THE MORPHOLOGY OF SYAGRUS RUGIFRONS BALY
(COLEOPTERA: EUMOLPIDAE)*

(Met opsomming in Afrikaans)
(Avec résumé en français)

S. W. BROODRYK, Plant Protection Research Institute, Pretoria

ABSTRACT

Close on 80 species of the genus Syagrus Chapuis occur in Southern Africa and Madagascar where they are indigenous. Syagrus rugifrons Baly occurs in South Africa and is the most destructive of the five species attacking cotton.

The eggs are cylindrical, light yellow and are surrounded by an egg-case. Egg length ranges from 0·94 mm to 1·13 mm and width from 0·46 to 0·50 mm for 40 eggs. The fully-grown larva is creamy white, the length of 20 larvae ranging from 8·00 mm to 9·00 mm and the width from 2·40 mm to 3·00 mm. Head light brown, hypognathous, with a number of setae. Mouth parts complete, antennae two-segmented, ocelli absent. Thorax with six legs and a pair of large mesothoracic spiracles. Abdomen ten-segmented with spiracles on the first eight segments. Pupa creamy white, exarate, enclosed in earthen cell. Adult black, the length of 60 beetles ranging from 6·30 mm to 8·00 mm and the width from 3·20 mm to 4·00 mm. Head hypognathous, epicranium coarsely rugose, antennae with 11 segments. Prothorax and elytra strongly sclerotized.

INTRODUCTION

The genus Syagrus Chapuis includes nearly 80 species and is indigenous to Southern Africa and Madagascar. The adults of this genus generally feed on the leaves of growing plants and the larvae feed on the roots. Five Syagrus species include cotton in their host range and three of these species have been recorded in the Republic of South Africa. Syagrus rugifrons Baly is the only member of the genus which has to date proved to be of economic importance and this species has an impressive record of destruction in the history of cotton-growing in the dryland area of the Eastern Transvaal and Northern Natal.

This species, known as the syagrus beetle, destroyed crops in Northern Natal from 1920 to 1930 on such a scale that many lands had to be replanted up to three times in one season. After 1930 the cotton acreage dwindled for economic reasons and the syagrus beetle lost its importance. At the end of World War II, however, cotton-growing once more became profitable and with increased acreages of its host plant the syagrus beetle soon became present in devastating numbers. At present this beetle appears every season in varying numbers and is responsible for more damage than is readily detected.

Very little information on the morphology and biology of the syagrus beetle occurs in the published literature. This paper presents a description of the morphology of Syagrus rugifrons.

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**PROCEDURE**

Beetles were collected in the field near Barberton (Eastern Transvaal) and Magut (Northern Natal) and fed on fresh cotton leaves in wire gauze cages in the laboratory between January 1956 and December 1959. These beetles oviposited freely on the leaves and the eggs were then kept in petri dishes at 35°C and 90 per cent R.H. in an incubator to hatch. Newly-hatched larvae were transferred to young cotton plants growing in paper fibre pots of four inches in diameter and four inches high. As soon as the plants wilted, the larvae in each pot were transferred to fresh potted plants. Fully grown larvae were put into artificial ground cells in a petri dish where they pupated. The lid of the dish was painted black to simulate underground conditions. Beetles emerging from these cells were added to the laboratory colony. The breeding stock was supplemented from time to time with larvae, pupae and adults collected in the field.

The fungicide "Spergon", consisting of 96 per cent chloranil (Tetrachloro-p-benzoquinone) and 4 per cent inactive carrier was used freely on eggs and larvae to control fungi, without any noticeable adverse effects.

Larvae were killed in a P.A.A.D. mixture and after four hours in the mixture were transferred to 95 per cent ethyl alcohol in which they were stored. Pupae were preserved in the same way.

Microscopic preparations were made by dissecting out the particular part, heating it in 10 per cent sodium hydroxide and then washing it in slightly acid distilled water. The object was then dehydrated through an ethyl alcohol series, stained with acid fuchsin and, after a xylene bath, mounted in canada balsam.

The egg, larva and pupa have not previously been described. The terminology used in the description of the larva is that of Böving (1927, 1930) and Gardner (1934). In the pupal description a combination was made of the terms used by Cushman (1916) and Woods (1918, 1924). The description of the adult is an expansion of the original description by Joseph S. Baly (1878) and in this case the terminology of Snodgrass (1935) was followed.

**DESCRIPTION**

*The egg*

The egg (Fig. 1) is cylindrical and both ends are bluntly rounded. At oviposition it has a creamy-white colour but becomes light yellow within 24 hours. The length of 40 newly laid eggs ranged from 0·94 mm to 1·13 mm and the width from 0·46 to 0·50 mm. The chorion is soft and flexible and lacks definite sculpture. At eclosion the chorion is transparent and the larva visible within.

*The larva*

Larvae used in this description were in the final instar. The length of 20 larvae ranged from 8·00 to 9·00 mm and the width from 2·4 mm to 3·0 mm.

The head is light brown with a broadly oval dorsal outline, hypognathous and slightly retracted into the thorax. The head capsule (Fig. 2) is anteriorly divided by a median ecdysial line (*e l*; Snodgrass, 1944) which continues past the frontal suture (*f s*) onto the frons. The frons (*f r*) is relatively large, almost triangular and is anteriorly delineated by the curved epistomal suture (*e s*). Setae occur on each side of the median line in the following positions: two on the frons slightly dorsal to the epistomal suture, two medio-dorsal (*d e s*) on the epicranium (*e*) and two laterodistal, and also on the epicranium a number of short setae spread out laterally.

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The transverse width of the anterior margin of the clypeus (clp) is about twice as long as the anteroposterior length and the clypeus is posteriorly sclerotized and without setae. The transverse width of the labrum (lm) is about three times the anteroposterior length and the anterolateral margins are rounded. The labrum bears one large paramedian seta and two smaller lateral setae on each side of the meson.

The epipharynx (ephy, Fig. 3) bears two darkly sclerotized rods (sr) which fork near the posterior margin of the epipharynx and continue through the clypeus until they are joined together by a transverse (tr) rod just anterior to the epistomal suture. The distal margin of the epipharynx bears eight broad, somewhat flat setae and laterodistally there are two larger flat setae on each side of the meson. The median area of the epipharynx is covered with microtrichia and in this area two large sensory areas (sa) occur on each side of the mesal line. The clypeus (clp) ventrally bears one club-shaped seta and more caudally two unequal sensory spots (ss) on each side of the mesal line.

The larvae do not possess ocelli, a characteristic arrangement in the larvae of the family Eumolpidae (Sanderson, 1902).

The antennae (Fig. 4) are retractable, small, and consist of two segments borne on a membranous area. On the basal segment (seg I) a number of sensory spots (ss) occur and dorsally on this segment there is a single small seta. The second segment (seg II) is cylindrical and distally carries a number of setae (s) and a fairly prominent median sensory appendage (ap). The basal segment also bears a large, conical sensory appendage (ap).

The mandibles (Fig. 5) are palmate and the ventral aspect concave. The distal edges are bluntly rounded, without teeth and form the incisor area (i a). On the dorsal area two setae (dms) are each borne on a lightly sclerotized area. Also visible in dorsal aspect are the proximal pre-artis (pre-a) and postartis (psta-a). The left and right mandibles appear to be identical.

The maxilla (Fig. 7) bears a simple cardo (cd) which lies transversely posterior to the stipes (st) which is large and not definitely delineated. The stipes has one ventral seta (vs) and one long seta where the stipes and the palpifer (plf) meet. The maxillary mala (m m) is of equal width and is broadly rounded at the apex where it bears five to seven prominent flat setae (s) while ventrally there is a single long seta. The maxillary palpus (mp) consists of four darkly sclerotized segments borne on an unsclerotized palpifer. The palpifer lacks setae. The first two segments of the maxillary palpus are moderately transverse while the third and fourth segments are more longitudinal, and smaller than the preceding segments. The first and third segments each bear two setae, the first three segments each have at least one sensory area (sa) and the fourth segment bears a number of short sensory hairs (sh) apically.

The labium (Fig. 7) is fleshy and the prementum (prmt) bears two, one-segmented palpi (lp) and is posteriorly and laterally delineated by a wide U-shaped sclerotization (sc). Each labial palpus tapers distally and has two to three small setae and a number of short distal sensory hairs. The ligula (lig) is soft and bears a large number of short scattered microtrichia and two sensory spots (ss). The mentum (mt) is oval, lightly sclerotized and bears two anterolateral and one posterolateral seta on each side.

The hypopharynx (hphy) is fleshy, without any transverse hypopharyngeal sclerotizations and bears a number of irregularly distributed distal microtrichia.

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FIG. 1-7.—*Syagrus rugifrons* Baly. 1. Newly laid egg; 2. Head of larva; 3. Larval epipharynx and clypeus; 4. Larval antenna; 5. Left mandible of larva; 6. First abdominal spiracle of larva; 7. Larval maxilla and labium, ventral view

Fig. 1-7.—Syagrus rugifrons Baly. 1. Pasgelegde eier; 2. Kop van larwe; 3. Epifarinks en clypeus van larwe; 4. Antenna van larwe; 5. Linker-mandibel van larwe; 6. Eerste abdominale spirakel van larwe; 7. Maksilla en labium van larwe, ventrale aansig
The prothorax (prth, Fig. 8) consists of a broad flat shieldlike pronotum (pron) bearing a number of setae. The meso- and metathorax are of equal width and the mesothorax has a fully developed spiracle (sp) on the pre-epipleuron (pre-ep). The metathorax has no spiracle. The meso- and metathorax are each dorsally divided into a prescutum (prsc), scutum (sct), scutellum (scl) and postscutellum (psl). The prescuta lack setae while the scuta each bear two shiny transverse plates with two setae on each plate. The scutella each have a single shiny dorsal plate with two setae and the postscutella are without setae. The alar area (al) in both the meso- and metathorax has a shiny plate with three long and one short seta. The pre-epipleura (pre-ep) and post-epipleura (pst-ep) each have a shiny plate with a single seta.

The first six abdominal segments are similar (Fig. 8). Dorsally each has a prescutum (prsc) without setae (Fig. 9), a scutum (sct) and a scutellum (scl) each with a shiny plate bearing a single seta, and a postscutellum (psl) with two setae, each on its own plate. Laterad follows the alar area (al) with a large plate area bearing caudally two large setae and cephalad one small seta. Ventral to the alar area is the spiracle (sp), circularly sclerotized and clearly visible in the first eight abdominal segments. More ventrally the epipleural lobe (epipl) occurs with two setae on a single plate. The hypopleuron (hypl) follows with two setae.

Ventrally each abdominal segment consists of a presternum, eusternum, sterno­lum and a poststernellum. In the same area laterad there is a parasternum (parast) with nine or more setae. The presternum (prest) of one segment and the poststernellum (pst-st) of the previous segment do not bear any setae and combine to form an indistinctly delineated intersegmental section. The eusternum (eus) bears in each segment eight or more setae while the sternellum (snl) bears none.

The characteristic pattern outlined above, becomes obscure laterally on segments 7 and 8 due to fusion of the components. In segments 9 and 10 the main parts are completely fused and these segments are also much reduced in size. The posterior dorsal margin of the ninth segment bears four large setae (Fig. 10) while the tenth segment bears the Y-shaped anal groove (ag). In ventral aspect the arms and stem of the Y are equal in length and are surrounded by fleshy setiferous lobes.

The legs (Fig. 11) are borne on the thoracic segments and are of medium length and well developed. Each leg consists of a coxa (c), trochanter (tc), femur (fm) and tibiotarsus (tbr). The tibiotarsus bears a sickle-shaped claw (cl) which is heavily sclerotized except for the proximal ventral portion which bears a seta.

The spiracles (Fig. 6) are small, light in colour with a round shape due to annular sclerotization. The abdominal spiracles are roughly equal in size while the mesothoracic spiracle is twice their size.

The pupa

The pupa (Fig. 12 and 13) has a creamy white colour and is a pupa exarata. The length of 12 pupae ranged from 6·51 mm to 7·50 mm and the width from 5·1 mm to 5·3 mm. The body is soft and flexible and the abdomen can be moved in a circular manner. The body has a humped appearance and most of the setae occur dorsally. On the tip of the abdomen there are two strong sclerotized spines.

According to Woods (1918) the pupal setae are formed by the same trichogen cells which form the larval setae. In addition to having lost their sensory function, these setae stand on a large fleshy base not found in the larva. Peterson (1953) names these setae chalazae. Their function appears to be the elevation of the pupal body so that it does not come into contact with the moist cell wall. 

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In ventral view (Fig. 12) the prothorax (prth) can be seen partly to encircle the head in such a manner that the anterior margin of the prothorax lies anterior to the head. The mouthparts, antennae (ant), femora (fm), tibiae (tb) and tarsi (tar) are well developed and distinct. The wings (w) and elytra (ely) lie ventrally between the meso- and metathoracic legs. The striae (str) on the elytra are very distinct. The femora (fm) lie laterad of the ventral meson pointing outward with the tibiae (tb) parallel to them, while the tarsi (tar) lie along each side of the meson directed caudad. The metathoracic legs are partly obscured by the wings. The antennae (ant) are bent dorsad and lie dorsal to the meso- and metafemora. The terminal segments project beyond the mesothoracic tibiae on the ventral side. On the tip of the abdomen there are two strong, heavily sclerotized spines (sc s). These spines are initially soft and flexible but become hard and rigid after 36 hours.

On the epicranium (e) five setae occur on each side of the meson and on the frons (fr) three. Setae are also present on the distal ends of the femora. The pro- and mesothoracic femora each bear three while the metathoracic femora each bear two setae and a bifid spine (bs). These spines are well-developed, darkly sclerotized but smaller than the apical abdominal spines.

The wings (w) and elytra (el) cover the abdominal segments ventrally and only the last three are visible. The two subterminal segments bear a lateral seta on each side near the posterior margin. In the last segment this seta lies more cephalad and the two spines are apically placed.

The pupa is enveloped in a pupal shroud which remains unsclerotized and is shed at emergence of the adult.

In dorsal aspect (Fig. 13) the three thoracic segments and seven abdominal segments are clearly visible. On the first five abdominal segments the spiracles (sp) are distinct, on the sixth they are indistinct and on the seventh they are absent. The proximal points of attachment of the elytra (el) and the wings (w) and a part of the antennae (ant) are visible. Due to the development of the prothorax, the epicranium is not visible from the dorsal aspect. The prothorax (prth) is the first visible anterior segment and bears 12 setae on each side of the midline in the following pattern: on each side, three anterolateral, one mediolateral, one almost ventrolateral and two lateral near the caudal margin of the segment, two mesad, one halfway between the mesal line and the lateral margin and two lying laterally slightly anterior to the intersegmental line.

On each side of the meson laterad on the mesothorax (mesoth) there are two large setae with two short, minute setae (ms) at their bases. A third large seta with a small seta at its base is borne on the lateral margin of the scutellum (ds). The metathorax (metath) on each side of the meson bears two mediolateral setae and two smaller setae, one large seta caudad and one short seta mesad. The elytra (el), wings (w) and antennae (ant) cover and obscure the three thoracic segments in varying degrees.

The first five abdominal segments have distinct spiracles (sp) on the lateral margins. In the sixth segment the spiracle is indistinct and in the seventh it is absent altogether.

The first abdominal segment (abd i) is relatively short and bears on each side of the meson four large caudal setae, one small anterolateral seta and one small seta on the disc. This pattern is similar on the first six abdominal terga.
Fig. 8-13.—Syagrus rugifrons Baly. 8. Larva, left lateral view; 9. First abdominal segment of larva, left lateral view; 10. Anal segment of larva; 11. Larval leg; 12. Pupa, ventral aspect; 13. Pupa, dorsal aspect.

Fig. 8-13.—Syagrus rugifrons Baly. 8. Larve, linker laterale aansig; 9. Eerste abdominale segment van larve, linker laterale aansig; 10. Anale segment van larve; 11. Poot van larve; 12. Papie, ventrale aansig; 13. Papie, dorsale aansig.
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The seventh and terminal segment (abd vii) of the abdomen on each side of the midline bears the following setae: one large anterolateral, a small submedial, two large medioposterior and laterally a small thin seta and more caudally one large seta. On the lateroposterior margin a firm bifid spine (b s) occurs.

**The adult**

The adult is a black beetle. The length of 60 beetles ranged from 6·30 mm to 8·00 mm and the width from 3·20 mm to 4·00 mm. The morphological description of the adult is applicable to both sexes due to their similarity. The differences which do exist, are dealt with below. The head (Fig. 14) is hypognathous, partly retracted into the prothorax and not easily visible in dorsal view. In frontal view the epicranium (e) appears rugose and strongly pitted. The frons (fr) is similarly sculptured. The clypeus (c p) is indistinctly cut off at the proximal end and the anterolateral corners are broad and inflexed. The rugose sculpture diminishes anteriorly so that the epistomal margin of the clypeus is almost smooth. The labrum (lm) is twice as wide as long and bears a number of distal hairs. The mandibles (md) are strongly developed, black, and each bears two prominent teeth.

The eyes (cp) are compound (Fig. 14), large, sub-reniform and lie laterad to the antennal scapus (scp). The scapus is large and subglobose while the pedicellus (pdc) is considerably smaller and of similar shape. The flagellum consists of nine filiform segments.

The prothorax (prth) is slightly broader than long (Fig. 15) and sculptured with numerous small circular indentations. The scutellum (d s) is longer than wide and posteriorly acuminate between the elytra. The anterior margin lies parallel to the posterior margin of the prothorax.

The elytra (el, Fig. 14 and 15) are together somewhat wider than the prothorax. They cover the abdomen longitudinally and are strongly convex dorsally. The lateroposterior ends are also rounded and strongly curved ventrad. No setae occur on the elytra and they display a sculpture of fine indentations. Each elytron has 13 distinct longitudinal striae formed by grooves containing small indentations running posteriorly from the cephalic margin. From the midline the first stria (str i) runs about one-fifth of the length of the elytron before it ends in the mesal margin. The second stria (II) reaches the posterior tip of the elytron where it joins the thirteenth stria (XIII). The third stria (III) is connected with the second stria anteriorly and posteriorly it joins the twelfth stria (XII). Striae IV, V and VI meet posteriorly while IV and V are also connected anteriorly, as are striae VI, VII, XII and XIII. Striae VII to XI meet posteriorly. The humeral callus (h c) reduces the lengths of striae VIII to XI considerably. Stria XIII has a shallow indentation which is associated with the metathoracic femur. The elytra articulate to the mesotergum on each side of the dorsal scutellum (d s).

The legs (Fig. 18) are well-developed and alike. They display a pitted sculpture similar to that of the integument of the body but with setae arising in the pits. The coxae (cx) are well-developed (Fig. 17) and subspherical in the pro- and mesothorax while they are strongly developed and transversely elongated in the metathorax.

The trochanter (tr) displays a trapezoid shape from the ventral aspect but dorsally it is merely a thin ring around the femur.

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The femora (fm) are of the same width as the trochanter proximally but gradually thicken medially or mediodistally. Distally the femora are tapered and have a shallow groove to accommodate the tibiae when the beetle feigns death. In this same region a blunt toothlike projection occurs ventrally (t).

The tarsi (tar) consist of five tarsomeres each, of which the first two are heart-shaped with the articulation on the narrowed proximal end. The third tarsomere has a median base with two lobes, one on each side, which bear a few setae dorsally and a large number of hairs on the ventral side. The fourth and fifth tarsomeres are united (Imms, 1951) to form a terminal tarsomere with two curved claws (cl).

The thorax (Fig. 17) is heavily sclerotized ventrally and the three thoracic segments are easily distinguishable. The prothorax is modified and only the prosternum (prost) is distinct. In the meso- and metathorax the mesosternum (mesost) and the metasternum (metast) are discernible mesally while a number of clearly delineated sclerites laterally form the episterna and epimera of the pterothorax.

The abdomen is distinctly divided into five segments with heavy sclerotization. The first abdominal sternite is deeply indented to house the metathoracic coxae. The antero-lateral region on each side is rendered angular and meets the metasternal epimeron. The mesal portion (me p) which extends anteriorly between the metacoxae is apically rounded in the female, while it is sharp in the male (Fig. 19). This is the only character which was found to be reliable in determining the sex of these beetles.

The first abdominal sternite is wider and longer than the ones following and its posterior margin is unmodified and lies transversely with the lateral parts curving slightly caudad.

The second abdominal segment is somewhat shorter than the first; the third and fourth are progressively shorter. The last segment is about as long as the second and its width diminishes rapidly until it terminates in a rounded apex.

Opsomming
DIE MORFOLOGIE VAN SYAGRUS RUGIFRONS BALY (COLEOPTERA: EUMOLPIDAE)

Die genus Syagrus Chapuis omvat digby 80 spesies waarvan vyf katoenplante aanval. Syagrus rugifrons Baly is inheems in Suid-Afrika en rig ernstige skade aan in katoenlande.

Eiers kom in die natuur in eierpakkies voor, is liggeel, silindries en wissel in lengte van 0·94 mm tot 1·13 mm en in breedte van 0·46 mm tot 0·50 mm. Die volgroeide larwe is roomwit en die kop is ligbruin en hipognaat met 'n aantal setae. Die lengte wissel van 8·00 mm tot 9·00 mm en die breedte wissel van 2·40 mm tot 3·00 mm. Monddele is volledig, voelhorings is twee-segmentig en ocelli ontbreek. Toraks drie-segmentig met ses pote en op die mesotoraks 'n groot spirakel. Abdomen met tien segmente, die eerste agt dra spirakels. Papie room wit en 'n pupa exarata met lengte 6·51 mm en 7·50 mm en breedte tussen 5·1 en 5·3 mm. Die papie lê in 'n grondsel. Volwasse kewer wissel in lengte van 6·30 mm tot 8·00 mm en in breedte van 3·20 mm tot 4·00 mm en is swart van kleur. Kop hipognaat, epicranium grof gerif. Voelhorings elf-segmentig. Protoraks en dekvelerke sterk gesklerotiseer. Liggaam met fyn gaatjeskulptuur oortrek.
Résumé

LA MORPHOLOGIE DE SYAGRUS RUGIFRONS BALY (COLEOPTERA: EUMOLPIDAE)

Le genre Syagrus comprend près de 80 espèces, dont cinq attaquent les plants cotonniers. Syagrus rugifrons Baly est indigène en Afrique du Sud et occasionne de sérieux dégâts dans les champs cotonniers.

Les œufs, trouvés dans la nature, sont assemblés en paquets. Ils sont jaune clair, cylindriques, longs de 0,94 à 1,13 mm et larges de 0,46 à 0,50 mm. Les larves venues à maturité sont blanc-crème, avec une tête brun clair et hypognathe, pourvue d'un nombre de setae. Leur longueur varie entre 8,00 et 9,00 mm, leur largeur entre 2,40 et 3,00 mm. Les parties buccales sont complètes, les antennes se composent de deux segments et les ocelles font défaut. Le thorax est à trois segments, avec six pattes. Sur le mésothorax on trouve un grand spiracle. L'abdomen est à dix segments, dont les huit premiers portent des spiracles. Les nymphes sont des pupae exaratae de couleur blanc-crème, longues de 6,51 à 7,50 mm et larges de 5,1 à 5,3 mm. Elles se trouvent dans des enveloppes dans la terre. Les coléoptères adultes sont longs de 6,30 à 8,00 mm et larges de 3,20 à 4,00 mm. Ils sont de couleur noire. La tête est hypognathe, l'épicranium rugueux et ridé. Les antennes comptent onze segments. Le prothorax et les élytres sont fortement sclérosés. Le corps est couvert d'une sculpture foraminée.

ABBREVIATIONS USED IN FIGURES AND TEXT / AFKORTINGS IN FIGURE EN TEKS GEBRUIK

| abd | abdominal segment | abdominale segment |
| a g | anal groove | anale gleuf |
| al | alar area | alare area |
| ant | antenna | antennae, voethoring |
| b s | bifid spine | vertakte stekel |
| cd | cardo | cardo |
| cl | claw | klou |
| clp | clupeus | epeuys |
| cp | compound eye | saamgestelde oog |
| cx | coxa | coxa |
| d e s | dors. epicran. set. | dorsale epikran. setae |
| d m s | dorsal mand. setae | dorsale mandibel setae |
| d s | dorsal scutellum | dorsale scutellum |
| e | epicranium | epikranium |
| e l | ecdisial line | vervellingslyn |
| e ly | elytra | dekkyler |
| e phy | epipharynx | epifarinks |
| e pipl | epipleural lobe | epipleurale lobbe |
| e s | epistomal suture | epistomale sutuur |
| e us | eusternum | eusternum |
| fn | femur | femur |
| fr | frons | frons |
| f s | frontal suture | frontale sutuur |
| h c | humeral callus | humerale callus |
| h phy | hypopharynx | hypofarinks |
| h ypl | hypopleuron | hypopleuron |
| i a | incisor area | snyylakarea |
| l b | labium | labium |
| l m | labrum | labrum |
| l g | ligula | ligula |
| l p | labial palpus | labiale palpus |
| m d | mandible | mandibel |
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mes mesal portion
mesost mesosternum
mesoth mesothorax
met ast metasternum
metath metathorax
mm maxillary mala
mp maxillary palpus
ms minute seta
nt mentum
mx maxilla
parast parasternum
pdc pedicellus
plf palpifer
pre-a pre-artis
pre-ep pre-epipleuron
prest presternum
prnt prementum
pron pronotum
prost prosternum
prsc prescutum
prth prothorax
psl postscutellum
psl-a postartis
psl-ep post-epipleuron
psl-st poststernillum
s seta
sa sensory area
s ap sensory appendage
sc sclerotization
scl scutellum
scp scapus
ss sclerotized spines
scu scutum
seg segment
sh sensory hairs
snl sternellum
sp spiracle
sr sclerotized rod
ss sensory spot
st stipes
str stria
t toothlike projection
tar tarsus
tb tibia
tb tibiotarsus
tc trochanter
tr transverse rod
vs ventral seta
w wing

REFERENCES