The larvae of *T. steueri* were taken from nests of tawny owl (*Strix aluco*) collected by Pertti Nikkanen, at EH:Valkeakoski 679:33. The second generation was provided by Bo Wikström. Nests of ural owl (*Strix uralensis*), collected by Pertti Saurola at EH:Lammi 679:38, were the source of *T. svenssoni* larvae. The nests were provided by Seppo Sulkava and the resulting moths produced a second generation.

The larvae used for this study were first forced out of their cases and then boiled for five minutes in 10 % potassium hydroxide. After this the body was opened with tweezers from the right side and the inside was cleaned out. Heads were cut off and placed in 10 % potassium hydroxide for three days. After opening the skins were kept in 70 %, 94 % and absolute alcohol for five minutes each before spreading open on a microscope slide, so that the left side was complete in horizontal position. Euparal was used the mountant medium. Samples were left for three weeks to dry out in a drying cupboard.

The body of the larva is clearly divided into a head, a thorax with three segments and an abdomen with ten segments. The meta- and mesothorax have the same setal pattern, as also do abdominal segments 2-6. For this reason, drawings were not made of every segment. Figures have been drawn direct from a microscope without attempting to put the setae neatly pointing into the same direction, because of the fear of losing the exact measurements by doing so. Possible folds are shown on drawings as wavy lines. Not all setae showed on every sample, but all details have been checked on more than one larva. Statistical methods were not needed on the lengths of the setae, because the differences were so clear. Amongst others, the following are examples of the latest way of describing larvae: Ahola *et al.* (1988), Miller (1991) and Heckford (1997).

3. Description of larvae

3.1. *Tinea steueri*

The larva of *T. steueri* is case-bearing. The case is fusiform, dorsoventrally flattened and it has an opening at both ends. It is made out of material of animal origin. The body is cylindrical, slender and around 7 mm long and 1,5 mm wide. It is creamy white with head, prothoracic plate, claws of the prolegs and crochets, all brown. Pinacula and anal plate are inconspicuous and ocelli are absent.

3.1.1. Mouthparts

The antennae are four-segmented (Fig. 1). Segment one is the same length as segment number

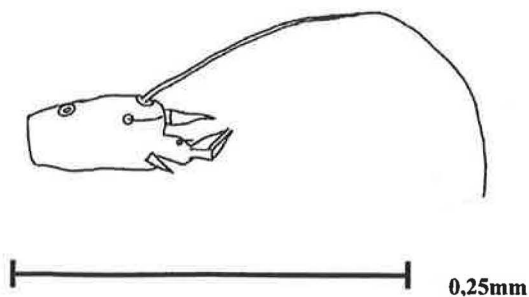


Fig. 1. Antenna of *T. steuri*.

two. Segments three and four are very small; they are attached almost laterally, not apically, on the inner side of segment two. There is a large seta on segment two. It is four times longer than the segment. On the same segment there is also a pore, a small seta, a hair and two small cones. On the third segment there are three small cones.

The upper jaws of the mandibles are large and thoroughly sclerotized (Fig. 2). They are elongated. On the apical margin there are five teeth. The form and direction of the teeth look different in the figures compared with *T. svenssoni*, but this is caused by the different drawing angle. On each mandible there are two long setae and one pore.

The largest part of the maxilla is the stipes, which is elongated and bears at the distal end a short, barrel-shaped palpiger with a large seta (Fig. 3). On the stipes there are two setae. The maxillary complex is composed of a laciniogaleal lobe and three-segmented maxillary palps. The distal portion of the lobe bears three sensilla trichodea, two sensilla stylocomica and one? sensilla basi-

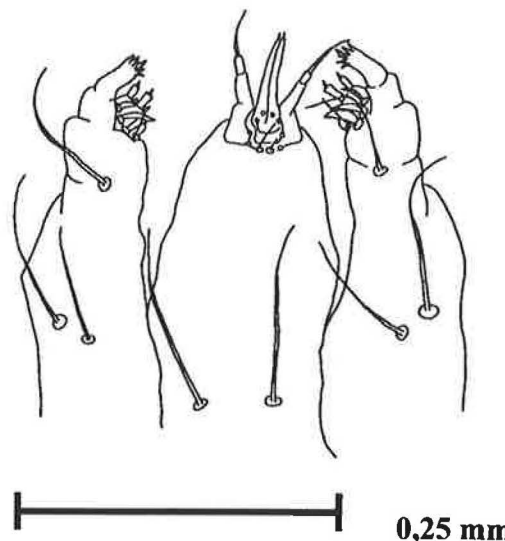


Fig. 3. Mouthparts of *T. steuri*.

comica. The mentum has two setae. The first segment of the labial palps is thick and quite long, whereas the second segment is small, one third the length of the first. Both segments bear a seta, that of the first segment is very short whereas the seta of the second segment is longer than the first segment. The spinneret is slightly shorter than the palps and has a conical shape.

3.1.2. Legs

On the prolegs there are large, unarticulated coxae of cylindrical shape. The coxae are widely separated. There is a single ring of crochets (Fig. 4).

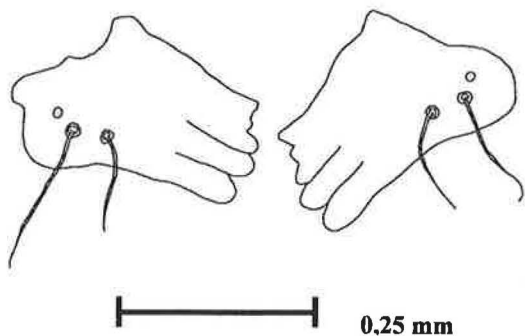


Fig. 2. Mandibles of *T. steuri*.

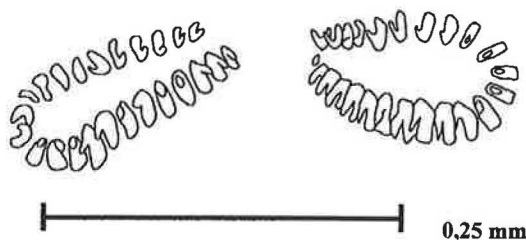


Fig. 4. Crochets of *T. steuri*.

trad from it is MD1. MD1 is anterior to D2 forming a horizontal line. Opposite SD1 and ventrad from MD1 can be found MSD1 and MSD2. MD1, MSD1 and MSD2 are situated in the same position on the meso- and metathorax, but on the anterodorsal side. Above the base of coxa there are three setae, MV1-3, on the meso- and metathorax. On the prosternum MV1 is absent and MV2 is antero dorsad from MV3. There were problems naming the setae on the meso- and metathorax because of the many folds on that area, but it appears that the most dorsal and the most anterior is MV1. The most ventral is MV3. MV2 is more anterior than MV3.

The abdominal microscopic setae (Figs. 6 and 7). On the first nine abdominal segments there are two microscopic setae. MD1 is on the anterior side. It is opposite the point between D1 and SD2, but slightly closer to SD2. On the ninth segment it is opposite the point between D1 and SD1. MV3 is also on the anterior side, opposite SV2.

On the ninth segment it is anteroventrad from SV1.

The long setae (Figs. 6 and 7). Both XD1 and XD2 are near the anterior margin of the protergum. XD2 is directly below XD1. They are of equal length, longer than D1 and slightly shorter than D2. Puncture XDC is very close, and posterior, to XD2. XDa is about halfway between XD1 and D1. XD_b is ventrad from the point between XDa and D1.

On the abdomen D1 is anterior to D2, which is more than twice the length of D1. D1 is more dorsal than D2, except on the ninth segment where it is ventrad. On the seventh and eighth segments D1 and D2 are opposite each other. On the prothorax D1 is anterodorsad and widely separated from D2. On the meso- and metathorax D1 and D2 form a vertical row, D1 being more dorsal. On the other segments their situation follows the long axis of the body. Also on the thoracic segments D2 is twice the length of D1.

There are two subdorsal setae on all segments except for ninth where SD2 is missing. Of the two SD1 is longer, being about as long as D2, except on the prothorax where SD1 is only half the length of D2. On the abdomen SD1 is above the spiracle and SD2 anterodorsad from it. On the meso- and metathorax SD1 is straight below SD2 and they continue the vertical row of D1 and D2. On the prothorax the subdorsal setae are widely separated. They form an oblique line with SD2 anteroventrad from SD1. On the prothorax SD2 is about three times longer than SD1.

In the lateral group there are three setae. L1 is the longest on all segments. On the thoracic segments L2 and L3 are about equal in length. On the abdominal segments L3 is longer than L2, except on the ninth segment where L2 is about twice the length of L3. On every segment, except the ninth, L2 is the most anterior. On the thoracic segments the three setae are close to each other. L3 is the most posterior. On the meso- and metathorax they form an oblique line, L2 being anteroventrad from L1. On the prothorax they form a triangle, L1 being posteroventrad from L2. On the abdominal segments 1-7 L1 and L2 form almost a horizontal line; L3 is ventrad from and opposite to L1. On the eighth segment L1 and L3 form a vertical line and L2 completes the triangle being anteroventrad from L1. On the ninth segment L1 is the most anterior; L2 is posterodorsad

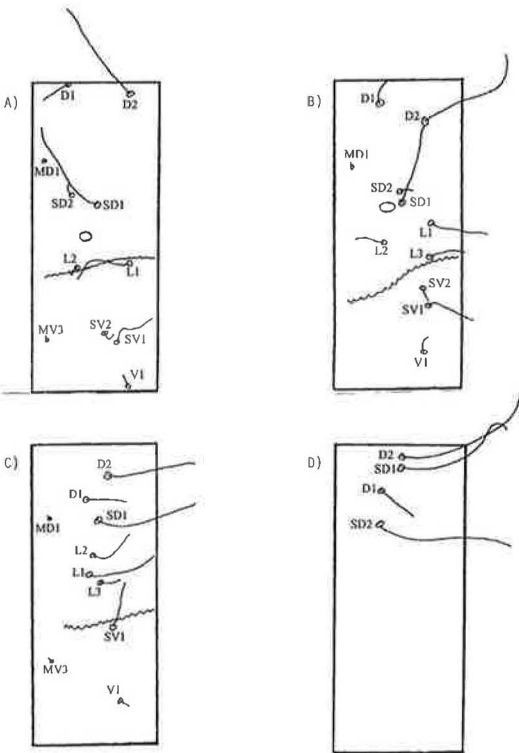


Fig. 7. Segments of *T. steueri*. A. 7. Abdominal segment; B. 8. Abdominal segment; C. 9. Abdominal segment; D. 10. Abdominal segment.

and L3 posteroventrad from it.

On the thoracic segments there are two subventral setae, which are arranged almost in a horizontal line, except on the prothorax where they seem to be arranged almost vertically. The arrangement of SV setae is left a rather unclear because of folds. On the abdominal segments 2-6 there are three SV setae. SV2 is anteroventrad and SV3 dorsad from it. SV1 is the longest, SV2 and SV3 being almost equal in length. On the first, seventh and eighth segments SV1 and SV2 are present; SV3 being absent. On the ninth segment only SV1 is present. There is only one seta in the ventral group. V1 is situated about half-way between the medioventral line and SV group. The V1 setae are far from each other.

The tenth segment is quite different from all others. D1, D2, SD1 and SD2 are all long setae. Three of them are about equal in length, D1 being half the length of the others. D2 is mediodorsal, SD1 lateral from it forming a vertical line. D1 is antero-laterad from SD1 and SD2 laterad from D1.

3.2. *Tinea svenssoni*

The larva of *T. svenssoni* is case-bearing. The case is fusiform, dorsoventrally flattened and it has an opening at both ends. It is made out of material of animal origin. The body is cylindrical, slender and around 7 mm long and 1,5 mm wide. It is creamy white with head, prothoracic plate, claws of the prolegs and crochets, all brown. Pinacula and anal plate are inconspicuous and ocelli are absent.

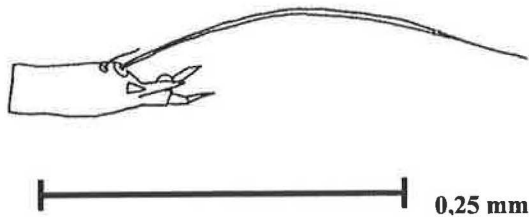


Fig. 8. Antenna of *T. svenssoni*.

3.2.1. Mouthparts

The antennae are four-segmented (Fig. 8). Segment one is the same length as segment number two. Segments three and four are very small; they are attached almost laterally, not apically, on the inner side of segment two. There is a large seta on segment two. It is four times longer than the segment. On the same segment there is also a pore, a small seta, a hair and two small cones. On the third segment there are three small cones.

The upper jaws of the mandibles are large and thoroughly sclerotized (Fig. 9). They are elongated. On the apical margin there are five teeth. The form and direction of the teeth look different in the figures compared with *T. steueri*, but this is caused by the different drawing angle. On each mandible there are two long setae and one pore.

The largest part of the maxilla is the stipes, which is elongated and bears at the distal end a short, barrel-shaped palpiger with a large seta (Fig. 10).

3.2.2. Legs

On the prolegs there are large, unarticulated coxae of cylindrical shape. The coxae are widely separated. There is a single ring of crochets (Fig. 11). Crochets are uniordinal and they are arranged in a uniserial circle. The arrangement of crochets forms an elongated horseshoe with a narrow opening facing inward. The number of crochets per proleg varies from 20 to 28.

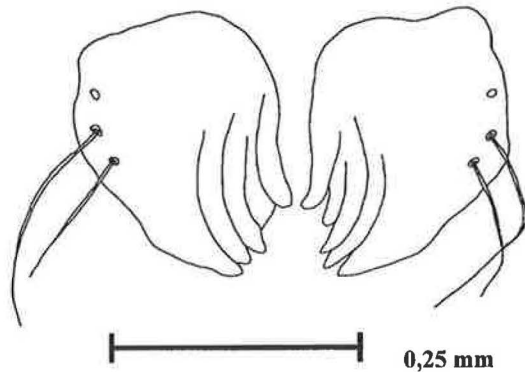


Fig. 9. Mandibles of *T. svenssoni*.

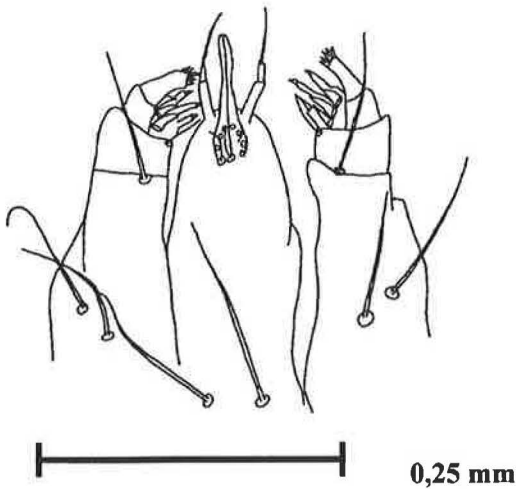


Fig. 10. Mouthparts of *T. svenssoni*.

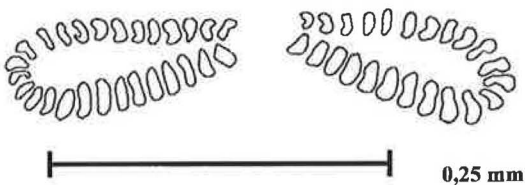


Fig. 11. Crochets of *T. svenssoni*.

3.2.3. Cranial Setae

Puncture Pb is caudad from P2, but closer to the posterior than to the vertical group of setae (Fig. 12). P1 is one of the longest setae of the cranium. It is situated near the adfrontal suture. P2 is much shorter, only about one-third of the length of P1. P2 is laterad and caudad from P1. Puncture Pa is between P2 and L1 and slightly closer to L1.

Clypeal setae are about equal in length. C2 is caudad from C1 and also nearer to the medial line. F1 is at the same level as the frontal puncture, which is mesad from it. F1 is about as long as C1 and C2. AF2 is behind AF1 and slightly mesad from it. AF1 is slightly shorter than AF2. Puncture AFa is halfway between AF1 and AF2.

A1 and A3 are long setae. They are about twice the length of A2. A2 is straight behind and A3 laterad from A1. Puncture Aa is next to A3, situated laterad and slightly ventrad from it. The ocellar group consists of three setae. O1 is about as long as A1 and A3. O2 is one of the longest setae

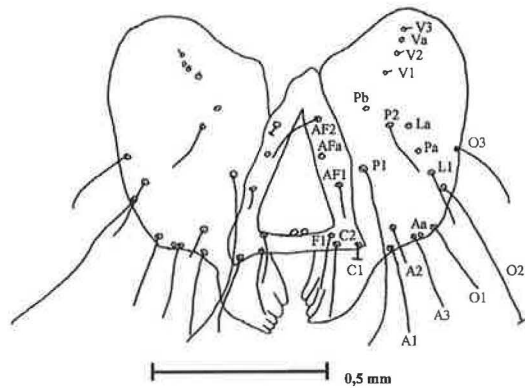


Fig. 12. Head of *T. svenssoni*.

of the cranium. It is about twice as long as A3. O3 is close to the size of A3. The most anterior is O2, O3 being the most caudad. O1 is ventrad from O2, which is about halfway between O1 and O3. Puncture Oa should be between O1 and O2. It (or any additional punctures) was not to be found, because the place is exactly on a fold using this preparation.

The subocellar setae form a triangle. SO2 is the most posterior and SO1 is the most anterior. SO3 is the longest; SO1 and SO2 are the same length as each other. Puncture SOa is in the middle of the triangle. L1 is about as long as P2. L1 is situated between P2 and O2; closer to O2. Puncture La is laterad from P2. The three vertical setae form a line. Puncture Va is between V2 and V3. There is only one genal seta and puncture; G1 and Ga. Ga is very near to G1 and laterad from it.

3.2.4. Thoracic and abdominal setae

The thoracic microscopic setae (Fig. 13). MXD1 is on the posterodorsal side of the prothorax and slightly anterior to ventrad from it is MD1. MD1 is D2, forming a horizontal line. Opposite of SD1 and ventrad from MD1 can be found MSD1 and MSD2. MD1, MSD1 and MSD2 are situated in the same position on the meso- and metathorax. Above the base of coxa there are three setae, MV1-3, on the meso- and metathorax. On the prosternum MV1 is absent and MV2 is anterodorsad from MV3. There were problems naming the setae on

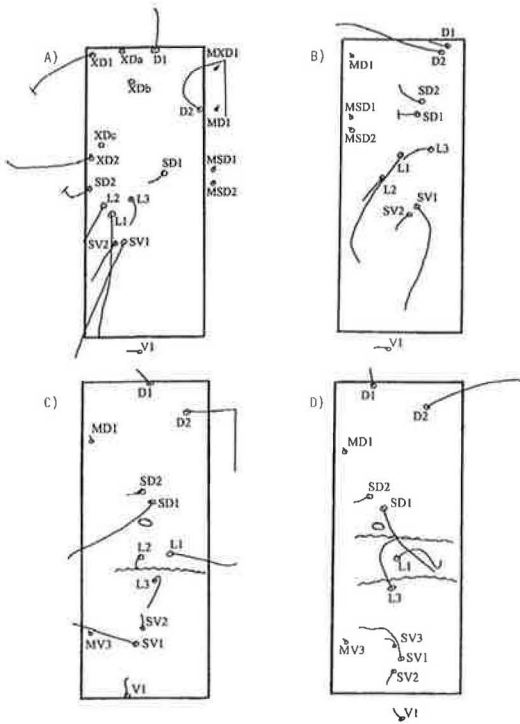


Fig. 13. Segments of *T. svenssoni*. A. Prothorax; B. Mesothorax; C. 1. Abdominal segment D. 2. Abdominal segment.

the meso- and metathorax because of the many folds on that area, but it appears that the most dorsal and the most anterior is MV1. The most ventral is MV3. MV2 is more anterior than MV3.

The abdominal microscopic setae (Figs. 13 and 14). On the first nine abdominal segments there are two microscopic setae. MD1 is on the anterior side. It is opposite the point between D1 and SD2, but slightly closer to SD2. MV3 is also on the anterior side, opposite SV2.

The long setae (Figs. 13 and 14). Both XD1 and XD2 are near the anterior margin of the protergum. XD2 is directly below XD1. They are of equal length, longer than D1 and slightly shorter than D2. Puncture XDc is very close, and posterior, to XD2. XDa is about halfway between XD1 and D1. XDb is ventrad from the point between XD1 and D1.

On the abdomen D1 is anterior to D2, which is more than twice the length of D1. D1 is more dorsal than D2, except on the ninth segment where it is ventrad. On the seventh and eighth segments D1 and D2 are opposite each other. On the prothorax D1 is anterodorsad and widely separated

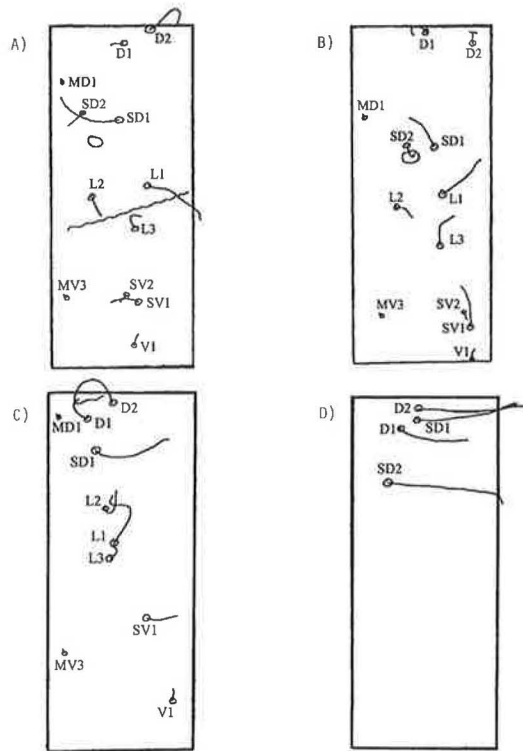


Fig. 14. Segments of *T. svenssoni*. A. 7. Abdominal segment; B. 8. Abdominal segment; C. 9. Abdominal segment; D. 10. Abdominal segment.

from D2. D1 is about three times shorter than D2. On the meso- and metathorax D1 and D2 form a vertical row, D1 being more dorsal. On the other segments their position follows the long axis of the body. On the meso- and metathorax D2 is about four times the length of D1.

There are two subdorsal setae on all segments except for ninth where SD2 is missing. Of the two SD1 is longer, being about as long as D2, except on the prothorax where SD1 is only one-fourth the length of D2. On the abdomen SD1 is above the spiracle and SD2 anterodorsad from it. On the meso- and metathorax SD1 is straight below SD2 and they continue the vertical row of D1 and D2. On the prothorax the subdorsal setae are widely separated. They form an oblique line with SD2 anterodorsad from SD1. On the prothorax SD2 is about five times longer than SD1.

In the lateral group there are three setae. L1 is the longest on all segments. On the thoracic segments L2 and L3 are about equal in length. On the abdominal segments L3 is longer than L2,

except on the ninth segment where L2 is about twice the length of L3. On every segment L2 is the most anterior. L3 is the most posterior. On the meso- and metathorax they form an oblique line, L2 being anteroventrad from L1. On the prothorax they form a triangle, L1 being posterodorsad. On the abdominal segments 1-7 L1 and L2 form almost a horizontal line; L3 is ventrad from the point between L1 and L2. On the eighth segment L1 and L3 form a vertical line and L2 completes the triangle being anteroventrad from L1. On the ninth segment the lateral setae form a vertical line, L2 being the most dorsad; L1, in the middle, is closer to L3 than to L2.

On the prothorax SV setae are in a horizontal line. On the meso- and metathorax there are also two subventral setae, which are arranged almost in a vertical line. The arrangement of SV setae is rather unclear because of the folds. On the abdominal segments 2-6 there are three SV setae. SV2 is anteroventrad and SV3 dorsad from SV1. SV1 is the longest, SV2 and SV3 being almost of equal in length. On the first, seventh and eighth segments SV1 and SV2 are present; SV3 being absent. On the ninth segment only SV1 is present.

There is only one seta in the ventral group. V1 is situated about half-way between the medioventral line and SV group. The V1 setae are far from each other. The tenth segment is quite different from all others. D1, D2, SD1 and SD2 are all long setae, and of about equal length, except D1, which is slightly shorter. D2 is mediodorsal, SD1 lateral from it forming a vertical line. D1 is antero-laterad from SD1 and SD2 laterad from D1.

4. Discussion

Following Carter's (1984) key to identifying lepidopterous larvae and Hannemann (1977), it is easy to tell which case-bearing larvae belong to the Tineidae. The larvae of the Tineinae, which build a case, make it out of material of animal origin (e.g. wool, feathers, fur). These larvae form the genus *Tinea*. In order to separate *Tinea* species from each other it is worth first looking for ocelli. According to Carter (1984) only *Tinea columbariella* Wocke, 1877 is completely without any ocelli. This research shows that *Tinea steuerei*

and *Tinea svenssoni* also belong to this group. So the most important task after Carter (1984) turned out to be separating *T. steuerei* and *T. svenssoni* from *T. columbariella* and from each other. Hinton's (1947) key to Tineidae larvae is more specific and with the aid of it one can separate *T. steuerei* and *T. svenssoni* from *T. columbariella*, so that the only task left is to separate those two from each other.

4.1. How *Tinea steuerei* differs from the General Description of Tineidae?

In order to find the differences which separate *T. steuerei* from the general description of Tineidae and Tineinae (based on Hinton 1946), it was essential to compare the setal characteristics. Many differences were found as set out below. Also there were differences in the positions of pores, which are listed here, but as generally known, pores can be very variable in position, so it is worth putting more emphasis on the length and position of setae.

In the Tineidae in general the cranial seta AF2 is slightly shorter than AF1. *T. steuerei* has it reversed; AF1 is slightly shorter than AF2. Other differences in cranial setae are that A3 should be at least as long as A1, but in *T. steuerei* A3 is only two-thirds of A1. O2 is said to be as long as A3. In *T. steuerei* O2 is twice the length of A3 and L1 is three times A3, whereas it should be shorter than A3. In *T. steuerei* L1 is by far the longest seta of cranium. The pore Va is generally between V2 and V3, but in *T. steuerei* Va is on the lateral side of V2.

On the prothorax in the Tineidae generally XDb is between XD1 and D1, but *T. steuerei* has it ventrad from the point between XDa and D1. On the meso- and metathorax L2 should be antero-dorsad from L1, but L2 is antero-ventrad from L1. The seta SD1 is said to have a heavily pigmented area around its base, but *T. steuerei* does not have this.

On the second segment, SV2 is said to be often absent and SV3 should be always absent, but in *T. steuerei* both are present. SD setae form a vertical line on the meso- and metathorax and also on the first eight segments. In *T. steuerei* SD setae form a vertical line only on the meso- and me-

tathorax. Of the L-setae, in general L3 is the longest on abdominal segments. Of the L-setae of *T. steueri*, L1 is the longest on abdominal segments. On the ninth segment L-setae should form a vertical line, but *T. steueri* has L1 anterior to the point between L2 and L3. On the ninth segment L3 is usually rarely as short as L2; in *T. steueri* L3 is half the length of L2.

4.2. How *Tinea svenssoni* differs from the General Description of Tineidae?

In the Tineidae in general (based on Hinton 1946), the cranial seta AF2 is slightly shorter than AF1. *T. svenssoni* has it reversed; AF1 is slightly shorter than AF2. O2 is said to be as long as A3. In *T. svenssoni* O2 is twice the length of A3. In general pore Pa is between L1 and P1, but *T. svenssoni* has Pa between L1 and P2.

On the prothorax in the Tineidae generally XDb is between XD1 and D1, but *T. svenssoni* has it ventrad from the point between XDa and D1. On the meso- and metathorax L2 should be anterodorsad from L1, but L2 is anteroventrad from L1. The seta SD1 is said, by Hinton (1947), to have a heavily pigmented area around its base, but *T. svenssoni* does not have this.

On the second segment, SV2 is said to be often absent and SV3 should be always absent, but in *T. svenssoni* both are present. SD setae form a vertical line on the meso- and metathorax and also on the first eight segments. In *T. svenssoni* SD setae form a vertical line only on the meso- and metathorax. Of the L-setae, in general L3 is the longest on abdominal segments. Of the L-setae of *T. svenssoni*, L1 is the longest on abdominal segments. On the ninth segment L3 is usually rarely as short as L2, in *T. svenssoni* L3 is half the length of L2.

4.3. How *Tinea steueri* and *Tinea svenssoni* differ from Each Other?

The clearest difference between these two is the length of the cranial seta L1. In *T. svenssoni* L1 is as long as P2. In *T. steueri* L1 is the longest seta of the cranium being more than six times longer

than P2. But many other differences were also found as follows: in *T. svenssoni* the seta P2 is one-third of the length of P1, whereas in *T. steueri* P2 is only one-fifth of P1. *T. svenssoni* has the pore Pa between L1 and P2. In *T. steueri* Pa is between L1 and P1. The setae A1 and A3 are of equal in length in *T. svenssoni*, whereas in *T. steueri* A3 is only two-thirds of the length of A1. *T. svenssoni* has O1 as long as A1 and A3. *T. steueri* has O1 as short as A2. *T. svenssoni* has O2 situated as far from O1 as from O3. *T. steueri* has O1 and O2 situated close to each other and O3 is further away.

T. svenssoni has L1 between O2 and P2, but closer to O2; *T. steueri* has L1 is exactly halfway between O2 and P2. *T. svenssoni* has the pore La laterad from P2. *T. steueri* has La situated halfway between L1 and P2. *T. svenssoni* has pore Va between V2 and V3, but *T. steueri* has Va next to V2 and laterad from it.

On the prothorax in *T. svenssoni* D2 is four times longer than SD1, whereas in *T. steueri* D2 is only twice the length of SD1. In *T. svenssoni* is D2 three times longer than D1. In *T. steueri* D2 is twice the length of D1. The seta SD2 in *T. svenssoni* is five times longer than SD1, whereas in *T. steueri* SD2 is three times longer than SD1. On the meso- and metathorax in *T. svenssoni* D2 is four times longer than D1. In *T. steueri* D2 is only twice the length of D1.

On the segments 1-7 one difference was to be found. It is not absolutely certain, because the lateral setae were where there were folds on every sample caused by the method used. In *T. svenssoni* L1 and L2 form a horizontal line and L3 is ventrad from the point between them. In *T. steueri* L1 and L2 form a horizontal line and L3 is ventrad from L1. On the 9. segment in *T. svenssoni* the lateral setae form an almost vertical line, whereas in *T. steueri* L2 and L3 form a vertical line. L1 is anterodorsad from L3 and anteroventrad from L2.

4.4. Key to the Larvae of Tineidae modified after Hinton 1947

(Numbering follows the original key of Hinton. Bold font shows the present modifications.)

1. Head with postgenae only near each other on a very narrow front. Prolegs without recurved spines above crochets.

2. L group of prothorax trisetose. D1 setae of first eight abdominal segments less widely separated than D2 setae. Head with A1 about as long or longer than A2. L group of ninth abdominal segment trisetose.

3. SV group of meso- and metathorax bisetose. Head never with more than one convex ocellar lens on each side and sometimes with none.

13. Thoracic legs with coxae of right and left sides never fused or nearly fused.

14. SV group of meso- and metathorax in a vertical line. Ninth abdominal segment with L group trisetose. First eight abdominal segments with SD2 more or less directly dorsal to spiracle. Spiracles of seventh abdominal segment only one-half to two-thirds the size as those of eighth segment.

15. L1 and L2 of first seven abdominal segments in a more or less horizontal line with L1 considerably below spiracle.

22. Prothorax with distance between SD1 and XD2 twice as great as between XD1 and XD2.

→ 23. *Tinea pelliionella* / *T. columbariella*

22.a) Distance between SD1 and XD2 is slightly shorter than between XD1 and XD2.

22.b) The cranial seta L1 is as long as P2.

→ *Tinea svenssoni*

22.c) L1 is the longest cranial seta being more than six times longer than P2.

→ *Tinea steueri*

Even after this research it is still not possible to make a complete cladistic figure of the *Tinea*-genus because e.g. the larva of *T. bothniella* Svensson, 1953 still remains undescribed. Although in the future phylogenies may be based more on the analysis of long chain fatty acids than on setal research, for practical identification we must surely have chaetotaxonomy for many years to come.

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