

Part 1.1

The supporting framework

Vinculum & Tegumen - the VT-ring

Orientation

The vinculum forms an anteroventral arc and the tegumen a posterodorsal arc, together forming a complete or nearly complete sclerotised ring. In the set position the tegumen is usually positioned entirely posterior to the vinculum. In the natural position the tegumen is also dorsal to the vinculum, either as a result of the VT-ring laying at an angle oblique, or transverse, to the long axis of the abdomen, or as a result of a degree of fixed angulation at the vinculum-tegumen articulation (VTA).

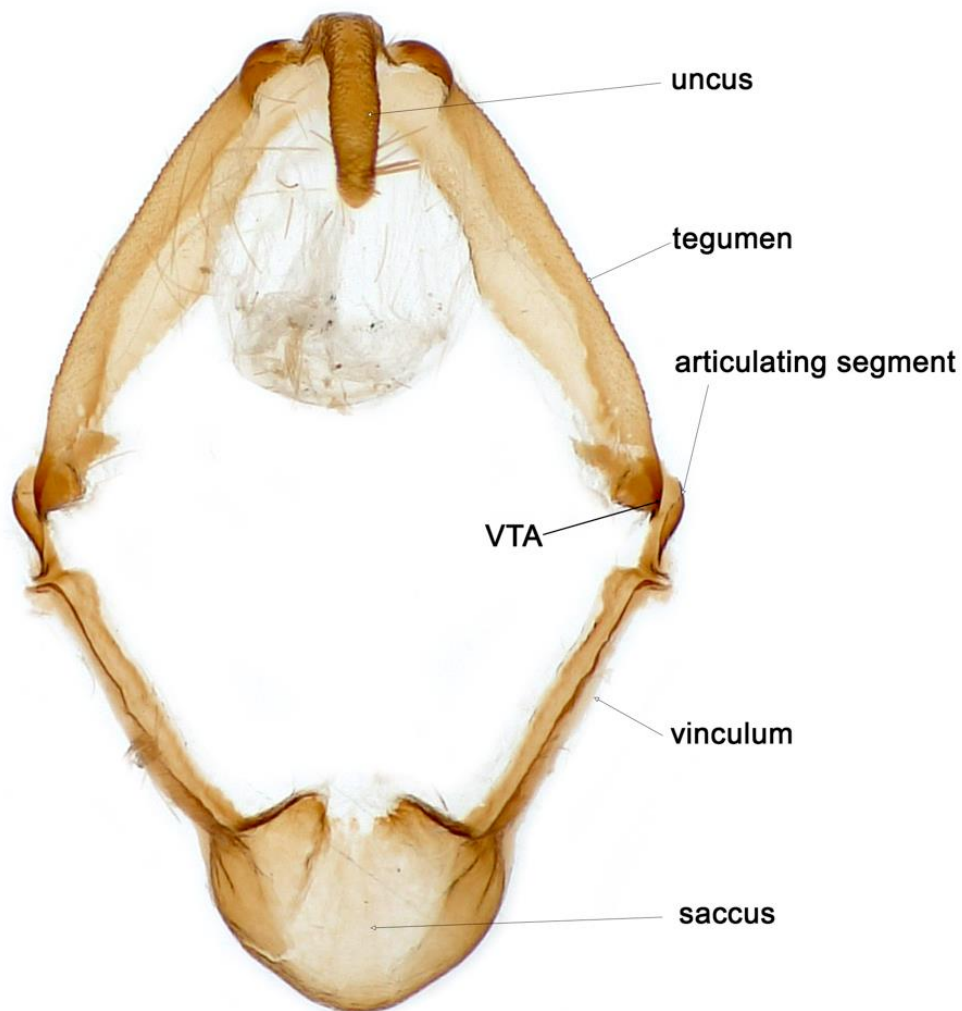


Figure 1: VT-ring of *Diarsia mendica* (Ingrailed Clay) (set specimen)

Definitions

VT-ring

A sclerotised support for the male genitalia composed of the vinculum and the tegumen; connected externally to the integument (the A8/9 intersegmental membrane) and internally to the valvae and diaphragm.

Vinculum

A sclerotised (or partly sclerotised) structure, with ventral and dorsal laminae and an anterolateral fold, derived from the ventral plate of A9, and connected to the tegumen such that together they form the supporting framework of the male genitalia. The edge of the ventral lamina is connected to the A8/9 intersegmental membrane; the edge of the dorsal lamina is connected to the bases of the external laminae of the valvae. The vinculum is commonly composed of a central “saccus” and a pair of “lateral arms”.

Tegumen

A sclerotised (or partly sclerotised) arch, with dorsal and ventral laminae and a posterolateral fold, derived from the dorsal plates of A9&10, and connected to the vinculum such that together they form the supporting framework of the male genitalia. The edge of the dorsal lamina is connected to the A8/9 intersegmental membrane; the edge of the ventral lamina is connected to the diaphragm. The “uncus”, “gnathos” and “socii” (when present) are treated as components of the tegumen. The “anal tube” arises from the portion of the diaphragm attached to the tegumen and may be connected to the tegumen by sclerotised supports.

Saccus

A central expanded component of the vinculum.

Lateral arms of the vinculum

Narrow portions of the vinculum continuous medially with the saccus and connected posterodorsally to the tegumen.

Articulating segment

A modified portion of the posterior end of a lateral arm of the vinculum which forms an articulation with the tegumen.

Body of the tegumen

The main structural component of the tegumen to which the uncus, gnathos and socii, when present, are attached.

Dorsal arc (of the tegumen)

The anterior/medial edge of the dorsal lamina of the body of the tegumen, excluding any part of this edge that extends into the pedunculi.

Ventral arch (of the tegumen)

The arch formed by the anterior/medial edge of the ventral lamina of the body of the tegumen

Posterior extension (of the tegumen)

A paired sclerotised extension from the posterior margin of the body of the tegumen which provides some support to, and is usually connected to, the uncus.

Uncus

A sclerotised, usually midline, process arising from the posterior margin of the body of the tegumen, derived from the dorsal plate of A10.

Median band

The portion of the uncus extending from the posterior margin of the body of the tegumen to the posterior extent of the posterior extensions.

Hyaline window

An unsclerotised area in the dorsal lamina of the tegumen at the junction between the body of the tegumen and the uncus.

Gnathos

A sclerotised process extending from the ventral edge of the posterior margin of the body of the tegumen, derived from the ventral plate of A10. In its complete form, it has lateral arms and a median lobe and it divides the diaphragm into a dorsal excretory zone and a ventral copulatory zone. It may be incomplete with partial division of the diaphragm.

Socius (pl. socii)

Any paired structure arising from the posterior margin of the body of the tegumen, that is not an uncus or a gnathos.

Pedunculus (pl. pedunculi) / peduncular lobe

Any development differentiating the anterior ends of the body of the tegumen.

Peduncular strand

A sclerotised strand arising from a pedunculus, or from the anterior ends of the body of the tegumen, which forms part of the articulation with the vinculum.

It is useful to note in relation to these definitions that the anal tube emerges from the diaphragm anteroventral to an uncus and posterodorsal to a gnathos.

1) The VT-ring in Family: Noctuidae

The next two figures illustrate some of the range of variation seen in the Noctuid VT-ring and in the relative proportions of its components. To some extent the apparent width of the VT-ring varies with the degree to which the anterior ends of the tegumen can be unfolded; the greater the unfolding the more transverse the appearance of the tegumen.

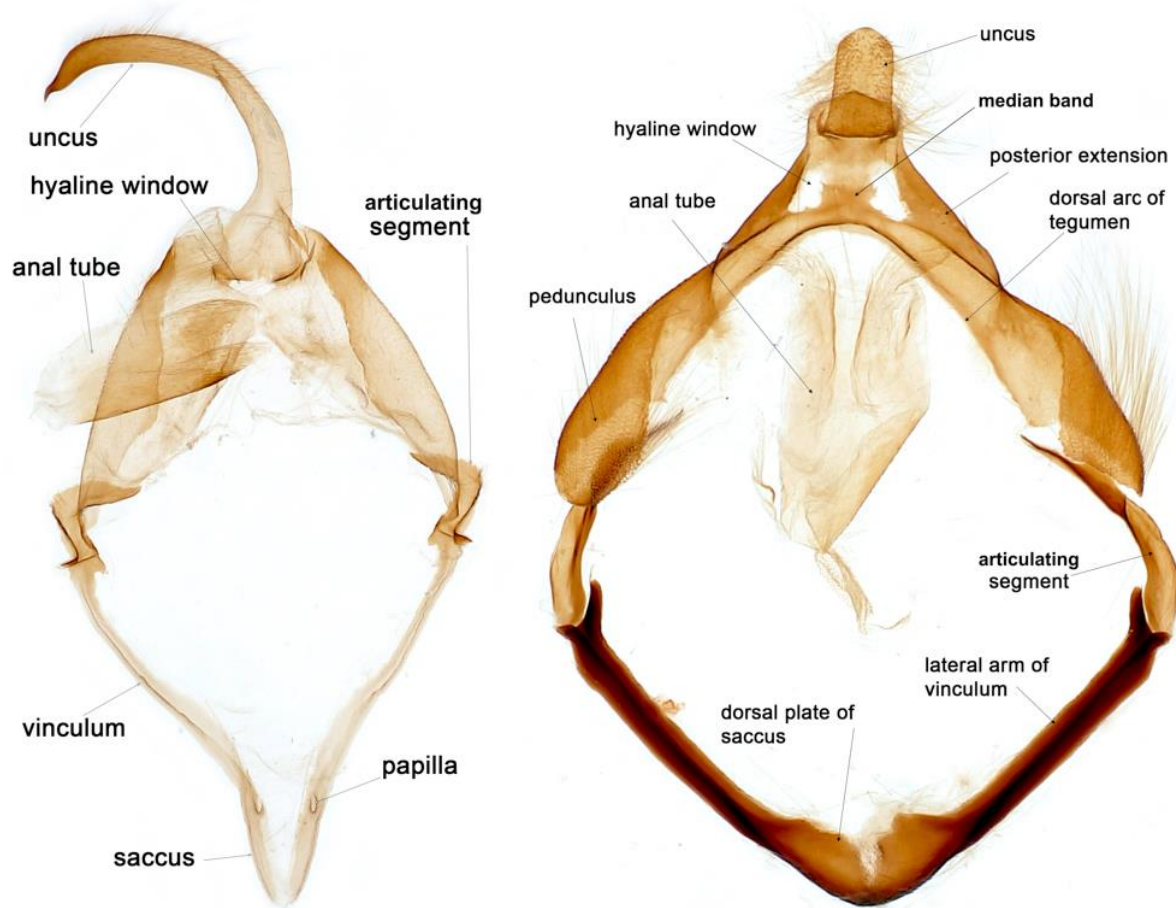


Figure 2: Labelled VT-rings. Left – *Diachrysia chrysitis* (Burnished Brass); right – *Hyppa rectilinea* (Saxon)

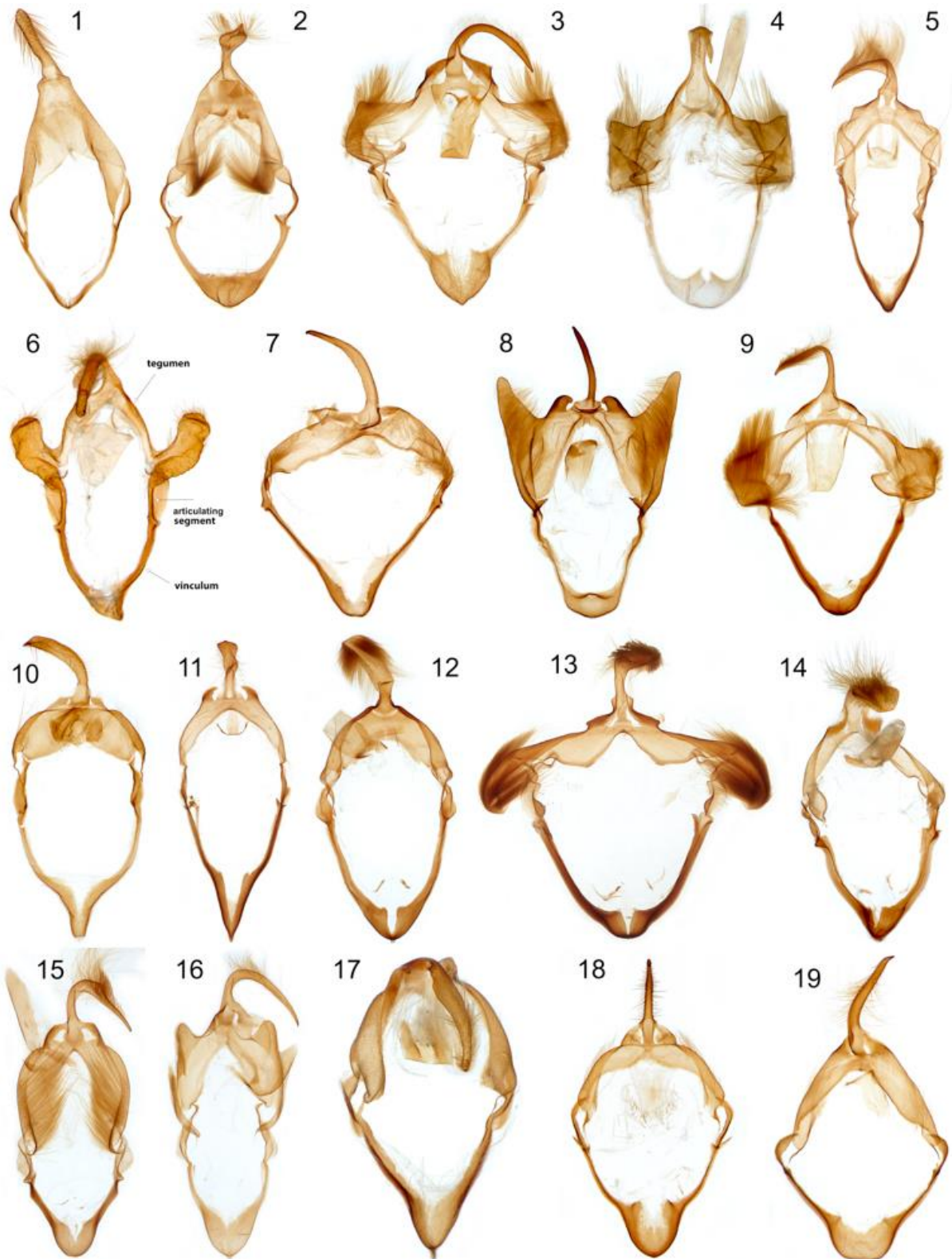


Figure 3: Noctuid VT-rings. 1: *Stilbe anomala* (Anomalous), 2: *Euplexia lucipara* (Small Angle Shades), 3: *Hydraecia micacea* (Rosy Rustic), 4: *Mesapamea secalis* (Common Rustic), 5: *Sunira circellaris* (Brick), 6: *Conistra rubiginea* (Dotted Chestnut), 7: *Xylena solidaginis* (Goldenrod Brindle), 8: *Enargia paleacea* (Angle-striped Sallow), 9: *Aporophyla nigra* (Black Rustic), 10: *Panolis flammea* (Pine Beauty), 11: *Orthosia incerta* (Clouded Drab), 12: *Tholera decimalis* (Feathered Gothic), 13: *Anarta trifolii* (Nutmeg), 14: *Hada plebeja* (Shears), 15: *Lacanobia oleracea* (Bright-line Brown-eye), 16: *Leucania obsoleta* (Obscure Wainscot), 17: *Agrotis clavis* (Heart & Club), 18: *Lycophotia porphyria* (True Lover's Knot), 19: *Eugnorisma glareosa* (Autumnal Rustic)

2) The vinculum in Family: Noctuidae

The Noctuid vinculum is most often U or V-shaped. It has a central component, the **saccus**, and a pair of **lateral arms**. It can be visualised as a folded sclerotised band with ventral and dorsal laminae; the fold is anterolateral and the edges posteromedial. The lateral arms are narrow, to the extent that the laminae and edges are usually only clearly defined in the saccus component. The saccus may be short/transverse, quadrate or long/elongate and is occasionally produced anteriorly in the midline.

A narrow, tough hyaline membrane connects the external lamina of the valva to the lateral arms of the vinculum. This connection forms an articulation between the VT-ring and the valvae, allowing the valvae to be separated during copulation.

This connecting membrane continues onto the dorsal lamina of the saccus. Here the membrane is broader and more flexible, allowing for excursion of the medial ends of the valvae as they open. The connection of the posterior edge of this portion of the membrane appears more variable depending on how closely connected the internal laminae of the valval bases are to each other. Essentially the membrane is topologically continuous with the diaphragm as it connects to the internal laminae of the valval bases; but in species with the valval bases very closely connected the continuity of the membrane with the diaphragm becomes very narrow and may be obliterated.

The continuity of the saccus with the lateral arms of the vinculum is such that the determination of the position of the junction between them can be somewhat arbitrary. Since the lateral arms are connected to the valvae, the saccus can be regarded as the part of the vinculum that naturally⁶ extends anterior to the valvae. It may be angled dorsally and / or expanded to become bulbous.

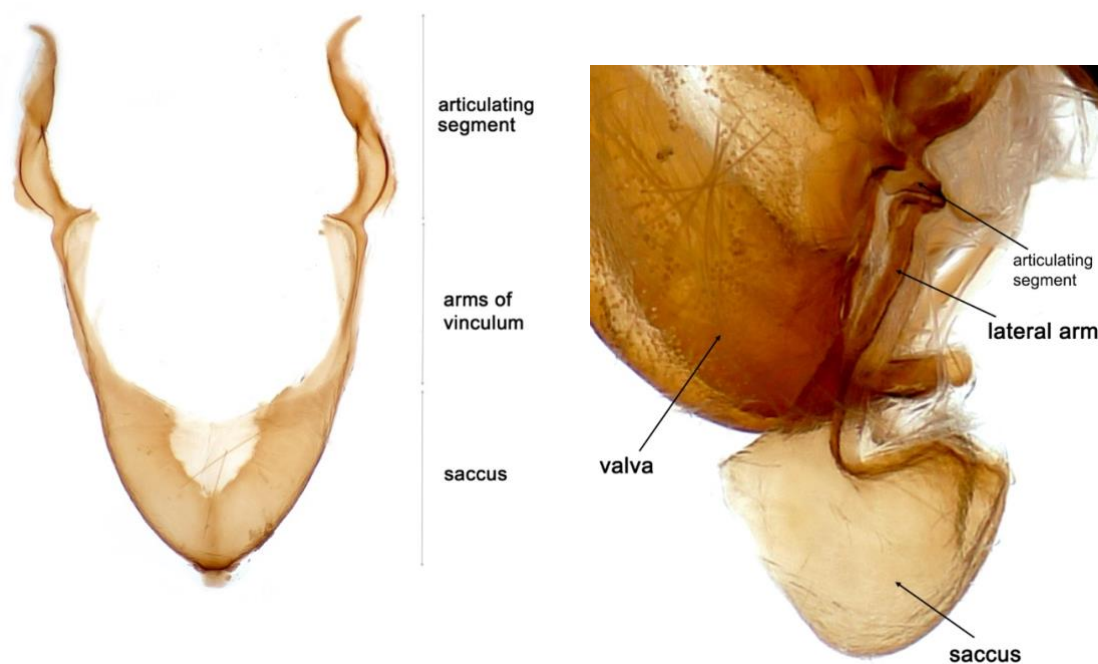


Figure 7: Vinculum of *Leucania comma* (Shoulder-stiped Wainscot) (natural) and lateral view of vinculum of *Diarsia mendica* (Ingrailed Clay) with valvae in situ (natural)

⁶ In set specimens the saccus is often deformed and then may not extend anterior to the valvae.

The articulating segments are strongly connected to, and usually inseparably fused with, the posterior ends of the lateral arms of the vinculum; and are best considered to be part of the vinculum. The sclerotization of the articulating segment often becomes attenuated towards the tegumen and its connection to the tegumen is often hyaline, increasing the flexibility of the articulation between vinculum and tegumen.

The junction between the lateral arms of the vinculum and the articulating segment is usually marked by a carina or small spur at the posterior end of the lateral arm; this carina may be on the dorsal surface and so not very evident in a standard ventral view (e.g. *Noctua comes*). The carina appears to provide some support for tethering the base of the valval costa, when the valvae open out during copulation.

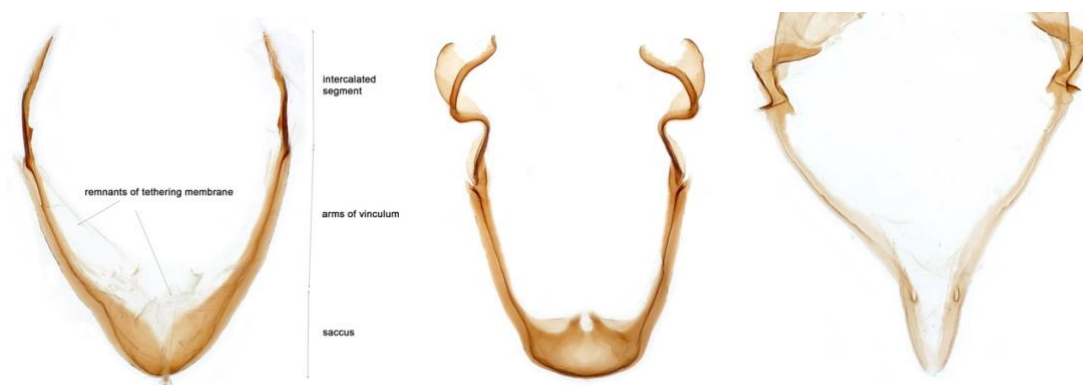


Figure 8: Vinculum. Left: *Noctua comes* (Lesser Yellow Underwing), centre: *Apamea monolypha* (Dark Arches) and *Diachrysia chrysitis* (Burnished Brass)

The relative proportion in length (in the long axis of the abdomen) of the saccus to the length of the lateral arms ranges from around $\frac{1}{3}$ to $\frac{1}{2}$ and is most commonly around $\frac{2}{3}$.

Some species show a small midline carina or nipple at the anterior extremity of the saccus eg *Noctua comes* and *Leucania comma*.

The ventral lamina of the saccus is usually hyaline. The dorsal lamina may be hyaline (e.g. in *Diachrysia chrysitis*), but most often it shows marginal sclerotization. In some species the dorsal lamina is ~fully sclerotised and its posterior edge may be sculptured (e.g. most species in Tribe: Apameini).

The laminate nature of the vinculum is often only apparent in the saccus component; the dorsal lamina never extends beyond the sclerotised edge of the lateral arms of the vinculum where they connect to the intersegmental membrane; but in some species the ventral lamina extends to connect the lateral arms – so covering the bases of the valvae and tethering them to a greater or lesser extent. This tethering membrane may be hyaline or diffusely sclerotised and connects with / is continuous with and the A8/9 intersegmental membrane at its posterior edge (and may need to be divided before a specimen can be set e.g. *Noctua comes*). This membrane seems to limit the excursion of the valval bases as the valvae separate. It is not clear to me how this is helpful in nature.

The sclerotization of the vinculum is usually of similar strength/density to that of the tegumen, but in *Diachrysis chrysitis*, and other species in Subfamily: Plusiinae, the vinculum is noticeably less well-sclerotised than the tegumen. Most Plusiinae also show a pair of small papillae on the ventral surface of the saccus.

3) The tegumen in Family: Noctuidae

In the Noctuidae, the tegumen is usually in the form of a sclerotised arch, entirely posterior to the vinculum.

The hyaline membranes enclosing the dorsal and ventral surfaces of the tegumen are not considered as part of the tegumen (they are part of the integument and diaphragm respectively), but it is helpful in visualising its structure to consider it as having dorsal and ventral laminae which are continuous with each other at a lateral fold, with the margins of the laminae and the fold being sclerotised to form an arch with ventral and dorsal edges. The structure at the closed apex (posterior) of the arch, where it articulates with the uncus, and usually has posterior extensions, is more complex. The anterior end of the arch, where it articulates with the vinculum, can also be complex with the elaboration of anterior/ventral extensions (pedunculi).

The sclerotisation of the arch is mainly posterodorsal in the midline and usually twists and folds to become more lateral as it extends anteriorly. The dorsal edge is attached to the A8/9 intersegmental membrane; the ventral edge is attached to the posterodorsal portion of the diaphragm.

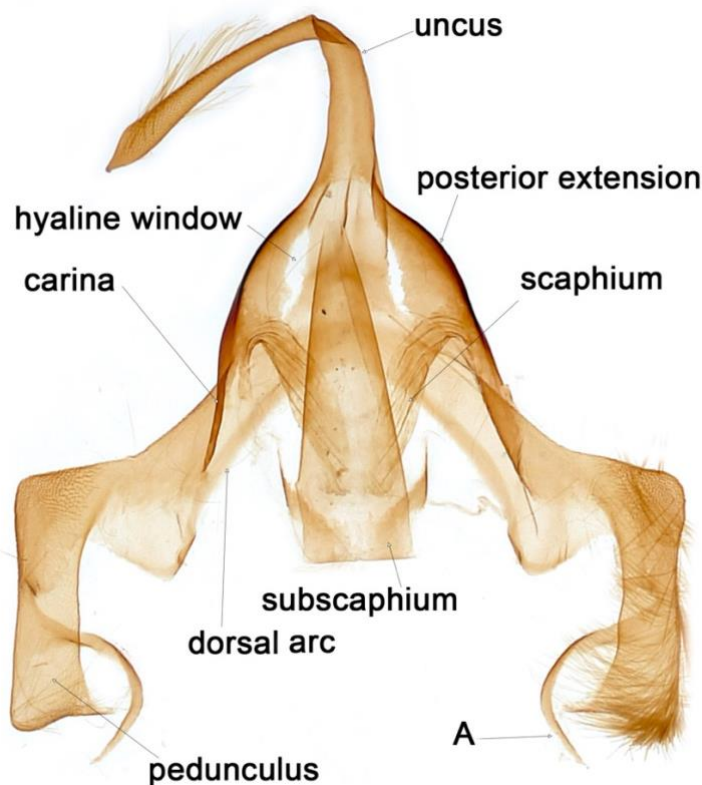


Figure 9: Tegumen of *Apamea monoglypha* (Dark Arches). A is the peduncular strand; the carina extends anteriorly from the posterior extension to become part of the ventral edge

The alimentary canal enters the tegumen between the dorsal and ventral laminae and the anal tube emerges in the diaphragm in the ventral arch. It often has sclerotised supports that are attached to the posterior portion of the ventral edge of the tegumen. Because of this close association with the tegumen the anal tube and its supports will be considered in this section rather than in part 3 dealing with the diaphragm.

The A8/9 intersegmental membrane is detached in preparation and is largely irrelevant to further discussion of the tegumen.

From a practical perspective it seems best to consider the tegumen as only the sclerotised parts, whilst retaining its conception as a 3-dimensional structure with ventral and dorsal laminae joined at a fold.

The arch of the Noctuid tegumen is well-defined at its dorsal edge (best seen in dorsal view) around the apex of the arch and extending anteriorly, usually to its attachments to the articulating segment. I call this well-defined edge the **dorsal arc**. It ranges from elongate with its sides relatively close together and parallel, to broad with the sides diverging anteriorly. The apex of the arc may be smoothly rounded, U or V-shaped.

The anterior extension of the tegumen is the part of the sclerotised arch that extends anterior to, and often ventral to, the anterior end of the dorsal arc (the dorsal edge of the tegumen continues anterior to the dorsal arc, in a less well-defined fashion, along the edge of the anterior extension). This anterior extension is the **pedunculus**. In general, the pedunculus overlaps the articulating segment, but it is quite variable in form and extent, from an undistinctive continuation of the sides of the arch of the tegumen to an elaborate distinct lobe often densely set with hair-scales.

A sclerotised strand extends from the pedunculus towards the junction of the vinculum and articulating segment, the **peduncular strand** of the vinculum-tegumen articulation. The peduncular strand is usually twisted around the articulating segment, which in turn twists around it.

There is usually a **posterior extension** from the ventral surface of the posterior margin of the arch. This commonly takes the form of a pair of struts on either side of the base of the uncus. These struts usually fuse with the lateral margins of the base of the uncus, but may appear to be free, the connection between the struts and the uncus being hyaline; they may be straight, shouldered or rounded, so forming a sloping, angular or evenly rounded posterior margin to the tegumen. The "posterior extension" may also extend anteriorly and curve ventrally.

Variation in the body of the Noctuid tegumen occurs mainly in its overall shape, particularly in the shape and extent of the posterior extension and in the shape and extent of the pedunculus.

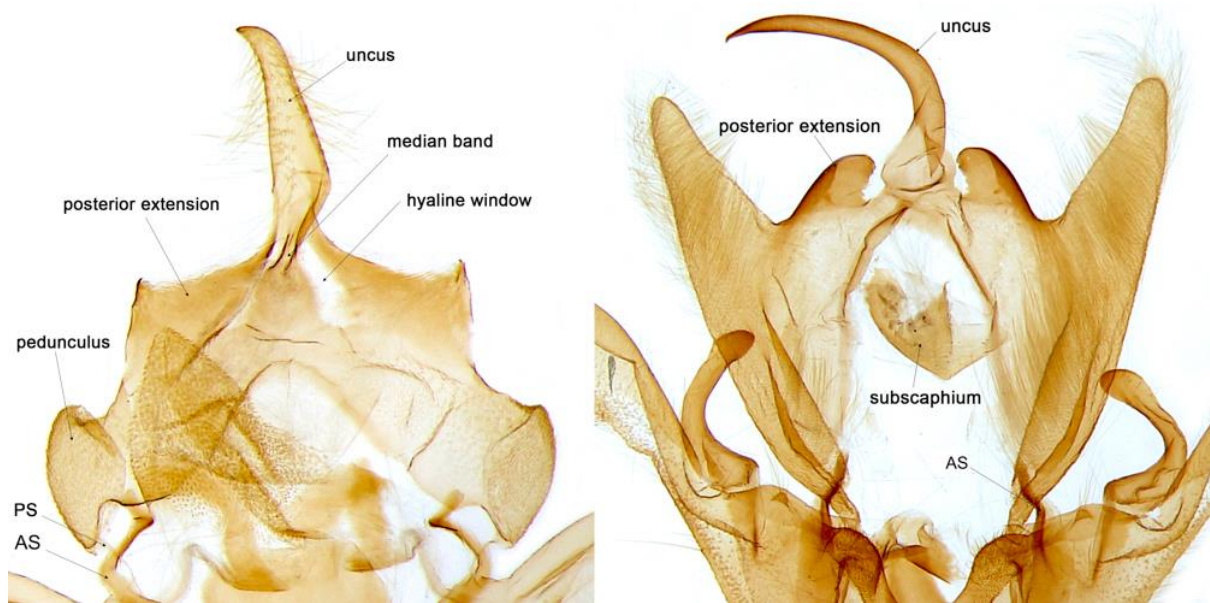


Figure 10: Tegumen. Left - *Leucochlaena oditis* (Beautiful Gothic), right – *Enargia palacea* (Angle-striped Sallow)

Because the arms of the arch naturally curve ventrally, the apparent shape of the tegumen differs considerably between the natural position, in which the peduncular lobes are seen more or less edge-on, and the set position in which the peduncular lobes are flattened to some extent. This difference is more dramatic in a set specimen of the detached tegumen in which the pedunculi can be fully flattened. Thus, the tegumen appears increasingly transverse with the degree of flattening that is obtained.

In *Enargia paleacea* the lateral plates of the arch of the tegumen are produced posteriorly and the posterior extensions are discrete without a sclerotised attachment to the uncus

4) The Vinculum-Tegumen Articulation (VTA) in Family: Noctuidae

In the Noctuidae there are 2 sclerotised components to the complex articulation at the junction of vinculum and tegumen:

- an **articulating segment (AS)** firmly fused with the posterior end of the lateral arm of the vinculum and extending to the anterior end of the dorsal arc of the tegumen, where its attachment is usually hyaline (i.e. not sclerotised). It may follow a fairly direct course around the anterodorsal edge of the tegumen, but more often extends posteriorly, then medially or follows a more sinuate course.
- a **peduncular strand (PS)** from the anterior end of the pedunculus towards the vinculum-articulating segment junction, which may attach at this junction or more posteriorly to the articulating segment. The peduncular strand is often a simple narrow extension of the anterior end of the pedunculus but may originate subapically on the dorsal edge of the pedunculus or on a carina on the inner surface of the pedunculus.

The articulating segment and peduncular strand may appear separate but they are connected by a hyaline membrane, such that the two sclerotised lines form the margins of a twisted articulating band.

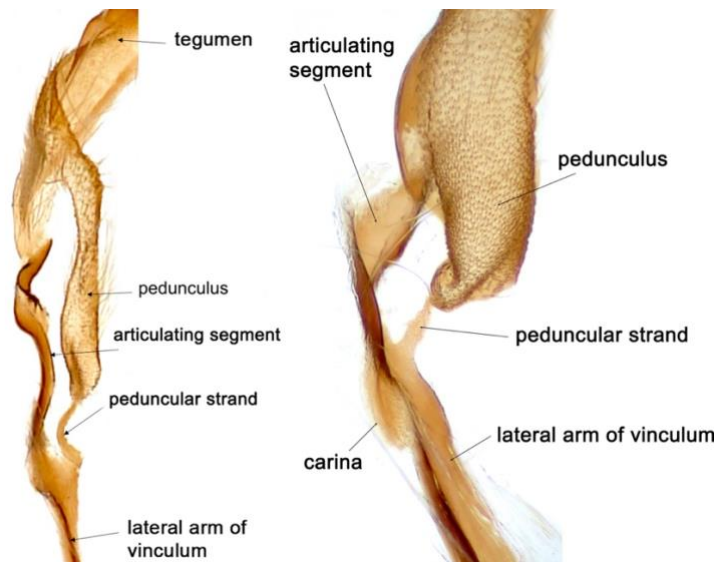


Figure 11: Vinculum-tegumen articulation with valvae removed. Left – *Sunira circellaris* (Brick), right – *Agrotis clavus* (Heart & Club)

An added complication when examining this articulation is that the base of the costa has a hyaline articulation with the VT-ring close to the vinculum-articulating segment junction. This costal articulation may be supported by a small carina at the posterior end of the vinculum.

It should be noted that much of the structure of the VTA may be obscured in a standard slide preparation of the genitalia in ventral view.

5) The Uncus in Family: Noctuidae

The Noctuid uncus takes various shapes but is most often narrow and curved ventrally. It is nearly always deformed in a slide preparation and in setting it a decision has to be made whether to present it uncurved and projecting posteriorly, or with its curvature and rotated laterally.



Figure 12: Noctuid unci. Top: *Autographa bractea* (Gold Spangle), *Amphipyra berbera* (Svensson's Copper Underwing), *Diloba caeruleocephala* (Figure of Eight). Bottom: *Allophyes oxyacanthae* (Green-brindled Crescent), *Brachylomia viminalis* (Minor Shoulder-knot), *Fissipunctia ypsilon* (Dingy Shears)

Most Noctuid unci have a covering of hair-scales which vary in density and pattern.

Articulation of the uncus

The overlapping nature of the sclerotisation at the junction between the uncus and the body of the tegumen can make it difficult to determine precisely the limits of each structure. Generally, the dorsal surface of the base of the uncus is attached to the central portion of the posterior margin of the dorsal lamina the body of the tegumen; it is usually supported laterally by a posterior extension of the tegumen, the sclerotization of which may or may not fuse with the sides of the uncus, usually close to its base. **Hyaline windows**, in the dorsal lamina of the junctional region, paired or midline, appear to provide for flexibility at the uncus-tegumen articulation. Where there are a pair of hyaline windows (the most common situation in the Noctuidae) they are separated by a **median band** connecting the uncus to the posterior margin of the tegumen. I regard the median band as part of the uncus and the posterior extensions as part of the body of the tegumen (but recognise that this is open to other interpretation).

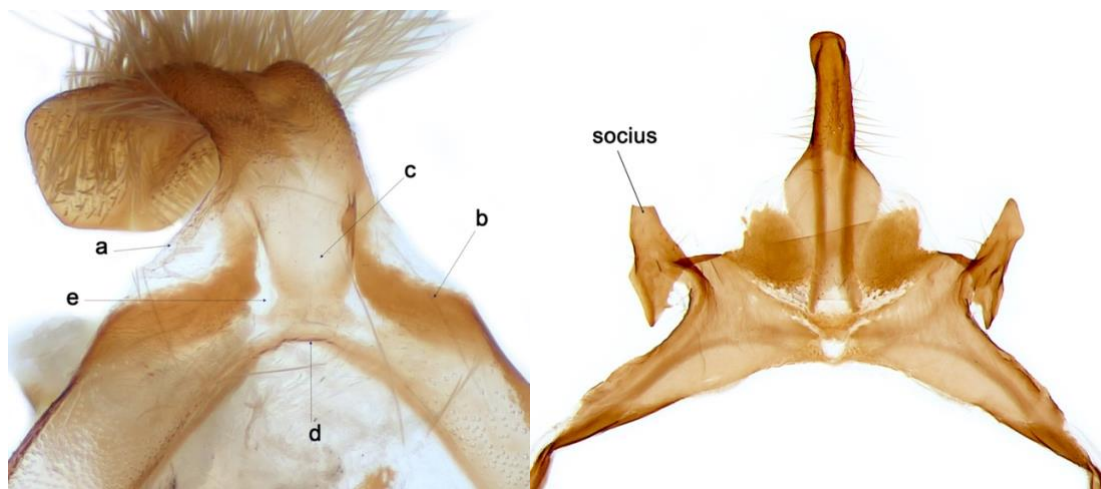


Figure 13: Left: Uncus-tegumen articulation of *Hada plebeja* (Shears) (dorsal view). a – hyaline component of posterior extension, b – sclerotised component of posterior extension, c - median band, d – apex of dorsal arc, e – hyaline window. Right – Tegumen of *Colocasia coryli* (Nut-tree Tussock)(set) (subfamily: Pantheinae)

6) Other structures of the tegumen

Gnathos

The absence of this structure is a feature of the male genitalia of the Noctuidae.

Socius (pl. Socii)

Within the Noctuidae these paired structures are present only in the (controversially-placed) monospecific subfamily: Pantheinae

Anal Tube

The anal tube is a feature of the part of the diaphragm bounded by the ventral edge of the tegumen. This edge has strong hyaline connections to the anal tube, such that in dissecting the parts of the male genitalia the anal tube will always detach with the tegumen rather than with other parts of the diaphragm. Its features may be seen in a standard slide preparation of the genitalia but are generally best displayed in a lateral view of the detached tegumen.

Usually, in the Noctuidae, the anal tube itself is diffusely sclerotised, especially on its ventral surface. Sometimes it is supported by a sclerotised band extending from the diaphragm into the ventral surface of the anal tube (**subscaphium**); other arrangements include a paramedian paired subscaphium, a midline **scaphium** (a sclerotised support for the dorsal surface of the anal tube) or a paired scaphium. When a scaphium is present it is usually connected directly to the ventral arch of the tegumen by a pair of **basal bars**. In some species both subscaphium and scaphium are present.

Fig.14 shows a standard Noctuid arrangement with a diffusely sclerotised scaphium attached to the ventral arch of the tegumen in the midline posteriorly, providing a tether for a diffusely sclerotised anal tube. *Anarta trifolii* has an extraordinarily strong subscaphium.

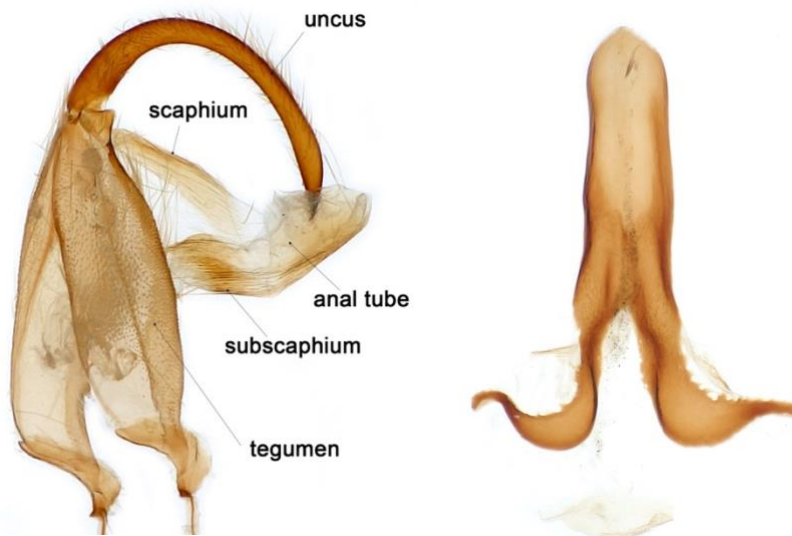


Figure 14: Left – Tegumen (lateral view) of *Autographa gamma* (Silver Y), Right – Anal tube of *Anarta trifolii* (Nutmeg)

In *Panolis flammea* (Fig. 15) the ventral surface of the anal tube is diffusely sclerotised and finely spiculate and the base is supported by a pair of small but stronger lateral sclerotisations. The dorsal surface of the anal tube which is continuous with the ventral lamina of the body of the tegumen is entirely hyaline.



Figure 15: *Panolis flammea* (Pine Beauty): above left - detached tegumen; below left - detached anal tube in lateral view; right - detached anal tube in ventral view

In *Orthosia incerta* (Fig. 16) the base of the ventral surface of the anal tube is finely spiculate in continuity with a sclerotised arc at its point of emergence from the diaphragm.



Figure 16: *Orthosia incerta* (Clouded Drab): left- detached tegumen, right - detached anal tube

Appendix to Part 1: Illustrated dissections

The next few pages provide some illustrated dissections to demonstrate the application of the terms used to describe the features of the tegumen.

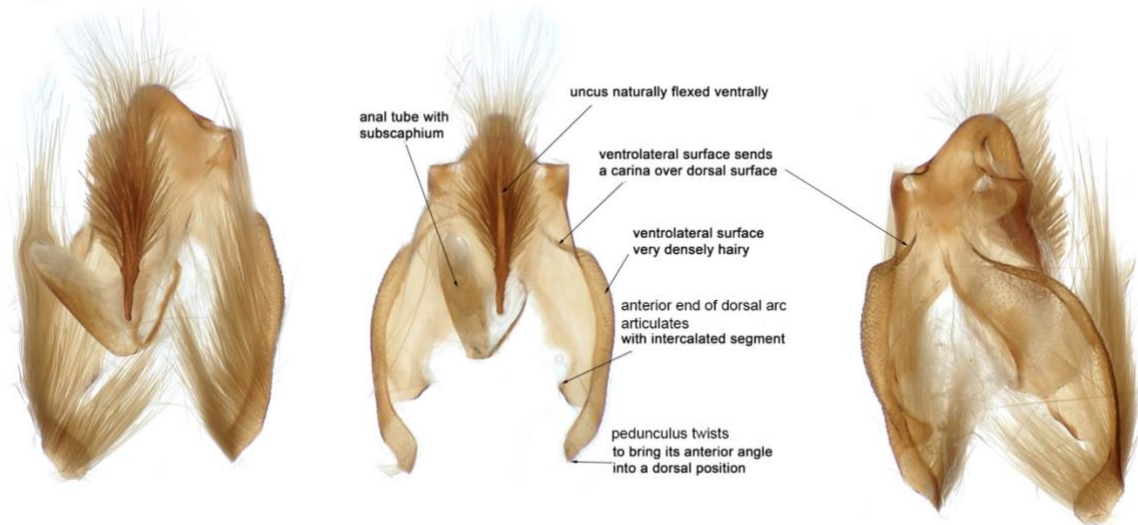


Figure A1: Tegumen of *Leucania comma* (Shoulder-striped Wainscot). Left - ventral view; centre - ventral view with hairs removed; right - dorsal view

The ventral surface of the pedunculus is usually densely covered in hair scales (which are difficult to remove without damaging the structure of the pedunculus). In *Leucania comma* (Fig. A1) these hairs extend posteriorly over the whole length of the ventral margin of the tegumen. The lateral margins of the posterior extension are continuous anteriorly with the ventral edge of the tegumen. The posterior end of the fold of the tegumen sends a carina medially onto the dorsal surface, which serves to strengthen the uncus-tegumen articulation. The posterior extensions in this species are relatively deep with angular shoulders.

The images in Fig. A2 showing the tegumen of *Diachrysia chrysitis* demonstrates the following features and variations:

- The dorsal arc (marked in green in the central image) formed by the dorsal edge of the tegumen.
- The transtilla (marked in red in the central image) forms a distinct anterior border to the dorsal half of the anellus (shown here to alert the possibility of confusing this with the dorsal arc).
- The anal tube, although a feature of the diaphragm, is intimately association with the ventral surface of the tegumen. This species shows a fairly diffuse subscaphium.
- There are features in the shape of the apex of the uncus that are only visible in lateral view.
- There is a midline hyaline window and no median band at the uncus-tegumen articulation, and the posterior extension is largely hyaline; support for the uncus is provided by some paramedian strengthening of the posterior margin of the tegumen.
- The pedunculus is a simple tapering of the anterior ends of the body of the tegumen, its anterior edge directly connected to the articulating segment, without a peduncular strand.

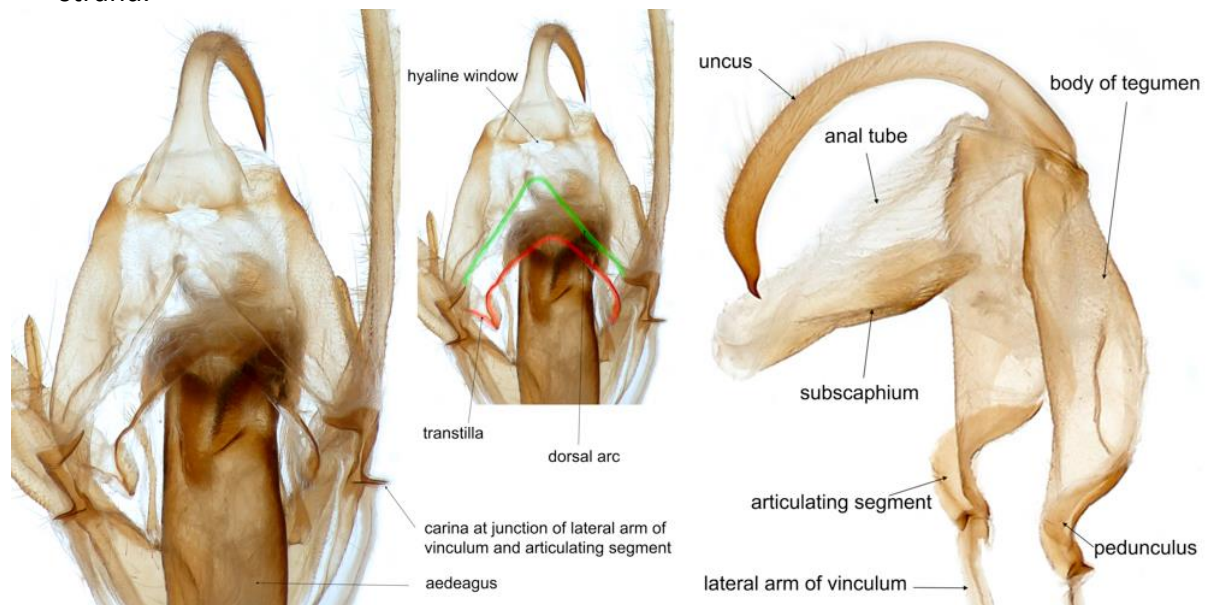


Figure 4: *Diachrysia chrysitis* (Burnished Brass). Left and centre - dorsal view of tegumen in natural position with aedeagus in situ. Right - lateral view of tegumen

Fig. A3: *Mesapamea secalis* demonstrates:

- A very transverse overall shape to the tegumen, due largely to the very large angular peduncular lobes
- The peduncular lobes are pouched, with a hairy ventral lamina, a sclerotised dorsal lamina, anterior, posterior and lateral folds where the two laminae meet, and a medial opening.
- The peduncular strand emerges from a carina on the inner surface of the ventral lamina of the pedunculus
- Posterior extensions reach a long way posteriorly, with associated elongate hyaline windows

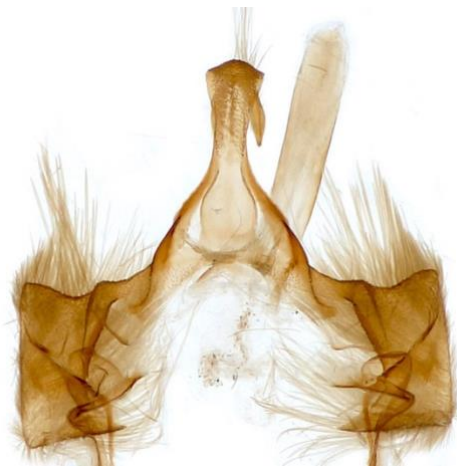


Figure A3: Tegumen of *Mesapamea secalis* (Common Rustic)

Fig A4: *Xylena vetusta* has an almost horizontal tegumen, with small pedunculi and a posterior extension in which the sclerotization diminishes towards the uncus, such that its attachment is largely hyaline.

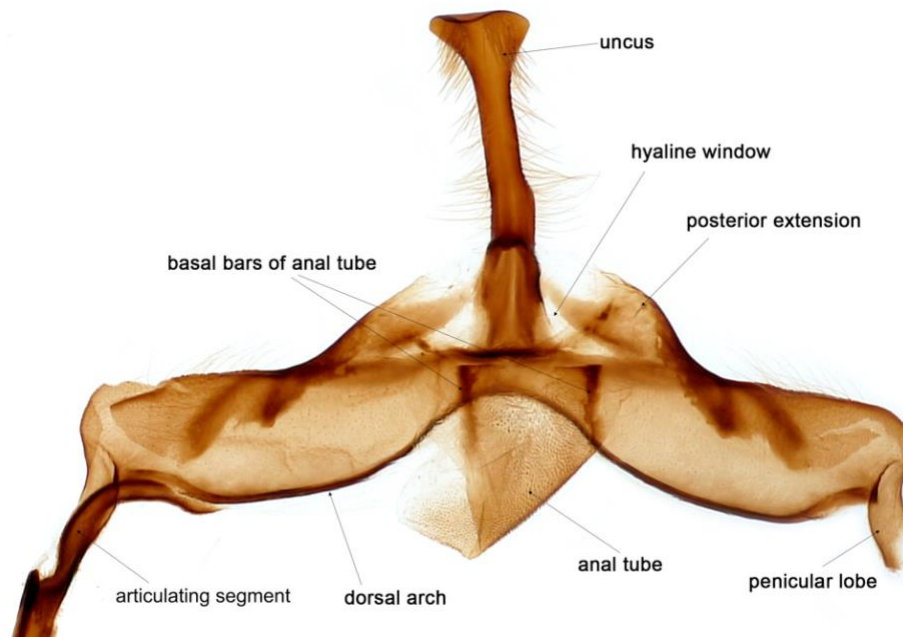


Figure A4: Tegumen of *Xylena vetusta* (Red Sword-grass)

Fig A5: *Anarta trifolii* also shows a very transverse tegumen with an angulate dorsal arc. The posterior projections are distinctly shouldered and slightly produced at the angles. The pedunculi are fairly large, hairy and free.



Figure 5: Tegumen of *Anarta trifolii* (Nutmeg)

In *Bryopsis muralis* (fig. A6) the uncus is connected directly to the posterior margin of the tegumen without any supporting posterior extension.

In *Deltote uncula* the anterior ends of the arch of the tegumen are expanded into broad rounded peduncular lobes. There is a pointed carina at the apex of the arch.

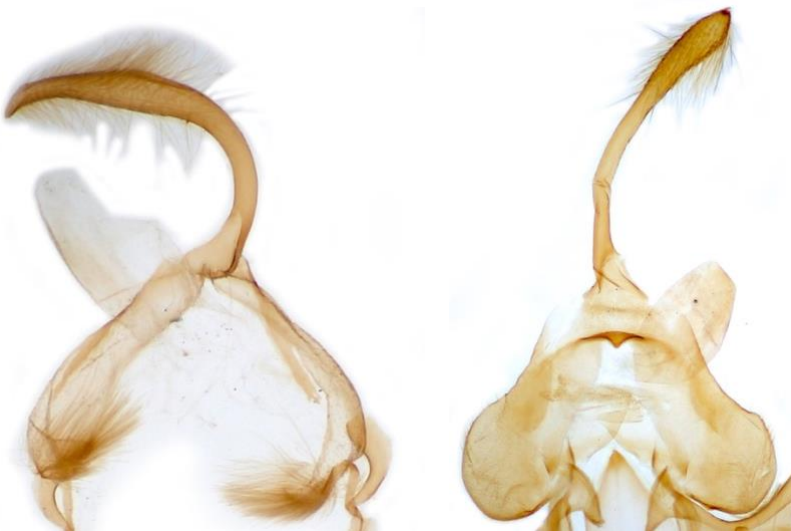


Figure A6: Tegumen of: left – *Bryopsis muralis* (Marbled Green), right – *Deltote uncula* (Silver Hook)

The next three images examine the vinculum-tegumen articulation (VTA) in *Leucania comma*



In Fig. A8 the left image shows the natural position of the VTA. The articulating segment is (naturally) twisted through 180° in its long axis. In the right image the tegumen has been rotated to untwist the articulating segment and labels added. Fig. A9 is the same as the right image in Fig. A8, but without the labels.

Figure 6: *Leucania comma* (Shoulder-striped Wainscot). Lateral view of genitalia showing position of the VTA. AS = articulating segment, PS = peduncular strand

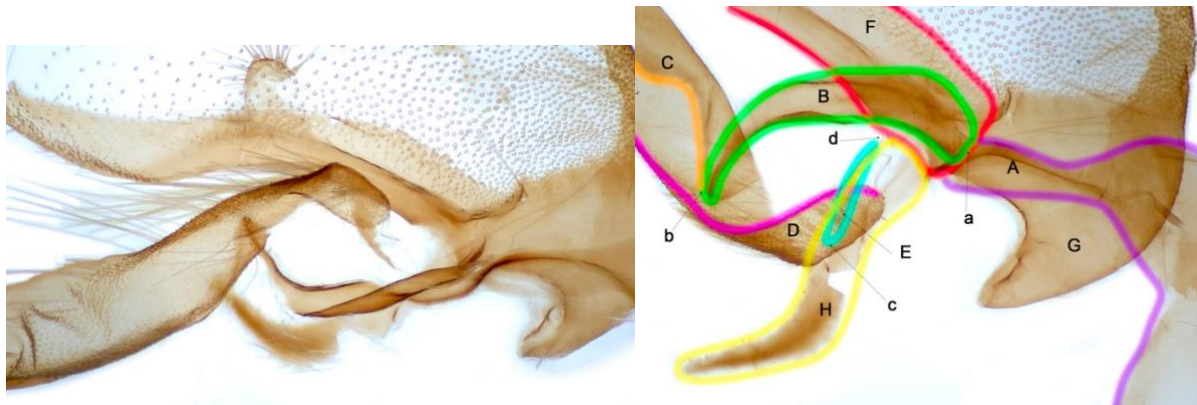


Figure 7: *Leucania comma*. VTA. A = vinculum (outlined purple), B = articulating segment (outlined green), C = dorsal arc of tegumen (orange edge), D = ventral edge of tegumen continuing into pedunculus (violet edge), E = peduncular strand (outlined turquoise), F = costa (outlined red), G = base of valva, H = transtilla (outlined yellow); a = sclerotised connection between vinculum and articulating segment (and hyaline connection from vinculum-articulating segment junction to costa), b = connection between articulating segment and anterior end of dorsal arc, c = connection between pedunculus and peduncular strand, d = hyaline connection from peduncular strand to articulating segment.

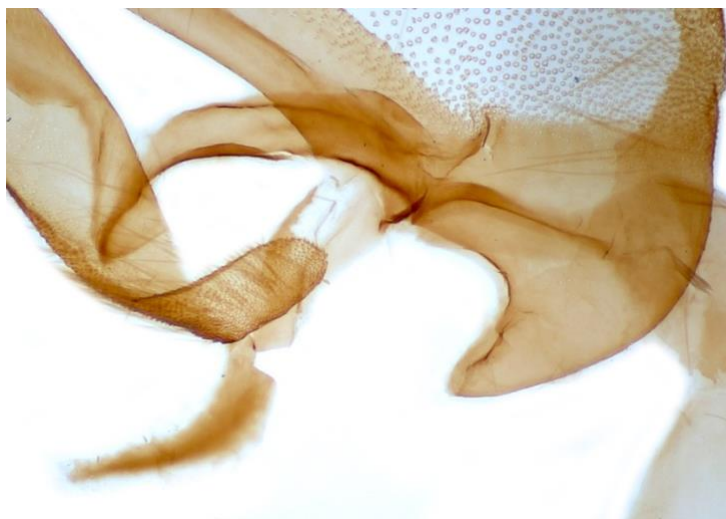


Figure A9: *Leucania comma*: VTA

Fig. A10 shows another example of the VTA, from *Hada plebeja*, with the same labelling system as in fig. A8. Fig. A11 shows the same preparation in dorsal view to show the hyaline connection between the pedunculus and the articulating segment.

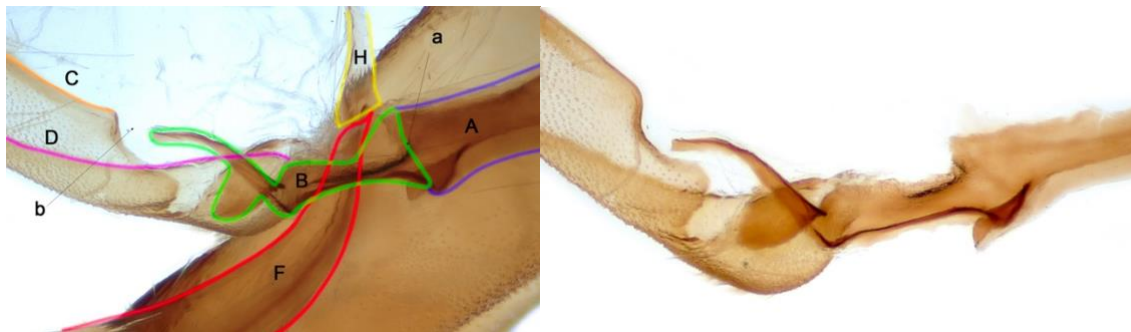


Figure 8: VTA of *Hada plebeja* (Shears). Left – labelled with valvae in situ, right – with valvae removed. A = V, B = AS, C = dorsal arc, D = ventral edge of tegumen, F = costa, H = transtilla; a = sclerotised connection V-AS, b = hyaline connection AS-dorsal arc

dorsal view

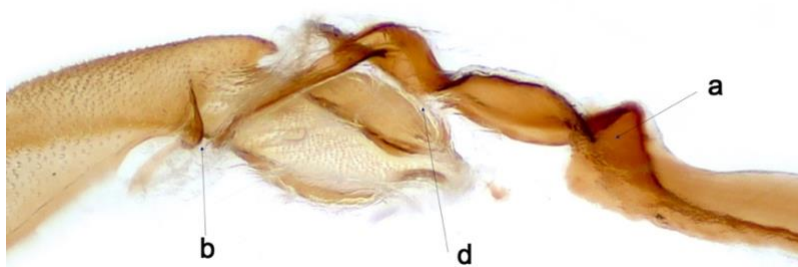


Figure A11: VTA of *Hada plebeja* (Shears), dorsal view. b = hyaline connection AS-dorsal arc, d hyaline connection PS-AS

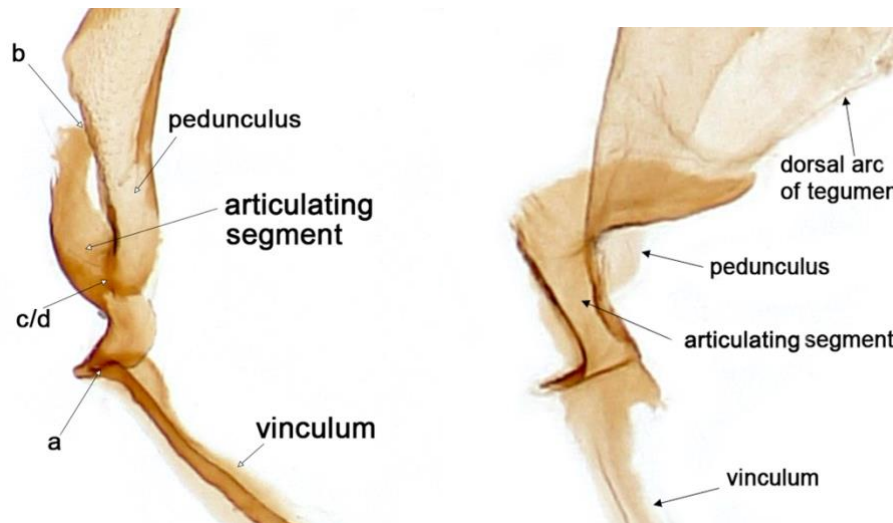


Figure A12:VTAs of: left - *Diarsia mendica* (Ingrailed Clay), right – *Diachrysia chrysitis* (Burnished Brass)

In *Diarsia mendica* and *Diachrysia chrysitis* (fig.24) the anterior end of the pedunculus forms a direct sclerotised attachment to the articulating segment, without a peduncular strand.

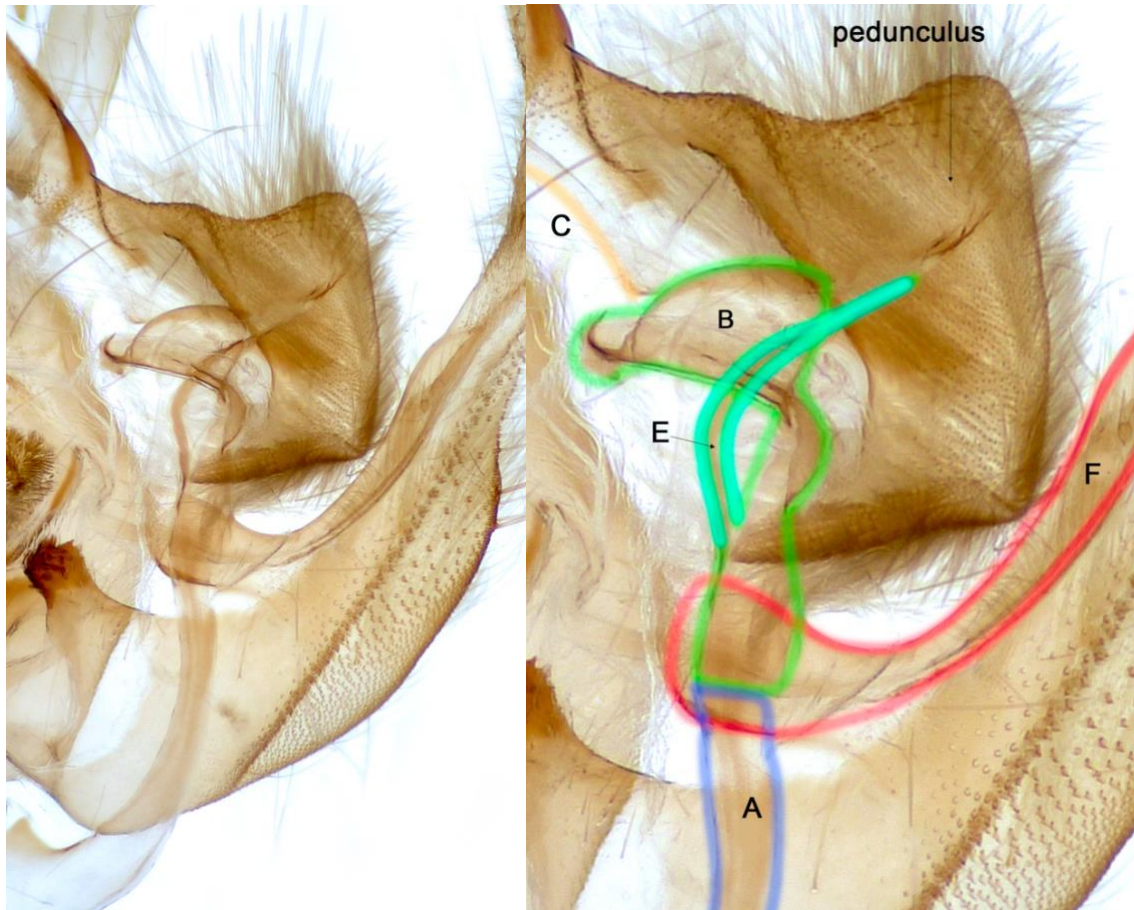


Figure A13: VTA of *Mesapamea secalis* (Common Rustic). A = V, B = AS, C = dorsal arc, E = PS, F = costa

In some species with a pouch-like pedunculus, such as *Mesapamea secalis* (Fig. A13), the peduncular strand originates on a carina on the internal surface of the ventral lamina of the pedunculus. In this species the articulating segment also has an expansion that connects to the medial margin of the ventral surface of the pedunculus, as well as the usual attachment to the anterior end of the dorsal arc.

Hydraecia micacea (Fig. A14) is another example with a pouched pedunculus and an elaborate VTA. The articulating segment twists around the PS on the dorsal side to make its usual connection to the dorsal arc of the tegumen. The PS originates in a strong carina at the lateral margin of the pedunculus and extends across the inner side of its ventral lamina, becomes free and curves anteriorly to fuse with the articulating segment. In examples such as this the articulating segment appears as a twisted band with sclerotised margins that diverge posteriorly, with one margin connecting to the dorsal arc and the other to the pedunculus.

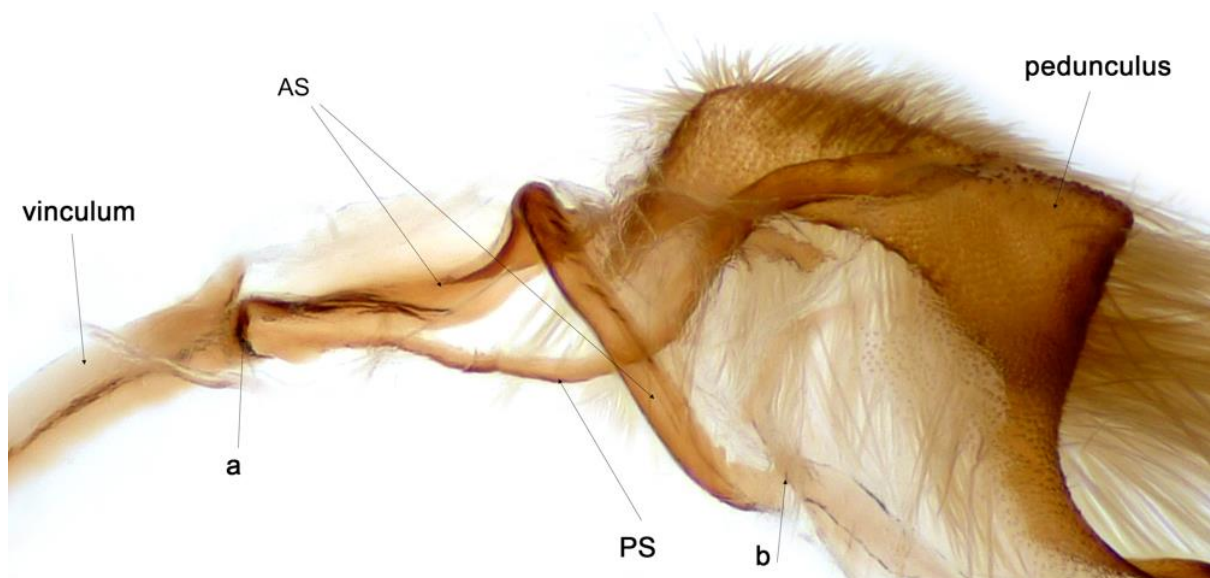


Figure 9: *Hydraecia micacea* (Rosy Rustic). above - VT ring, below - VTA. a = sclerotised connection between vinculum and articulating segment, b = connection between articulating segment and anterior end of dorsal arc



The VTA of *Hyppa rectilinea* (Fig. A15) is relatively simple. The articulating segment is a simple curved strand extending from the vinculum to the anterior end of the dorsal arc. The pedunculus lacks a peduncular strand but has a simple hyaline connection between its anterior end and the posterior half of the articulating segment.

Figure A15: VT-ring of *Hyppa rectilinea* (Saxon)

Chris Lewis

Published on British Lepidoptera 09/12/2024