The larva of *Autographa buraetica* (Lepidoptera, Noctuidae)

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The larva of *Autographa buraetica* (Staudinger, 1892) is described from materials based on ex ovo rearings carried out in Sweden in the summers 1989 and 1991. Description of mouthparts, chaetotaxy and ornaments are given with drawings and photographs. The larva can be separated from other species of *Autographa*, also from the sister species *A. pulchrina* (Haworth, 1809). The so-called "intermediate form" belongs to *A. buraetica* (not to *A. pulchrina*), but, based on a limited material, the "intermediate" larvae seem to show slight average differences to those of the "typical" *A. buraetica*.

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1. Introduction

Recently, an increasing number of pairs of sibling species have been detected among Plusiinae. Much confusion exist on geographical distribution of such species, and the disorder in biogeographical knowledge has added further difficulties in solving taxonomic problems within the group. The most difficult genus within Plusiinae appears to be *Autographa*.

The nominal taxon, *Autographa buraetica* (Staudinger, 1892), has been recently mentioned as a species by Sugi (1982) and Kljutshko & Kononenko (1986). Occurrence of the species in North America was observed by Lafontaine (1987), actually making *A. buraetica* the only holarctic species of the genus. The species was recently reported as new to Finland and Europe by Kerppola & Mikkola (1987). The immature stages have so far been undescribed, a serious lack as the species is an interesting pair of sister species with *A. pulchrina* (Haworth, 1809).

In the summers 1989 and 1991, females collected in central Sweden were made to lay eggs. Three moths were of typical form and others were of a form which appears to be intermediate between *A. buraetica* and *A. pulchrina* (see Palmqvist 1988) but is considered to belong to *A. buraetica*.

2. Material and methods

Eleven *Autographa* females were collected on 7.VII. 1989 in an old (300 years) pine-spruce forest (C. Källander and N. Ryrholm leg.), which is situated close to Ovansjö in Gästrikland, Central Sweden. The individuals were kept separately and all of them laid a number of eggs. After death, the genitalia of all specimens were examined. Of these, two females belonged to *A. pulchrina*, three to the "typical" *A. buraetica* (larval rearings 4, 8 and 10) and six to the "intermediate" form (see Palmqvist 1988, larval rearings 1–3, 5, 7, and 9). In addition, ten

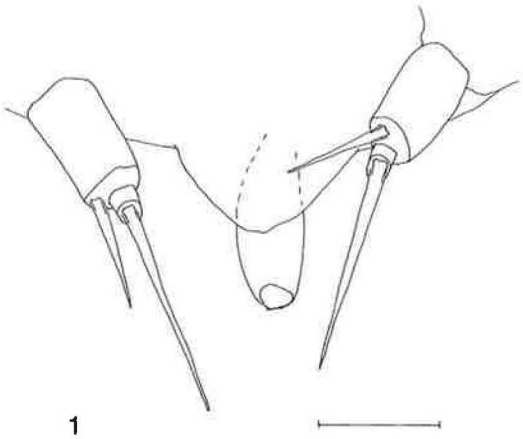

Fig. 1. Spinneret and labial palps of the "typical form" of *buraetica*. Scale in drawings = 0.1 mm.

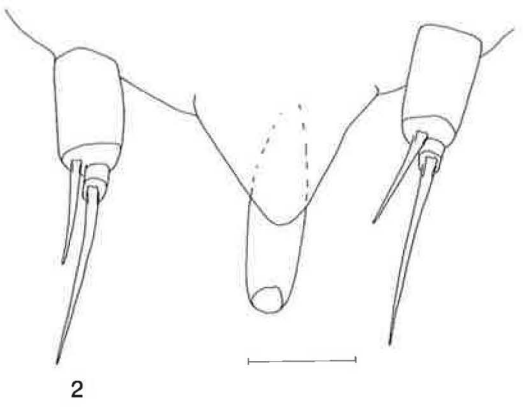

Fig. 2. Spinneret and labial palps of the "intermediate form" of *buraetica*.

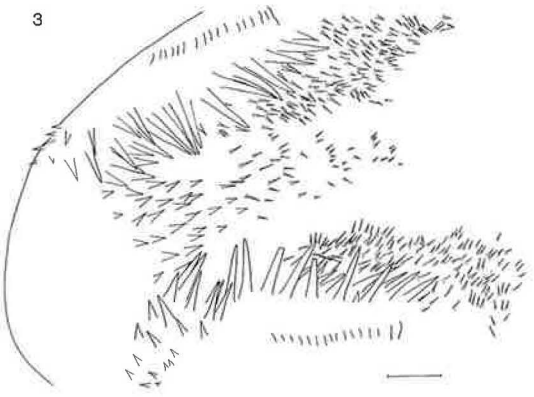

Fig. 3. Hypopharynx of the "typical form" of *buraetica* dorsal view.

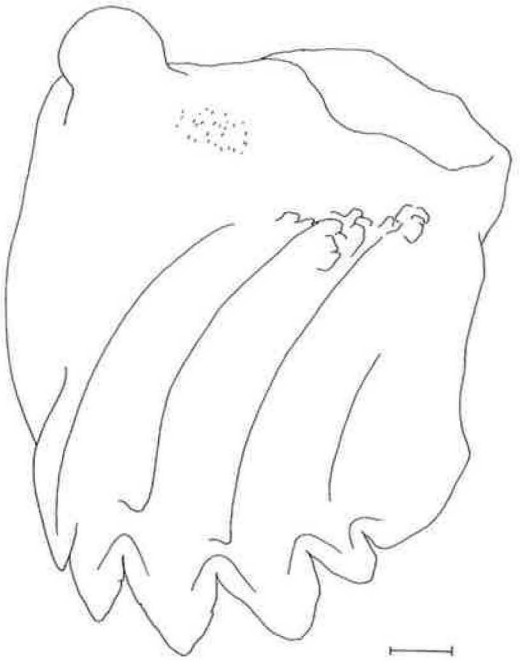

Fig. 4. Inner surface of mandible of "typical" *buraetica*.

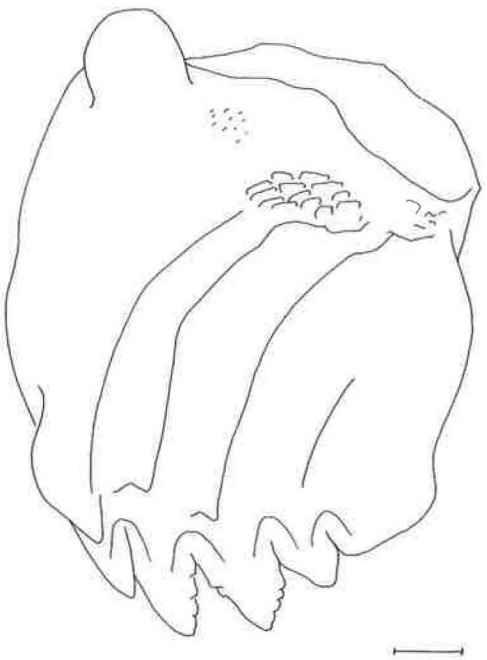

Fig. 5. Inner surface of mandible of the "intermediate form" of *buraetica*.

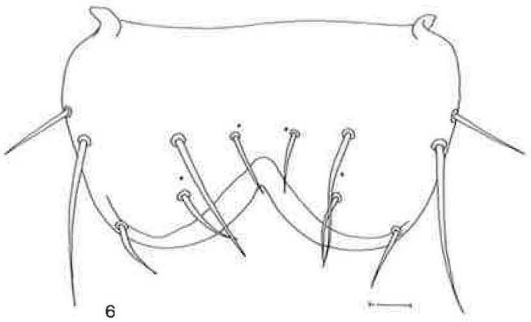

Fig. 6. Dorsal view of labrum of "typical" *buraetica*.

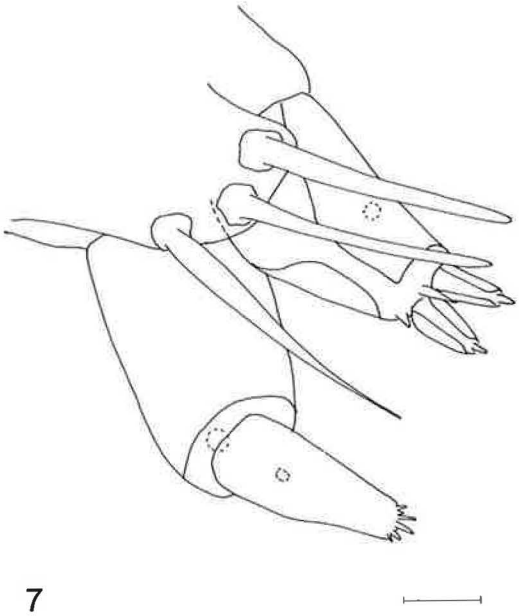

Fig. 7. Last segments of maxillary palps of "typical" *buraetica*.

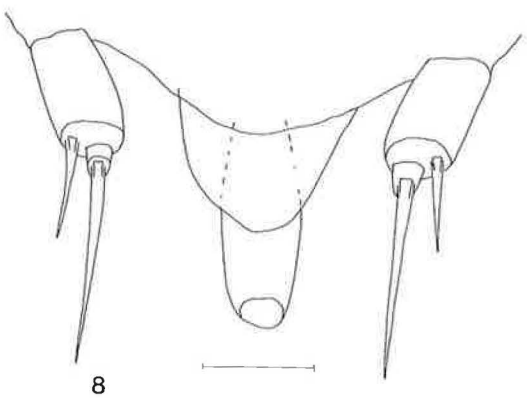

Fig. 8. Spinneret and labial palps of *pulchrina*.

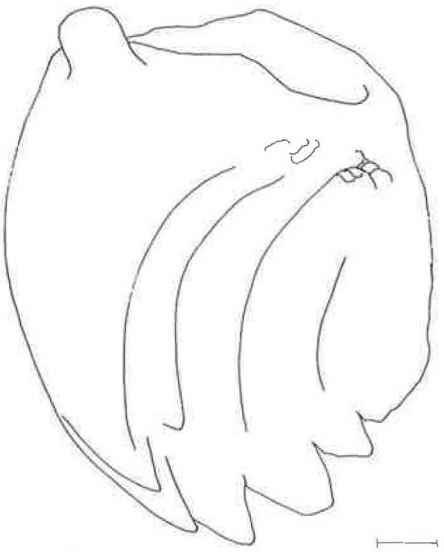

Fig. 9. Inner surface of mandible of *pulchrina*.

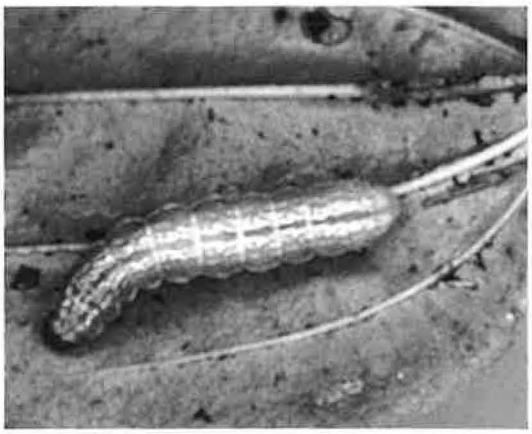

Fig. 10. Larva of "typical" *buraetica*, ex ovo 1989 (Photo K. Silvonen).

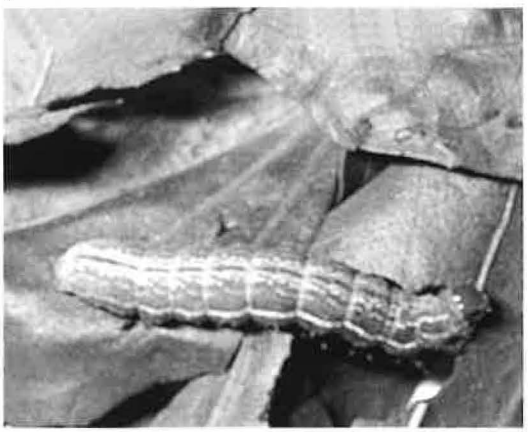

Fig. 11. Larva of the "intermediate form" of *buraetica*, ex ovo 1989 (Photo N. Ryrholm).

Fig. 12. Head and thorax in lateral view of "typical" *buraetica*, ex ovo 1989 (Photo M. Ahola).

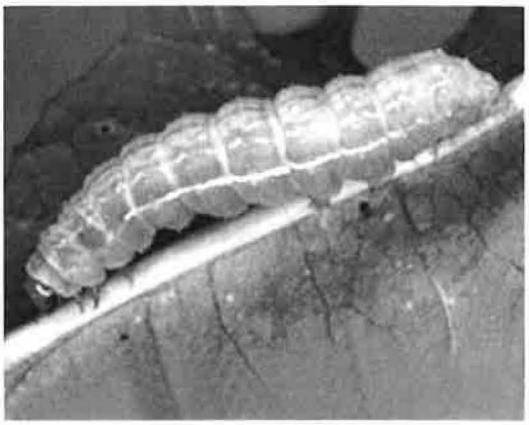

Fig. 14. Larva of *pulchrina* found in nature in Finland, EH: Koski Hl 1990 (Photo and leg. K. Silvonen).

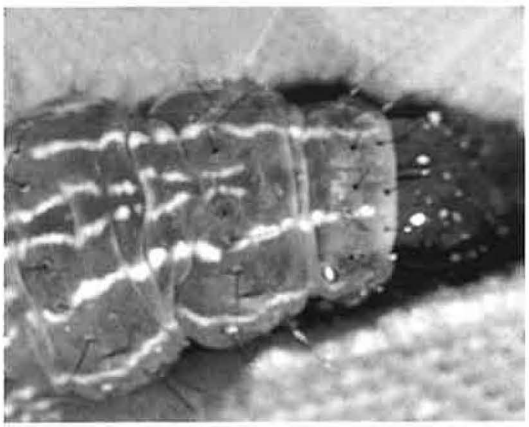

Fig. 13. Head and thorax in dorsal view of "typical" *buraetica*, ex ovo 1989 (Photo M. Ahola).

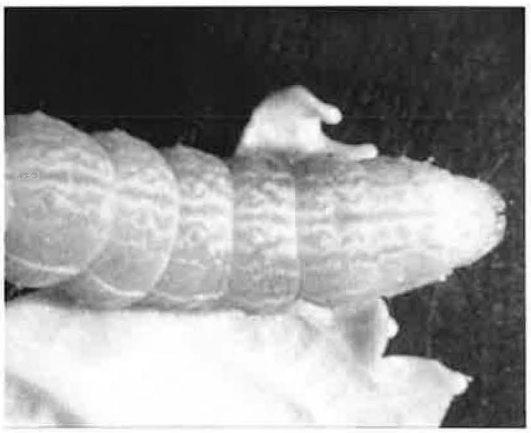

Fig. 15. Dorsal view of last 3-10 abdominal segments of *pulchrina* found in nature in Finland, EH: Koski Hl, 1986 (Photo and leg. M. Ahola).

larvae of the intermediate form from an ex ovo rearing in 1991 were studied. The description of the hypopharyngeal complex, mandible and labrum is based on six larvae of the typical form (4, 19) and three of the intermediate form (2, 3) preserved in alcohol. Measurements of chaetotaxy were made of two inflated and 17 of alcoholpreserved larvae. Data of the ratios of 150 setal distances/larva were processed by computer. Setal nomenclature follows Hinton (1946) as interpreted by Ahola (1986).

3. Diagnosis

The larva of *A. buraetica* mostly resembles that of *A. pulchrina* (Figs. 8–9 and 14–15) and *A. jota*. The morphology and chaetotaxy of these species are close together and the differences are slight. The more slender spinneret, swollen base of the first mandibular tooth and the second inner ridge terminating also in a little process before cutting margin of mandible are characteristic for *A. buraetica*. In addition, the combination of a wide space between the margins of middorsal line, a narrow white spiracular line running close to the top of spiracles and black SD1 and L2 setal punctures of abdomen separates *A. buraetica* from the larvae of other closely related *Autographa* species.

4. Description of the larva of *A. buraetica*

Mouthparts: Spinneret tubular, slightly tapering forward, length 2.7–3.7 × its width and 0.9–1.1 ×

length of seta Lp2 on labial palp. Length of first segment of labial palp (Lps1) 1.8–2.0 × width. Seta Lp2 1.4–1.7 × Lps1 and 1.9–2.3 × Lp1. Seta Lp1 on labial palp 2.3–4.6 × Lps2 (Figs. 1–2). Distal part of hypopharynx bearing 8–10 differentiated lateral spines, similar to proximolateral teeth, triangular short spines present cephalad of them, and short and stout spines medially of posterior part of region. Proximolateral teeth of hypopharynx arranged in two rows, 8–11 teeth on outer row and 2–5 in inner row. Length of proximolateral teeth 2–3 × that of spines on proximolateral region. Raduloid present with 16–17 ridges (Fig. 3). Inner surface of mandible with two strong longitudinal ridges both terminating in process before cutting margin and with short third ridge without process. Base of first (= ventral) tooth of cutting margin strongly swollen (Figs. 4 and 5). Lateral setae of labrum forming row, labral notch relatively narrow (Fig. 6). Third segment of maxillary palps elongated (Fig. 7).

Chaetotaxy and some other characters: Seta L2 on prothorax and SD2 on all thoracic segments thin, hair-like, seta SD1 on 9th abdominal segment not reduced. Seta SV2 present on first abdominal segment. Setae SD1 and SD2 as well as L1 and L2 on thorax, and setae SV1 and SV2 on 1th–4th abdominal segments located close together on same chalaza. Length of seta P1 on head 1.1–1.4 × height of frons and situated at level of AF2 setae. Dorsal setae equal in length, seta D2 on S8 0.9–1.1 × D2 on S2. Length of seta D2 on S8 2.7–3.5 × height of spiracle of same segment. Frons slightly longer than coronal suture, epicranial index 1.0–1.2 on head. Distance between 3rd and 4th ocellus relatively short, if compared with distance between ocelli Oc2 and Oc3: Oc2–Oc3 1.0–2.7 × Oc3–Oc4. Number of crochets of prolegs 18–25. For distances of setae see Table 1. Larva typically with long distance between D1 setae on thorax.

Ornaments: Head green with more or less enlarged, black genal stripe, dorsally running from adfrontal suture to seta A3 and below L1 to neck including setae A1, A3, O1, O2, O3 (sometimes), SO1 and SO2 as well as ocelli. Seta A2 with black basal spot, not fused with genal stripe. Ventral margin of stripe beginning from postgenal suture running dorsad from SO3 to O3 and neck. Epicranial stem either bordered with blackish-grey fields of first group of reticulation or more rarely area green. Setal punctures black; frons, adfrons and postgenae green.

Table 1. Distances of setae of *A. buraetica* shown as ratios and compared with related species *A. pulchrina*, *A. jota* and *A. mandarina*. N = sample size, Oc1–6 = ocelli, SD = standard deviation, SI–III = thoracic segments, S1–6 = abdominal segments, Spl = spiracle of the prothorax, Sp2 = spiracle of the second abdominal segment.

Segment:	buraetica			pulchrina			jota			mandarina		
setal ratio	mean +–SD	range	N	mean +–SD	range	N	mean +–SD	range	N	mean +–SD	range	N
Head:												
O1–O2/A3–Oc2	1.76 0.17	1.5–2.1	19	1.54 0.27	1.3–2.2	9	1.64 0.32	1.4–2.0	3	1.40 0.09	1.3–1.5	10
AF1–P1/P1–P2	1.01 0.10	0.8–1.2	19	1.08 0.10	0.9–1.2	8	1.06 0.10	0.9–1.2	3	1.25 0.14	1.0–1.5	10
P1–P2/AF1–AF2	1.12 0.15	0.9–1.4	19	1.05 0.20	0.8–1.3	8	0.99 0.27	0.8–1.3	3	0.86 0.06	0.7–1.0	10
Oc2–Oc3/Oc3–Oc4	1.53 0.16	1.0–2.7	19	1.24 0.15	1.0–1.3	9	1.11 0.19	1.0–1.3	3	1.40 0.36	1.0–2.0	10
SI:												
SD1–L1/L1–Spl	1.07 0.06	0.9–1.2	19	1.08 0.10	1.0–1.3	9	1.06 0.10	0.9–1.2	3	1.31 0.11	1.2–1.5	10
SIII:												
D1–D1/D1–D2	2.19 0.23	1.9–2.7	19	1.89 0.25	1.6–2.3	9	1.93 0.10	1.8–2.0	2	1.61 0.17	1.4–1.8	10
S2:												
SD1–SD2/SD2–Sp2	2.88 0.40	2.1–3.5	19	2.33 0.29	1.8–2.7	9	2.18 0.45	1.7–2.6	3	2.77 0.25	2.4–3.3	10
S6:												
SV1–SV2/SV2–SV3	0.84 0.12	0.7–1.2	19	0.76 0.10	0.7–1.0	9	0.66 0.08	0.6–0.7	2	0.60 0.04	0.5–0.7	10
S9:												
V1–V1/SV1–V1	1.37 0.12	1.1–1.6	19	1.24 0.06	1.1–1.3	9	1.37 0.21	1.1–1.6	3	1.04 0.08	0.9–1.2	10

Middorsal lines absent on shields, running splitted on body, white margins narrow, broadly separated (space between white margins 2/3 of distance D1–D1 or more), area between white margins green, slightly darker than dorsal zone. White subdorsal line narrower than middorsal white margins, on prothoracic shield visible only cephalad of D2 seta, lacking on anal shield or small white fleck on anterior margin of shield. This line running waved on body (crest of wave just cephalad of seta D2, bottom on fifth annulet), broken at seta D2 and intersegment. Addorsal line between middorsal and subdorsal lines on S1–S8 narrow cephalad of seta D1, widening on posterior part of segment and fused shortly with middorsal line on anterior part of segments. Dorsal and subdorsal zones green. Spiracular line white, narrow, running between setae SD1 and L1, closer to spiracles on segments S1–S4 and again on S8. Lines without darker borders. Ventral region green. All setal punctures of prothorax, those of D and SD groups of thorax and punctures of SD1 (on S1–S8), L2 (on S1–S6) and SV3 (on S1–S4) black or blackish-brown, other punctures much paler, mostly green. Chalazae of body green with white top, except those of SD1, L2 and SV3 with more or less enlarged black basal spots on segments S1–S4. Spiracles white with black rims. Thoracic prolegs black or blackish-brown with green coxae. (Figs. 10–13).

5. Discussion

A. buraetica belongs to the group of *Autographa* species, in which the larvae possess trisetose SV group on the first abdominal segment. According to Lafontaine & Poole (1991) the presence or absence of seta SV2 on the first abdominal segment may not be a stable character in phylogeny. However, in identification this character is useful (Ahola & Waselius 1986). The group has recently been enlarged including now following species of *Autographa*:

nigrisigna (Walker,[1858]) by Gardner 1947
mappa (Grote & Robinson, 1868) by Crumb 1956
corusca (Strecker, 1885) by Crumb 1956
ampla (Walker,[1858]) by Crumb 1956
pulchrina (Haworth, 1809) by Beck 1960
jota (Linnaeus, 1758) by Beck 1960
mandarina (Freyer, 1846) by Kljutshko & Skvortsov 1987
urupina (Bryk, 1942) by Torikura 1990
aemula ([Denis & Schiffermüller], 1775) by Beck (pers. comm.), and
buraetica (Staudinger, 1892), this study.

Differences between larvae of the typical and intermediate forms of *A. buraetica* seem to be slight and inconstant, if any. Spinneret of the typical *A. buraetica* equals the length of the seta Lp2 of the labial palps, that of the intermediate form is shorter (Figs. 1 and 2). The teeth of cutting margin of the mandible are smooth in the former whereas finely serrated in the latter (Figs. 4 and 5). Habitually the larva of typical *A. buraetica* seems to be darker green, black basal flecks around SD1 setae larger and black markings on the head larger than those of intermediate form (Figs. 10 and 11). According to our material, however, it is not possible to absolutely identify larvae of the intermediate form, except as *A. buraetica*.

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