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Significance of the chaetotaxy in larval identification of *Pyrausta bambucivora* Moore (Lepidoptera: Crambidae: Pyraustinae)

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Abstract

The identification and diagnosis of insect pest can best be strengthen through an examination of the arrangement of various setae and punctures of different body segments. In the current study, the cephalic region and other body segments (thoracic, abdominal) of the last instar caterpillar of *Pyrausta bambucivora* Moore (Crambidae) have been examined thoroughly and contingent the occurrence of 17 tactile setae, 4 proprioceptors and 10 pores on each half of the head.

Keywords: Chaetotaxy, Crambidae, Lepidoptera, Pyraustinae

Introduction

Pyrausta bambucivora Moore is commonly known as bamboo leaf roller. Larvae of this species rigorously attack bamboo tree and left it deskeletonized after feeding on them. The identification and control of this pest species is much more important at imago stage than that at adult by studying their biology and chaetotaxy. The purpose to carry out chaetotaxic studies of aforesaid species is to identify the different setae and puncture on the larval head and other body segments by studying their arrangements, distribution pattern and size, which further help to classify the species. Globally, the minority of workers such as Mathur (1954 and 1959), Singh (1956), Mathur and Singh (1963), Azam and Ali (1965), Franzmann and Garrett (1978), Yoshiyasu (1980), Goel and Kumar (1981), Stehr (1987), Lin (1993), Amutha and David (1998), Rose and Singh (2010) and Pinheiro *et. al.*, (2011) have given significant contribution in intensification of the chaetotaxic study. So due to paucity of chaetotaxic information and nomenclature, in the present paper, we endow with detailed descriptions of the chaetotaxic study of *Pyrausta bambucivora* Moore along with diagram's.

Material and Methods

Immature stages of *Pyrausta bambucivora* Moore has been collected from Punjab and reared in the laboratory up to pupal stage on fresh host plant leaves. To study chaetotaxy in legitimate manner, the complete distention of the larval body was done by boiling the mature larvae in the test tube. For proper maceration isolated heads and body were kept in KOH (10%) for 7-9 hrs followed by washing in 1% glacial acetic acid followed by mounting in 70% alcohol and glycerine in 9:1 ratio. For setal study, isolated heads of caterpillar shifted to petridish containing glycerine whereas permanent slides of thorax and abdomen were made by fixing them in DPX on glass slide and then observed under stereoscopic zoom microscope.

Results

Head: Cranium moderately sclerotized, golden brown in colour and somewhat shiny; median epicranial suture less than half the length of adfrontal suture; front clypeus longer than broad; ecdysial line wavy joining in middle to medium epicranial suture; mouth parts strongly

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sclerotized; stemmatal area somewhat differentiated from rest of cranium, having six stemmata, fifth stemmata present near the base of antenna and sixth behind fifth stemmata; stemmata 1, 2 and 6 large and almost equal in size; stemmata 3 present away from stemmata 2; each half of head represents 17 tactile setae, 4 proprioceptors and 10 pores; all setae spine like arise from pinacula on the last larval instar.

Frontal group seta F1 and pore Fa; F1 situated much closer to lateral margin of frons, directly postrad to C2, whereas, pore Fa lies near median longitudinal line; present dorsad to F1. Clypeal group contains setae C1 and C2, the latter present close to epicondyle, C1 slightly shorter than C2 and present towards median longitudinal line. Setae AF1 and AF2 along with pore AFa constitutes adfrontal group; AF2 slightly more than half the length of AF1, situated posterad to point where median epicranial suture joins the lateral adfrontal suture near median epicranial suture, AF1 posteromesad to A1, close to lateral frontal suture; pore AFa lies near the mid line and also anterad to AF2. Setae A1, A2, A3 and pore Aa located on the anterodorsal area, represent anterior group; A1 in level of stemmata 3, lies towards median longitudinal line; A2 present almost in straight line posterior to A1; A3 posterolatrad to A2; A3>A1>A2 lengthwise; pore Aa lies close to A2 than A3 and posteromesad to A2. Setae P1 and P2 along with pore Pb denotes as posteriodorsal group; P1 greatly longer than P2; P2 posterolaterad of P1; pore Pb closer and anterad to P2. Seta L1 represents lateral group; pore La absent; L1 posterolatrad to A3. Stemmatal area inundated with setae S1, S2, and S3 in addition to pore Sa and Sb; S1 present inside semicircle of stemmata, near but ventrocaudad to second stemmata; S2 caudad to stemmata 1, S3 present posterad to sixth stemmata ; S2>S1>S3 lengthwise; pore Sa lies dorsad to stemmata 6; pore Sb lies very close and behind stemmata 3. Substemmatal area contains setae SS1, SS2 and SS3; SS1 lies near and below stemmata 6, SS2 lies close and caudad to stemmata 6; SS3 dorsocaudad to SS1; SS1>SS3<SS2 lengthwise; pore SSa absent. Seta MG1 and pore MGa constitutes genal group; MG1 present at lower and rear portion of the head; pore MGa lies dorsoanterad to seta MG1. Microdorsal group furnished with setae MD1, MD2, MD3 and pore MDa; MD1 dorsolaterad to P2; MD2 lies in middle of MD1 and MD3 and present posteromesad to MDa; MD3 posterodorsad to MD2; pore MDa lies close and posterior to MD2 **(Plate-1, Figure 1 & 2).**

Thoracic Chaetotaxy: Spine like tactile setae.

T1 (Plate-1, fig.3): Prothoracic shield dark brown strongly sclerotized, elongated and bent inwards; anterior margin straighter and longer, posterior margin short and notched in the middle with edges rounded; each half with six setae and two pores; XD group present near anterior margin of shield; XD1 lies above and anterad to XD2; pore XDa present posterodorsad to XD1; XDb anterodorsad to XD2; XDa and XD1 situated close to each other. Dorsal group present near posterior margin of shield; D1 anterodorsad to D2; D1 close to middorsal line; D2 longer than D1 in length. Subdorsal group situated on posterolateral margin of shield; SD1 longer than SD2; SD1 anterolatrad to SD2. Lateral group bisetose, with setae L1 and L2 sharing same pinaculum; the latter prespiracle in position; L1 longer than L2; L2 directly laterad to SD1; L1 posteroventrad to L2. Subventral group lies above leg base, bisetose, beset on common oblong pinaculum; SV2 shorter and anterior to SV1. Ventral group consisted of single tactile seta V1, present below coxa near midventral line. Microscopic setae bear two groups MXD and MV; MXD1 equally distant from D1 and D2 and lies close to posterior margin of thoracic shield; MV group represented by setae MV2 and MV3; MV3 lying precoxal in position; MV2 posterodorsad to MV3.

T2 and T3 (Plate-1, fig. 4): Dorsal group composed of two setae D1 and D2 share same pinaculum; D1 posterodorsad to D2; D2 longer than D1. Subdorsal group comprises setae SD1 and SD2 present on common pinaculum; SD1 anterolaterad to SD2. Lateral group trisetose with setae L1 and L2 present on common pinaculum and L3 on separate irregular pinaculum; L1 anteroventrad to SD1; L2 anteroventrad to L1; L3 posterodorsad to L2. Subventral group unisetose; seta SV1 lying on subtraingular pinaculum, present anteroventrad to L3. Seta V1 situated posteroventrad to base of leg close to midventral line. MD1 situated close to the anterior margin of segment and anterolaterad to D2; proprioceptors MSD1 and MSD2 lying anterad to seta SD1; MSD1 posterodorsad to MSD2; microsetae MV1, MV2 and MV3 situated opposite leg; MV3 anteroventrad to MV2 and latter posteroventrad to MV1.

Abdominal Chaetotaxy

A1, A2, A7 and A8 (Plate-1, fig.-5,7): Setae of dorsal group D1 and D2 present close to middorsal line of segment; in A1 and A7, D1 longer and anterodorsad to D2; but in A2 and A8, D2 somewhat longer than D1. Subdorsal group possesses setae SD1 and SD2; SD1 longer than SD2 and encircled by rounded pinaculum; SD2 microscopic; in all the segments, SD1 dorsad to spiracle; SD2 anterodorsad to spiracle. Lateral group trisetose, represented by setae L1, L2 and L3; L1 and L2 present on common pinaculum; L3 present on a separate irregular pinaculum; L1 posteroventrad to spiracle; L2 anteroventrad to L1; L3 posteroventrad to L1; L3>L2>L1 lengthwise. Subventral group contains setae SV1, SV2 and SV3; in segment A2, subventral group trisetose, beset with setae SV1, SV2 and SV3, share same pinaculum; SV1 ventrad to L3; SV2 anterodorsad to SV1; SV3 anteroventrad to SV1; in segment A1 and A7, subventral group bisetose, beset with seta SV1 and SV2 and share same pinaculum; SV1 longer than SV2; SV1 present below L3; SV2 anterodorsad to SV1; in segment A8, subeventral group unisetose with seta SV1 posteroventrad to L3. Ventral seta V1 posteroventrad to SV1 and close to midventral line. Micro setae MD and MV groups present; seta MD1 anterolatrad to D1; MV3 anterodorsad to SV1.

A3, A4, A5 and A6 (Plate-1, fig. 8): Prolegs present on these segments. Setae D1 and D2 donate dorsal group; D1 dorsad to spiracle; D2 posterolatrad to D1; D1 and D2 approximaly of equally length. Subdorsal group bears setae SD1 and SD2; SD1 situated above spiracle and laterad to D1; SD2 very minute and anterolaterad to SD1. Lateral group trisetose, with setae L1, L2 and L3; L1 and L2 present on same irregular pinaculum; the latter present posteroventrad to spiracle; L3 situated on a separate pinaculum; L1 posteroventrad to spiracle; L2 anteroventrad to L1; L3 posteroventrad to L1; L1 and L2 approximally of same length and L3 longer. Subventral group trisetose, beset with setae SV1, SV2 and SV3 on common pinaculum present on dorsal area of proleg; SV1 anteroventrad to L3; SV2 anteroventrad to SV1; SV3 posteroventrad to SV2. Ventral group contains setae V1 present towards ventral meson. Microsetae MD and MV present; MD1 anterolatrad to D1; MV3 lies anterad to seta SV2. Crochets triordinal.

A9 (Plate-1, fig. 9): Dorsal group bisetose having setae D1 and D2; D1 seta share same pinaculum with subventral group; D1 anteroventrad to D2; D1 shorter than D2. Subdorsal group unisetose, seta SD1 posteroventrad to D1, SD1 thin and hair-like, much shorter than D1. Lateral group unisetose with seta L1 posteroventrad to SD1. Subventral seta SV1 posteroventrad to L1. Seta V1 posteroventrad to SV1 and lies close to ventral meson. Microsetae MD1 and MV3 lies near anterior margin of segment; MD1 anteroventrad to D2; MV3 anteroventrad to SV1.

A10(Plate-1, fig.-10): Anal shield well developed; anterior margin straight; posterior margin more or less rounded; D1 present near anterior margin of shield; D1 longer than D2; D2 lies at distal margin of shield. SD1 anterolaterad to D2; SD2 beset near lateral margin of shield, anteroventrad to SD1; SD1 longer than SD2. Lateral group lies at dorsal margin of anal leg with seta L1 on anterior margin of the leg; L2 posterodorsad to L1; L3 dorsocaudad to L2; a pore lies posterodorsad and near to L1. Subventral group contains setae SV1, SV2, SV3 and SV4; SV1 lies dorsad to crochets; SV2 present anteroventrad to L2; SV3 anteroventrad to L1; SV4 anteroventrad to SV2. Ventral seta V1 located near midventral line.

Discussion

With look upon at larval head in the order Lepidoptera, a single seta F1 and a pore Fa represents frontal group (Heinrich, 1916). The similar condition found in Crambidae (Solis, *et.al.* 2005): Pyralidae (Azam and Ali, 1965; Doerksen and Neunzig, 1975; Yoshiyasu, 1980; Center *et al.,* 1982; Franzmann and Garret, 1978; Yoshiyasu and Ohara, 1982; Rose and Behl, 1985; Passoa and Habeck, 1987) by the respective workers. The present observation conforms to these aforesaid studies in the *Pyrausta bambucivora* Moore. On the otherside, Valley and Wheeler (1976) and Adamski and Brown (1987) have revealed that the species, *Stomopteryx palpilineella* (Chambers) (Gelechiidae) and *Glyphidocera juniperella* Adamski (Blastobasidae) have two frontal setae *i.e.*, F1 and F2.

The presence of two clypeal setae viz., C1 and C2 has been found to be there in the order Lepidoptera (Heinrich, 1916; Hinton, 1946) confirmed by Mathur, 1954, 1959;

Bhattacharjee and Menon, 1962; Mathur and Singh, 1956; Doerksen and Neunzig, 1975; Yoshiyasu and Ohara, 1982; Rose and Behl, 1985; Passoa and Habeck, 1987; Leonard *et al.,* 1992, Nasu and Komai, 1997; Solis *et al*., 2005. The similar condition of clypeal group (*i.e*., C1 and C2) has been seen in species mentioned above. The inverted V shaped adfrontal area contains two setae AF1 and AF2 along with a pore, condition similar to this has been found by Bhattacharjee and Menon (1962); Azam and Ali (1965); Doerksen and Neunzig (1975); Franzmann and Garrett (1978); Center *et al.* (1982); Rose and Behl (1985); Amutha and David (1998) in Pyralidae; Singh and Goel (1986) in Noctuidae and Solis *et al*. (2005) in Crambidae. An equilent condition has also been noticed in the aforesaid species of superfamily Pyraloidea contains *Pyrausta bambucivora* Moore. Whereas, the pore AFa has been wanting in two Olethreutinae moth species by Hetz and Werner (1980). The anterior group comprises three setae *i.e*., A1, A2 and A3 and a pore Aa and the same has earlier been confirmed by Azam and Ali (1965); Rose and Behl (1985) and Amutha and David (1998); Singh and Goel, 1990; Singh, 1991 and Solis *et al*., 2005 in the families Pyralidae, Geometridae, Lymantriidae and Crambidae respectively. The posterior group contains two setae viz., P1, P2 and two pores Pa and Pb on the larval head. But in presently studied species pore Pb is wanting. The arrangement of two setae and one pore has been found by Yoshiyasu (1980).

As far as, the seta L1 of the lateral group is concerned it has been noticed in almost all the species of different Lepidopteran families where as, the incidence of the pore La has been recorded as variable. On the other hand, this pore has been noted to be wanting in Crambid species *Pyrausta bambucivora* Moore. Similarly, this pore has been shown to be absent in *Sceliodes laisalis* Walker and genus *Austromusotima* Yen and Solis of the families Pyralidae and Crambidae by Ogunwolu (1978) and Yen *et al*. (2004) respectively. The dorsal group on the caterpillar head contains three microsetae *i.e*., MD1, MD2 and MD3 and a pore MDa (Hinton, 1946), which are duly present in the species *Pyrausta bambucivora* Moore.

The stemmatal group consists of three setae viz., S1, S2 and S3 besides two pores Sa and Sb as has been observed in *Pyrausta bambucivora* Moore. However, workers such as Mathur (1954), Sohi and Mavi (1969), Rishi (1971), Singh and Goel (1986) and Singh and Goel (1990) have reported an absence of the pore Sb in the families Pyralidae and Noctuidae.

Setae D1 and D2 are duly recorded in the above mentioned species (Hinton, 1946; Carter, 1984; Stehr, 1987). The position of setae in species such as *Agrotis ypsilon* Rottemberg (Rishi, 1971), *Chalciope hyppasis* (Cramer) (Singh and Goel, 1986) and *Noctua pronuba* (Linnaeus) (Neil and Specht, 1987) (Noctuidae) has been noticed by the respective workers.

It has been investigated that the subdorsal group is bisetose and represented by two setae *i.e*., SD1 and SD2 which found to be present in the species *Pyrausta bambucivora* Moore, Workers such as Sohi and Mavi (1969), Rishi (1971), Singh and Goel (1986) and Neil and Specht (1987) have reported similar setal arrangement in the species viz., *Agrotis flammarata* Schiffermullar, *Agrotis ypsilon* Rottemberg, *Chalciope hyppasis* (Cramer) and *Noctua pronuba* (Linnaeus) of family Noctuidae.

T1 contains bisetose lateral group which is anterior to spiracle and both the setae *i.e*., L1 and L2 being present on a single pinaculum has been noticed in the *Pyrausta bambucivora* Moore. Presence of two setae in the species of genus *Plusia* Felder, in species *Hyblaea puera* Cramer, *Melanolophia imitata* (Walker), *Dichocrocis punctiferalis* Guenée, *Agrotis flammatra* Schiffermüllar, have also been recorded by workers such as Mukherji and Singh (1951); Singh (1955), Evans (1962), Azam and Ali (1965), Sohi and Mavi (1969), Rishi (1971), Mackay (1972), Wong and Melvin (1976) and Allyson (1980, 1981). Whereas, workers like Rishi (1971), Godfrey (1973), Kumar and Goel (1987), Singh and Goel (1990) and Singh *et al.* (1995a) have observed only L2 seta of the lateral group in the Noctuid species *i.e*., *Agrotis ypsilon* Rottemberg, *Platysenta albalabes* (Grote), *Plusia orichalcea* Fabricius, *Amyna leucostriga* Hampson and *Earias insulana* (Boisduval), *E. vitella* (Stoll) respectively. The subventral group furnished with two setae *i.e*., SV1 and SV2 are always arranged on a common pinaculum in all the species of superfamily Pyraloidea. Presence of two subventral setae in the species *Hyblaea puera* Cramer of family Hyblaeidae; in *Melanolophia imitata* (Walker) of family Geometridae; in species *Agrotis flammarata* Schiffermüllar, *Agrotis ypsilon* Rottemberg, *Enargia decolor* (Walker), *Chalciope hyppasia* Cramer, *Noctua pronuba* (Linnaeus), *Amyna leucostriga* Hampson of family Noctuidae, in species *Cochylis arthuri* Dang of Cochylidae has been reported by Singh (1955), Evans (1962), Sohi and Mavi (1969), Rishi (1971), Wong and Melvin (1976), Singh and Goel (1986), Neil and Specht (1987), Singh and Goel (1990) and Arthur

and Powell (1990). Besides the presence of seta V1 in the presently studied species, the proprioceptors *i.e*., MXD1, MV2 and MV3 are always present.

Both T2 and T3 bearing dorsal (D1, D2) and Subdorsal (SD1, SD2) groups have bisetose setae present on the same pinaculum in the species *Pyrausta bambucivora* Moore. The two setae in dorsal group *i.e*., D1 and D2 and two into subdorsal group have also been noticed in certain moth species by the following workers (Singh, 1955; Mackay, 1959; Bhattacharjee and Menon, 1962; Azam and Ali, 1965; Evans, 1962; Sohi and Mavi, 1969; Rishi, 1971; Mackay, 1972; Common, 1973; Valley and Wheeler, 1976; Adamski and Brown, 1987; Leonard *et al*., 1992; Grehan *et al*.,1994; Amutha and David, 1998; Davis, 2000; Yen *et al*., 2004 and Solis *et al.,* 2005).

The setae of the lateral group have much variablity in their number and arrangement in order Lepidoptera (Stehr, 1987), furnished by one seta *i.e*., L1 (*Aenetus virescens* Doubleday, Grehan, 1981), (*Korscheltellus gracilis* (Grote) and *Sthenopis auratus* (Grote), Leonard *et al.,* 1992) or two setae viz., L1 and L2 (in genus *Glyphidocera* Walsingham, Adamski and Brown, 1987) or three setae viz., L1, L2 and L3 (*Tracholena homopolia* (Turner), Common, 1973), (*Heleanna melanomocla* (Meyrick), (*Nomophila noctuella* (Denis & Schiffermüller), Mackay, 1972), (*Zophodia convolutella* Hübner and *Hellula rogatalis* (Hulst), Allyson, 1980, 1981), (*Melanolophia imitata* (Walker), Evans, 1962). In the present observation, the lateral group contains three setae *i.e*., L1, L2 and L3 in all the species of superfamily Pyraloidea.

The subventral group may be represented by a single seta *i.e*., SV1, as in the species *Pyrausta bambucivora* Moore. Workers like Mackay (1972), Ogunwolu (1978), Rose and Behl (1988), Anioke and Boakye (1992) and Amutha and David (1998) in the family Pyralidae; Sohi and Mavi (1969), Rishi (1971), Singh and Goel (1986b, 1987), Singh and Goel (1990) in Noctuidae; Horak (1991), Nasu and Komai (1997) and Komai (1999) in Tortricidae; Brown and Nishida (2003) in Tortricidae have already investigated the presence of single seta SV1 in the respective families. Whereas, Stehr (1987), Joshi *et al.* (1989) and Darling (2003) have observed that there are two setae SV1 and SV2 in the families Notodontidae, Sphingidae, Epiplemidae and Thyrididae respectively. According to Fracker (1915) and Hinton (1946) the dorsal group comprises two setae *i.e*., D1 and D2 which are present on A1-A8 in the order Lepidoptera. Likewise, the present species have also the same arrangement as has been reported by Singh (1955) in the species *Hyblaea puera* Cramer of family Hyblaeidae

The subdorsal group having two setae *i.e*., SD1 and SD2 on A1-A8 has also been observed in the presently studied species, which was also confirmed in species such as *Stomopteryx palpilineella* (Chambers) (Valley and Wheeler, 1976); *Coryphista meadi atlantica* Murnoe (Mackay, 1972); *Zophodia convolutella* (Hübner) and *Hellula rogatalis* (Hulst) (Allyson, 1980, 1981) of the families viz., Gelechiidae and Noctuidae have been recorded by the respective workers. Trisetose lateral group contains three setae *i.e*., L1, L2 and L3 on the abdominal segments in the aforesaid fifteen species studied during course of present studies. The presence of all the three setae has also been observed in certain species by workers such as Valley and Wheeler (1976), Nasu *et al.* (1993), Nasu (1995) in their publications.

During present investigation, it has been noticed that on A1, this group possesses two setae (SV1, SV2) in the species *Pyrausta bambucivora* Moore. Similar condition of setal arrangement on A1 has confirmed by Valley and Wheeler (1976) and Sohi and Mavi (1969), Rishi (1971) and Kumar and Goel (1987) (Noctuidae) in the species *Stomopteryx palpilineella* (Chambers), *Agrotis flammatra* Schiffermüllar, *Plusia orichalcea* Fabricius respectively.

In the presently studied species *Pyrausta bambucivora* Moore, the subventral group is bisetose (*i.e*., SV1 and SV2) on A7. Similar bisetose arrangement on A7 has been found in species in *Nomophila noctuella* Denis and Schiffermüller (Pyralidae) (Mackay, 1972).

A single seta (SV1) of the subventral group on segment A8, is duly present in the species *Pyrausta bambucivora* Moore, investigated presently. The earlier observations in the species *Tracholena homopolia* (Turner) (Common, 1973), *Neobarbara olivacea* Liu and Nasu (Liu and Nasu, 1993), *Epinotia tianshanensis* Liu and Nasu and *Zeiraphera gansuensis* Liu and Nasu (Liu and Nasu, 1993), *Statherotis discana* (Felder and Rogenhofer) (Nasu *et al.,* 1993), *Heleanna melanomocha* (Meyrick) (Nasu, 1995) have conformed the aforesaid condition.

The presence of single seta V1 of the ventral group on A1-A8 in all the species goes in accordance to the earlier works by Singh (1955), Evans (1962), Sohi and Mavi (1969), Rishi (1971), Mackay (1972), Common (1973),

Wong and Melvin (1976), Ogunwolu (1978), Hashimoto (1982, 1986, 1991, 1991a. A single microseta MD1 of MD group is present on A1-A8 in the presently studied species.

According to Stehr (1987), the number of various setae pertaining to various groups on A9 are relatively reduced to D1 and D2, SD1, L1 (sometimes L2 and L3), SV1 (sometimes SV2) and V1 have been observed by workers such as Mackay (1972), Valley and Wheeler (1976), Ogunwolu (1978), Arita and Diakonoff (1979), Center *et al.* (1982), Arita (1989), Liu and Nasu (1993) and Nasu *et al.* (1993) in the species viz., *Nomophila noctuella* Denis and Schiffermüller (Pyralidae), *Stomopteryx palpilineella* (Chambers) (Gelechiidae), *Sceliodes laisalis* Walker (Pyralidae). Allyson (1981) has noticed that the seta SD1 is quite finer than the other setae in a Pyralid, *Hellula rogatalis* (Hulst). A similar condition has been found in *Pyrausta bambucivora* Moore.

After scrutiny of the relevant literature, it has been inferred that the chaetotaxy of A10 has been attempted by workers such as Singh (1953), Hasenfuss (1969) and Stehr (1987). Further, workers like Allyson (1980), Yoshiyasu (1980), Yoshiyasu and Ohara (1982), Hashimoto (1982), Wong *et al.* (1983), Singh and Goel (1986, 1987), Beck *et al.* (1993) and Singh *et al.* (1995). But they have just mentioned the names of the setae present on the anal shield. However, in the species studied presently, an attempt has been made to fill the gap regarding the chaetotaxy of A10. In the presently studied species, both the setae of the dorsal (D1, D2) and subdorsal groups (SD1 and SD2) are well represented on the anal shield and the lateral group represented by three setae *i.e.*, L1, L2 and L3. The subventral group contains four setae viz., SV1, SV2, SV3 and SV4 in *Pyrausta bambucivora* Moore.

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References

Adamski, D. and Brown, R. L. 1987. A new nearctic *Glyphidocera* with descriptions of all stages (Lepidoptera : Blastobasidae : Symmocinae). *Proc. Entomol. Soc. Wash.,* **89**(2): 329-343.

Allyson, S. 1980. Last instar larva of the gooseberry fruitworm, *Zophodia convolutella* (Lepidoptera : Pyralidae : Phycitinae). *Ibid.,* **112**: 43-45.

Allyson, S. 1981. Descriptions of last instar larvae of cabbage webworm *Hellula rogetallis* (Lepidoptera : Pyralidae) with a key to larva of North American species of *Hellula*. *Ibid.,* **113**(6): 361-364.

Amutha, S. and David, B. V. 1998. Chaetotaxy of three Pyralid larvae on four *Jasminum* species. *Ad. Bios.*, **17**(1): 65-80.

Arthur, A. P. and Powell, Y. M. 1990. Description of the last-instar larva of *Cochylis arthuri* Dang (Lepidoptera : Cochylidae) and charactrs for separating it from last-instar larva of *Cochylis hospes* Walsingham. *Can. Ent.,* **122**: 627-631.

Azam, K. M. and Ali, M. H. 1965. Morphology of larvae of *Dichocrosis punctiferalis* Guenée, the caster shoot of capsule borer with special reference to its chaeetotaxy (Lepidoptera : Pyralidae). *Indian J. Ent.,* **27**: 423-431.

Bhattacherjee, N. S. and Menon, M. G. R. 1962. External structure of the various stages of *Hymenia recurvalis* (Fabricius) (Pyralidae : Lepidoptera). *Ibid.,* **24**: 252-263.

Brown, J. W and Nishida, K. 2003. First record of larval endophagy in *Eulini* (Tortricidae): A new species of *Seticosta* from Costa Rice. *J. Lepid. Soc.*, **57** (2): 113-120.

Center, T. D., Balciunas, J. K. and Habeck, D. H. 1982. Descriptions of *Sameodes albiguttalis* (Lepidoptera: Pyralidae) life stages with key to Lepidoptera larva on Waterhyacinth. *Ann. Ent. Soc. Am.,* **75**: 471-479.

Common, I. F. B. 1973. A new species of *Tracholena* (Lepidoptera, Tortricidae) attacking Klinkii pine in Papua New Guinea, with a description of the larva and pupa of *T. Homopolia* from Australia. *J. Aust. Ent. Soc.,* **12**: 301-306.

Doerksen, G. P. and Neunzig, H. H. 1975. Description of some immatures *Nephopterix* in the Eastern United States (Lepidoptera : Pyralidae : Phycitinae). *Ann. Ent. Soc. Am.,* **68**(4): 623-639.

Evans, D. 1962. Descriptions and life history of *Melanolophia imitata* (Walker) (Lepidoptera : Geometridae). *Can. Ent.,* **94**: 594-605.

Franzmann, B. A. and Garrett, R. 1978. Description of the immature stages and adult genitalia of the banana scab moth, *Nacoleia octasema* (Pyralidae: Pyraustinae), from North Queensland. *Pacific Insects,* **19**(1-2): 45-51.

Godfrey, G. L. 1973. The larva of *Platysenta albalabes* (Grote) (Lepidoptera : Noctuidae). *Proc. Ent. Soc. Wash.,* **75**(2): 187-191.

Goel, S. C. and Kumar, A. 1981. Cephalic demarcations and chaetotaxy of larval *Diacrisia obliqua* (Walker) (Arctiidae). *Uttar Pradesh J. Zool.,* **1**: 1-10.

Grehan, J. R. 1981. Morphological changes in the three-phase development of *Aenetus virescens* larvae (Lepidoptera : Hepialidae). *New Zealand J. Zool.,* **8**: 505-514.

Heinrich, C. 1916. On the taxonomic values of some larval characters in the Lepidoptera. *Proc. Ent. Soc. Wash.,* **18**: 154-164.

Hinton, H. E. 1946. On the homology and nomenclature of the setae of lepidopterous larvae with some notes on the phylogeny of the Lepidoptera. *Trans. R. Ent. Soc., Lond.*, **97**: 1-37.

Kumar, V. and Goel, S. C. 1987. Body chaetotaxy of last instar caterpillar of *Plusia orichalcea* Fab. (Noctuidae). *Geobios new Reports,* **6**: 122-127.

Leonard, J. G., Grehan, J. R. B and Parker, B. L. 1992. First instar description of *Korscheltellus gracilis* (Grote) and *Sthenopis auratus* (Grote) (Lepidoptera: Hepialidae) with a consideration of cladistic relationships between setae. *J. New York Entomol. Soc*., **100**(4): 594-614.

Lin, C. S. 1995. Description of last-instar larvae of 31 species of Taiwan Spilomelini (Lepidoptera : Pyralidae : Pyraustinae). *Bull. Nat. Museum Natural Sci.,* **6**: 107-130.

Mackay, M. R. 1972. The larva of *Nomophila noctuella* (Lepidoptera : Pyralidae). *Ibid.,* **104**: 1479-1481.

Mathur, R. N. 1954. Immature stages of Indian Lepidoptera No. 9 Pyralidae, subfamily Pyraustinae. *Indian for. Rec.,* **8**(11): 241-265.

Mathur, R. N. 1959. Immature stages of Indian Lepidoptera No. 12. Pyralidae, subfamily Pyraustinae. *Ibid.,* **9**(10): 183-210.

Mathur, R. N. and Singh, P. 1956. Immature stages of Indian Lepidoptera 13-Pyralidae, subfamily Pyraustinae. *Ibid.,* **10**(6): 117-148.

Mukherji, S. and Singh, H. 1951. Studies on the chaetotaxy of larvae of *Plusia* species (Lepidoptera: Phalaenidae). *Proc. R. Ent. Soc. Lond.,* **20**: 15-24.

Nasu, Y. and Komai, F. 1997. A new species of genus *Hendecaneura* Walsingham (Lepidoptera, Tortricidae) injurious to the twigs of *Hirado azalea* Hybrids from Japan. *Jpn. J. Ent.,* **65**(2): 413-420.

Nasu, Y. and Komai, F. 1997. A new species of genus *Hendecaneura* Walsingham (Lepidoptera, Tortricidae) injurious to the twigs of *Hirado azalea* Hybrids from Japan. *Jpn. J. Ent.,* **65**(2): 413-420.

Neil, K. A. and Specht, H. B. 1987. Sixth instar larvae of *Noctua pronuba* (L.) (Lepidoptera: Noctuidae). *Can. Ent.*, **119** : 209-214.

Passoa, S. and Habeck, D. H. 1987. A description of the larva and pupa of *Rupela albinella*, a pest of rice in Latin America (Lepidoptera: Pyralidae: Schoenobiinae). *Fla Entomol.*, **70**(3): 368-375.

Rishi, N. D. 1971. Studies on the external morphology and chaetotaxy of ultimate instar larva of *Agrotis ypsilon* Rott. (Lepidoptera: Noctuidae), a serious agricultural pest in Kashmir. *Kashmir Sci.,* **8**(2): 143-156.

Rose, H. S. and Behl, N. K. 1985b. Cephalic chaetotaxy of the last instar larva of a Pyralid : *Corcyra cephalonica* (Stainton) (Lepidodptera). *Uttar Pradesh J. Zool*., **5**(2): 195-198.

Rose, H. S. and Singh, D. 2010. Cephalic chaetotaxy of the last instar larva of a pyralid: *Syllepte derogata* (Fabricius) (Lepidoptera). *J. Threatened Taxa*, **1**(12) : 672-673.

Singh, B. 1956. Some more Indian geometrid-larvae (Lepidoptera), with a note on the identity of components of various groups of setae. *Ibid.,* **9**(6): 131-163.

Singh, G. P., Goel, S. C. and Kumar, V. 1995a. A comparative account of the chaetotaxy of last instar larval of *Earias insulana* (Boisd.) and *E. vitella* (Stoll.) (Noctuidae: Chloephorinae). *Uttar Pradesh J. Zool.,* **15**(1): 27-34

Singh, J. 1991. Cephalic sclerites and chaetotaxy of a hairy caterpillar, *Lymantria marginata* Walk. (Lepidoptera : Lymantriidae). *J. Res. Lepid.,* **30**(3-4): 272-278.

Sohi, G. S. and Mavi, G. S. 1969. Morphology and chaetotaxy of the larvae of *Agrotis flammatra* Schiff. (Noctuidae : Lepidoptera). *Agric. J. Res.,* **6**(1): 224-232.

Solis, M. A., Davis, D. R. and Nishida, K. 2005. Life history and systematics of *Albusambia elaphoglossumae* (Lepidoptera: Crambidae): A new genus and species of musitimine with leaf mining biology from Costa Rica. *Rew. Biol. Trop.*, **53**(3-4): 487-501.

Stehr, F. W. 1987. *Immature insects*. Kendall/Hunt Publishing Company, Iowa. pp 729.

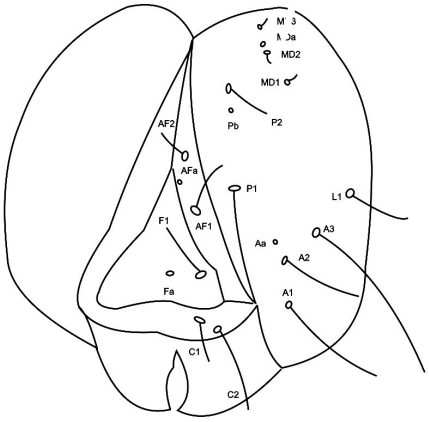
Valley, K. and Wheeler, A. G. 1976. Biology and immature stages of *Stomopteryx palpilineella* (Lepidoptera : Gelechiidae), a leafminer and leaftier of Grownvetch. *Ann. Ent. Soc. Am.,* **69**(2): 317-324.

Yen, S. H., Solis, M. A. and Goolsby, J. A. 2004. A New Musotimine genus Austromusotima, (Lepidoptera: Crambidae) feeding on old world climbing fern, *Lygodium microphyllum* (Schizaeaceae). *Ann. Ent. Soc. Am*., **97** (3): 397-410.

Yoshiyasu, Y. 1980. A systematic study of the genus *Nymphicula* Snellen from Japan (Lepidoptera: Pyralidae). *Tyo to Ga,* **31**(1-2): 1-28.

Yoshiyasu, Y. and Ohara, K. 1982. A new Aphidophagous species of a Phycitine Genus *Cryptoblabes* from Japan (Lepidoptera: Pyralidae). *Tyo ta Ga,* **33**(1-2): 51-60.

PLATE 1



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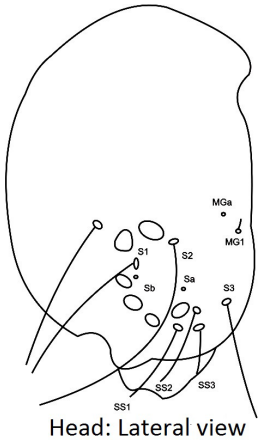

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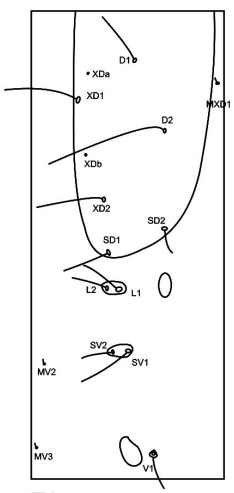

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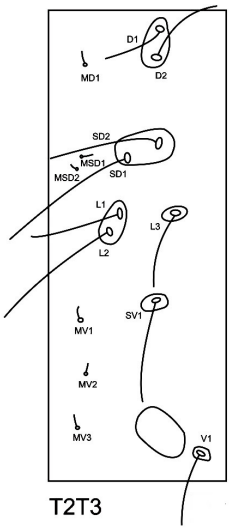

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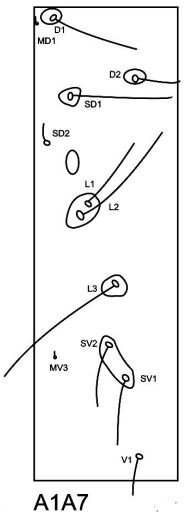

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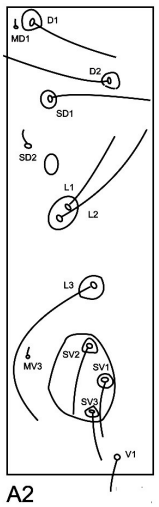

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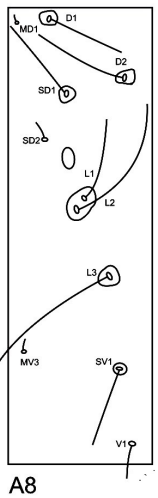

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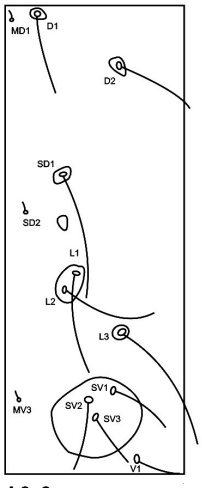

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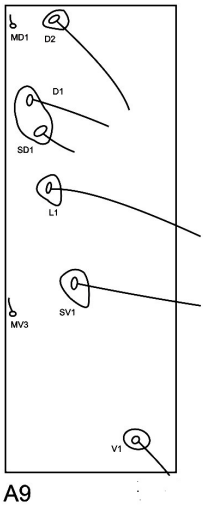

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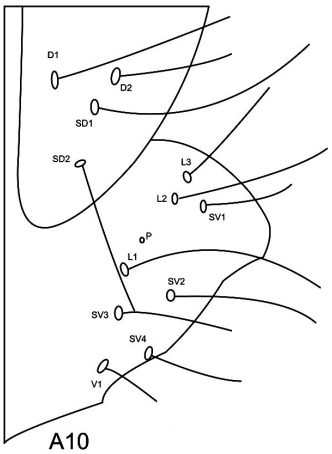

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