

# Family Elateridae

Key to the British subfamilies with keys to genus and species for the small subfamilies.

## Source material

Lompe (2015) Käfer Europas, Elateridae, published at <http://www.coleo-net.de/coleo/texte/elateridae.htm>.

## Checklist

From the Checklist of Beetles of the British Isles, 2012 edition, edited by A. G. Duff. 7 subfamilies, 38 genera and 73 species. One species has since been deleted.

Subfamily AGRYPNINAE, keyed to species

Subfamily HYPNOIDINAE, one species

Subfamily DENTICOLLINAE

Subfamily ELATERINAE

Subfamily MELANOTINAE, keyed to species

Subfamily NEGASTRIINAE, keyed to species

Subfamily CARDIOPHORINAE, keyed to species

## Image Credits

The colour illustrations of whole beetles in this key are reproduced from the Iconographia Coleopterorum Poloniae, with permission kindly granted by Lech Borowiec. The line drawings are from Leseigneur, L. (1972): Coléoptères Elateridae de la Faune de France. - Suppl. Bull. de la Soc. Linn. de Lyon 41. Close up photographs are originals by Mike Hackston of specimens at the Hampshire Cultural Trust's collection at Chilcomb House, Winchester with thanks to Christine Taylor who formerly looked after the entomological collection.

## Morphology of the Elateridae

An appendix to this key is a review of the morphology of the Elateridae as exemplified by the elaterine species *Agriotes pallidulus*.



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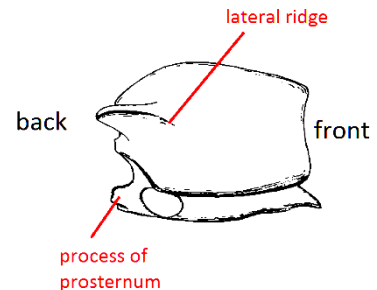
# Family Elateridae

Key to the British subfamilies with keys to genus and species for the small subfamilies.

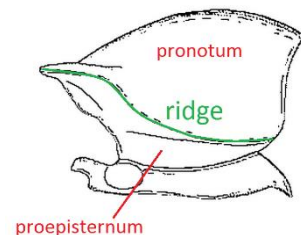
- 1 Pronotum and proepisternum not separated by a ridge, a ridge only apparent near the hind angles and then fading towards the front. Rear process of the prosternum short and appearing cut-off in side view. Scutellum heart-shaped due to an impression or indentation in the middle of the front margin. Length 7.0-9.5 mm. ....

## Subfamily Cardiophorinae

Five species in two genera. Line drawings from Leseigneur.



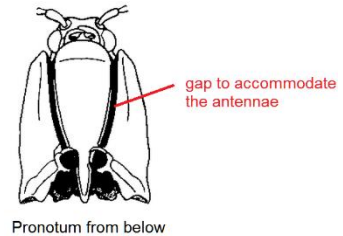
Pronotum and proepisternum almost always separated by a ridge that runs from the hind angles to the front margin often at angle (occasionally the middle part of the ridge is missing, but it is clear in the front half). Process of the prosternum longer and pointed. Scutellum not heart-shaped (if there is an indentation on the front margin there is also an indentation on each side. ....2



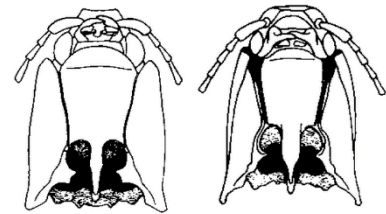
- 2 Prosternum separated from the sides of the proepisternum (at least in the front half) by a distinct groove each side which can accommodate the antennae. Elytra and pronotum covered with narrow flattened bristles. Length 9-17 mm. ....

..... **Subfamily Agrypninae**

Two species in two genera.



Prosternum touching the sides of the proepisternum forming a suture. There may be a slight groove present but it is certainly not anywhere near as broad as the antennae. The prosternum and proepisternum may be more broadly separated at the front forming a short furrow to accommodate the first few segments of the antennae. ....3



3 Claws with a comb of small teeth on the underside. ...[4](#)

This requires a magnification of at least 15x for larger species (over 10 mm.) and is very difficult to see at all for smaller species unless they are fresh. If they are stuck on card then the comb often sticks to the claw so it can't be seen.



If you are not sure and have a beetle under 9 mm long then check the extra characters in couplet 4b below before proceeding to couplet 5.

Claws smooth or at most with a single tooth. ....[5](#)



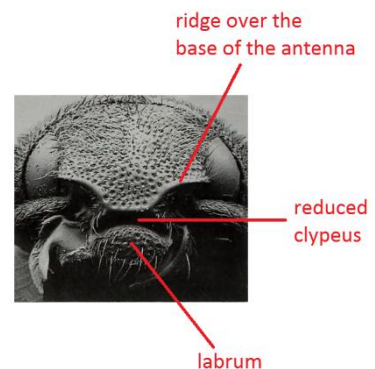
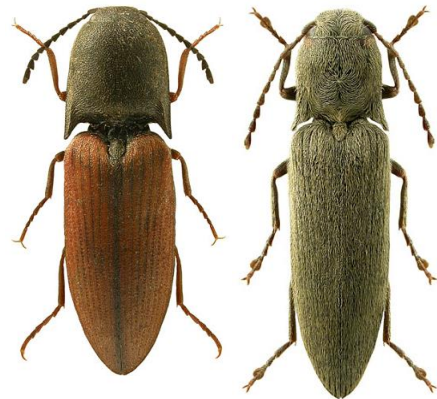
- 4 Large black species over 11 mm. [Subfamily Melanotinae](#). .....  
 ..... Genus **Melanotus**  
 Three species.



Length 3-12 mm. EITHER with the elytra orange-brown to variegated black/orange-brown and with the pronotum mostly black OR elytra and pronotum black but obscured by a dense covering of pale grey hairs. ....

..... **Subfamily Elaterinae, tribe Adrastini**  
 Three species in two genera.

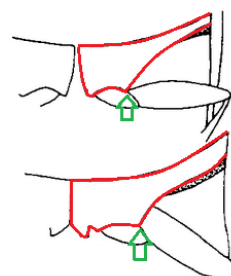
Although this tribe is in subfamily Elaterinae its members do not share the character on couplet 5. They have a characteristic arrangement on the head where the clypeus is reduced to a very narrow strip below a ridge which curves over the bases of the antennae and then straight on the front of the frons. This means that the frons appears to almost pass directly onto the labrum.



Unfortunately this couplet relies on a character on the underside of the beetle. However if your specimen is stuck onto card all is not lost – the feature can often be seen when viewed from the side.

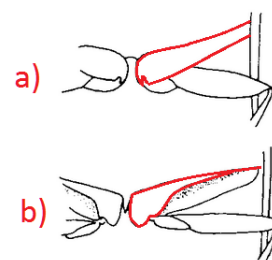
The hind femora can be fitted into grooves which run obliquely from the base of the leg to the edge of the underside. In front of this groove is a flattened plate (**outlined in red** below) which overhangs the groove to some extent along its rear margin. Morphologically this plate consists (at least partly) of the hind coxae and will be termed here the **hind coxal plate**.

- 5 The hind coxal plates are broad towards the middle of the beetle and then narrow towards the edge with the point where this narrowing begins marked by a sharp angle or tooth (**green arrow**). .....  
 ..... **Subfamily Elaterinae**  
 Most tribes.

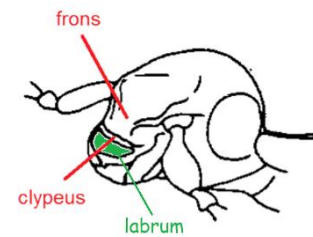


Hind coxal plates are either a) evenly narrowed towards the edge of the beetle or b) narrowing in a broad curve (sometimes quite abruptly) but without an angle or tooth at the point where the narrowing begins.

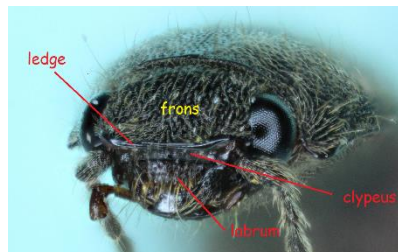
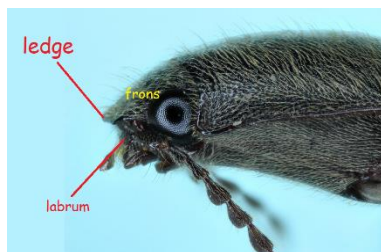
.....6



- 6 Ridges on the frons either absent or they are well-developed over the insertion points of the antennae and run obliquely towards the front. Viewing the head from the side, the surface of the frons runs into the clypeus and the labrum without a significant change in outline; the frons may or may not be separated from the clypeus by a groove or ridge. ....7



Front of the frons forming an overhanging ledge which covers the bases of the antennae; this ledge separates the level of the frons from the level of the clypeus and labrum, so that (viewed from the side) the front of the head is sharply angled above the clypeus and the labrum. ....8

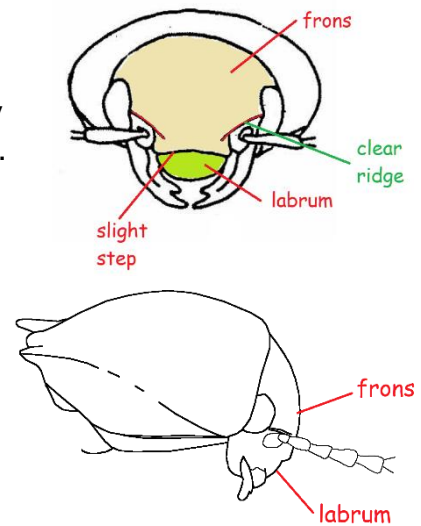


- 7 Head with the mouth-parts clearly forwardly-directed. Frons flat in profile. Hairs on the pronotum never predominantly “combed” towards the rear. ....  
 ..... **Subfamily Denticollinae, tribe Ctenicerini**  
 Length 6-17 mm

Viewed from the side, the frons is convex and the outline of the head curves round to the mouth which opens downwards or even slightly backwards. In doubtful cases, the hairs on the pronotum are mainly directed towards the rear at least in the front half. ....

..... **Subfamily Elaterinae, tribe Agriotini**

Genus *Agriotes* with six species and *Dalopius marginatus*. This tribe includes some very common species. Length 3.5-10 mm. The ridges that run over the base of the antennae are widely separated and curve from near the eye towards the front. These clear ridges then fade and don't join across the front to separate the clypeus from the frons. Tricks of the light may make it look like they continue to the front. Across the front of the frons/clypeus is a slight step to the labrum. The cavities at the base of the antennae are large. The rear edge of the hind coxal plates is almost straight or forms a slight curve.





- 8 Mouth-parts forwardly directed (prognathous). Eyes further forward on the head so there is a gap between them and the front of the pronotum AND/OR hairs on the pronotum appearing to be combed forwards. ....

..... **Subfamily Denticollinae, tribe Denticollini**

Length 6-21 mm. Lower photograph shows eyes only narrowly separated from the pronotum but with the hairs on the pronotum combed forwards.



Mouth-parts directed downwards. Hind margin of the eyes more or less touching the front of the pronotum. Hairs on the pronotum not appearing combed forwards. Length under 7 mm. ....9

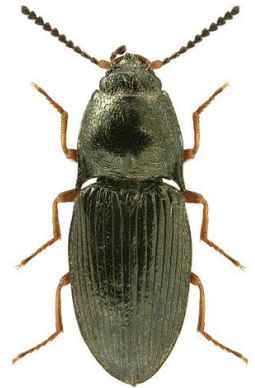
- 9 Frons bordered by a narrow ridge running along the sides over the eyes and then right-angled to continue across the front. Mesosternum (between front and middle legs) and metasternum (between middle and hind legs) butting up to one another round the outer side of the middle coxae. Elytra usually with a variegated colour. Small species, length 1.5-5.5 mm. ....

..... **Subfamily Negastriinae**

Seven species in four genera.

Frons without a ridge at the sides running over the eyes and with at most a slight thickening each side at the front near the base of the antennae. Mesosternum and metasternum separated from one another round the outer side of the middle coxae by the epimera. Elytra uniformly black. Subfamily Hypnoidinae. Length 5.3-6.8 mm. ....

..... ***Hypnoidus riparius***



## Subfamily Cardiophorinae

### Genus **CARDIOPHORUS** Eschscholtz, 1829

*asellus* Erichson, 1840

*gramineus* (Scopoli, 1763)

*vestigialis* Erichson, 1840

### Genus **DICRONYCHUS** Brullé, 1832

*equisetioides* Lohse, 1976

- 1 Claws slender, not broadened to form a tooth on the underside. Uniformly dark species or species with orange-brown pronotum and black elytra or dark species with orange-brown femora and tibiae. Genus *Cardiophorus*. .....2  
I have found the claw character difficult but *Cardiophorus asellus*, the species most similar to *Dicronychus* in colour has very distinct narrow claws.

Claws broadened into a tooth on the underside. Uniformly coloured species including the femora and tibiae. Length 7.5-9.5 mm. ....  
..... *Dicronychus equisetioides*



2 Pronotum completely or partly reddish. ....3

Pronotum uniformly black or brown. ....4



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- 3 Pronotum completely red-orange except for the basal angles and sometimes the front border narrowly black. Length 8.0-9.5 mm. ....  
..... ***Cardiophorus gramineus***



Pronotum with at least the front third black. Length 5.7-7.2 mm. ....  
..... ***Cardiophorus ruficollis***

Howard Mendel (2019) considered the evidence for this species in Britain and concluded that it should be removed from the British list. It is a very widespread species in Europe usually associated with coniferous forest, sometimes with oak and sometimes from anthills.



- 4 Punctures on the pronotum very regular, fine and dense. Uniformly black species, including the femora and tibiae. Upper surface appearing grey due to a covering of distinct, quite long grey or brownish hair. Length 7.5-9 mm. ....  
..... ***Cardiophorus asellus***



Punctures on the pronotum of different sizes. Femora and tibiae orange-brown; tarsi orange-brown or black. Hairs on the elytra less distinct and lying on the surface giving them more or a shiny appearance. Length 7.0-8.5 mm. ....

..... ***Cardiophorus vestigialis***

I tried hard to see punctures of different sizes on the pronotum but failed. Every now and then I'd see an area of larger punctures but then find it was an artefact due to lighting. They are slightly coarser and less regular than *asellus* but this can only be seen by comparison.



## Subfamily Agrypninae

### Genus AGRYPNUS Eschscholtz, 1829

*murinus* (Linnaeus, 1758)

### Genus LACON Laporte, 1836

*querceus* (Herbst, 1784)

- 1 The furrow under the pronotum accommodating the antennae extends the whole way to the base of the front legs. More elongate species with the scales on the elytra forming a distinct cross band (in fresh specimens). Length 9-12 mm. ....

..... ***Lacon querceus***

Rare species, dependent on ancient trees and associated deadwood.



Furrow under the pronotum only extending a little more than half way, ceasing well short of the front legs. More compact species with the scales on the abdomen forming a mottled pattern. Length 12-17 mm. ....

..... ***Agrypnus murinus***

Common species through England and Wales.



## Subfamily Melanotinae

Translated from the French at <http://www.insecte.org/forum/viewtopic.php?f=1&t=86535>

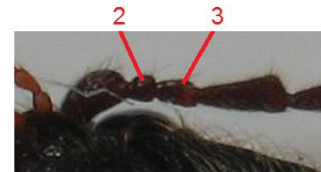
### Genus **MELANOTUS** Eschscholtz, 1829

*castanipes* (Paykull, 1800)

*punctolineatus* (Pelerin, 1829)

*villosus* (Geoffroy in Fourcroy, 1785)

- 1 Segments 2 and 3 of the antennae of distinctly different lengths (segment three longer. Length 13-19 mm. ....2



Segments 2 and 3 of the antennae more or less equal in length. Length 11-16 mm. ....

..... ***Melanotus punctolineatus***

Punctures on the pronotum dense and comparatively large.

Photographs from [http://www.galerie-](http://www.galerie-insecte.org/galerie/paysfam_1_Elateridae_05.html#Melanotus)

[insecte.org/galerie/paysfam\\_1\\_Elateridae\\_05.html#Melanotus](http://www.galerie-insecte.org/galerie/paysfam_1_Elateridae_05.html#Melanotus). A rare species with a few records from south east England.





- 2 Elytra 3.8-4.0 times as long as the pronotum measured along the centre line. ....  
..... ***Melanotus castanipes***



Elytra at most 3.5 times as long as the pronotum measured along the centre line. ....  
..... ***Melanotus villosus***  
The commonest species of the genus.



*castanipes*



*punctolineatus*



*villosus*



## Subfamily Negastrinae

### Genus FLEUTIAUXELLUS Méquignon, 1930

*maritimus* (Curtis, 1840)

### Genus NEGASTRIUS Thomson, C.G., 1859

*arenicola* (Boheman, 1852)

*pulchellus* (Linnaeus, 1761)

*sabulicola* (Boheman, 1851)

### Genus OEDOSTETHUS LeConte, 1853

*quadripustulatus* (Fabricius, 1792)

### Genus ZOROCHROS Thomson, C.G., 1859

*meridionalis* (Laporte, 1840)

*minimus* (Lacordaire, 1835)

- 1 Pronotum with quite dense shallow punctures, looking like pin-pricks although they may be obscured by hair. ....2

Pronotum at least towards the front with a wrinkled or granular texture. ....3



- 2 Antennae relatively longer, the third segment at least 1.7 times longer than the second. Upper surface uniformly black. Pronotum with the punctures clear and not obscured by hairs. Males around 4.5 mm; females larger and more robust at about 5.5 mm. ....  
..... ***Fleutiauxellus maritimus***



Antennae relatively shorter with the third segment at most 1.25 times longer than the second. Elytra black with four brown patches. Pronotum with the punctures shallower and obscured to some extent by short pale hairs; the area between the punctures has a microscopic pattern of minute ridges like the lines of a fingerprint. Length 3.0-3.8 mm. ....  
..... ***Oedostethus quadripustulatus***



- 3 Whole pronotum with a wrinkled texture, these wrinkles being rather wavy and running longitudinally. Areas between the striae on the elytra ridged at least in the basal half. Genus *Negastrius*. .....4

Pronotum with a coarse granular texture over the front half. Areas between the striae on the elytra more or less flat. Genus *Zorochrus*. .....6



- 4 Pronotum broadest in the middle, narrowing to the hind angles with a regular curve. Striae of the elytra impressed all the way to the tip with the areas in between also remaining convex. Elytra very variable in the pattern of black and yellow and sometimes completely black. Base of the antennae paler. Legs pale brown. Length 2.9-6.0 mm. (average 4.0-4.5 mm.). .....  
..... ***Negastrius sabulicola***

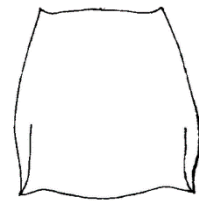


Pronotum as broad at the base as in the middle (i.e. ear half more or less parallel-sided) or only slightly narrower in which case narrowing from the middle but then widening again before the hind angles which are directed backwards of outwards. Elytra with the areas between the striae convex towards the front, but flat in the last quarter. ....5

- 5 Sides of the pronotum more distinctly rounded in the front half and the pronotum itself more clearly convex. Upper surface somewhat shining with fine short yellowish hairs (which may become very scant). Elytra with the areas between the striae with punctures only adjacent to the striae, almost smooth in the convex central part except for the first interval which is always densely punctured (best to focus on the middle part of the second and third interval). Base of the antennae and the legs yellowish. Elytra usually with extensive yellowish markings like *sabulicola*. Length 2.7-5.5 mm. ....  
 ..... ***Negastrius pulchellus***



Sides of the pronotum more weakly rounded, appearing much flatter towards the base. Upper surface with long, distinct silvery-grey hairs and thus dull. Elytra with the areas between the second and third striae completely covered in punctures. Antennae and legs more or less dark. Elytra completely black or each with 1-3 pale patches (rarely similar to *sabulicola*). Length 3-4 mm. ....  
 ..... ***Negastrius arenicola***



- 6 Upper surface flatter. Pronotum dull, almost completely covered with fine granules. Uniformly black. Length 1.5-2.5 mm. ....  
..... ***Zorochros meridionalis***



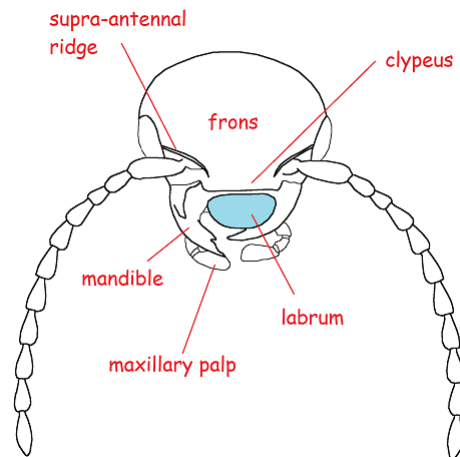
Upper surface more convex. Pronotum with a granular texture in the front half only with the rear half with punctures of one or two types. Elytra more or less shining, black with patches of yellowish-brown. Length 2.5-3.8 mm. ....  
..... ***Zorochros minimus***



# Morphology of the Elateridae exemplified by *Agriotes pallidulus* by Mike Hackston

## Head

The head is dominated by the rounded frons between the compound eyes. This transitions onto the vertex (top of the head) without a break. There are no simple eyes on the top of the head. Each side there is a supra antennal ridge running obliquely from the inner edge of the eye towards the centre of the frons. In some genera these join together to separate the frons from the clypeus. Here they are broadly separated and the clypeus and frons form a single structure (the frontoclypeus). The frons is covered with round punctures which have the spaces between them about equal to or less than the diameter of the punctures. These are much more superficial at the front where the clypeus is. On the top surface of the head the punctures stop and the last piece is smooth (the vertex). The antennae have eleven segments. The first is the scape and the second is the pedicel. The other nine form the flagellum with the first of these (third antennal segment) the smallest. The later segments are somewhat asymmetrical with the inner edge more rounded. In front of the clypeus and separated by a membrane is the labrum which also has punctures. This is bounded on its front edge by the mandibles. The mandibles are pointed and have an additional tooth on the inner surface. The maxillary palps have four segments (the first is very small) with the last segment rather wedge-shaped. Behind these are the labial palps which have two segments.



## Thorax

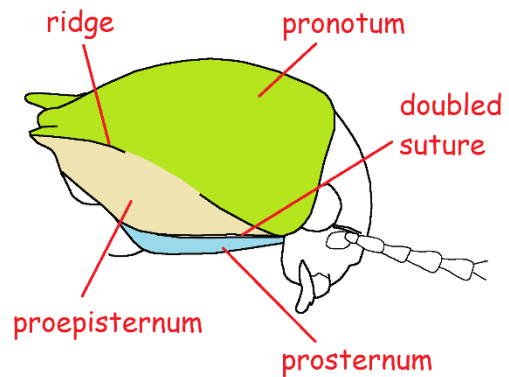
The thorax is divided into three parts, the prothorax, mesothorax and metathorax. Each of these is itself divided into a dorsal section, two lateral sections and a ventral section. Each bears a pair of legs. The mesothorax has the elytra attached and the metathorax bears the membranous flying wings.



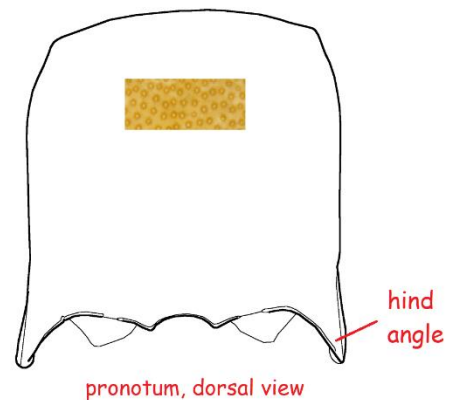


### a) Prothorax

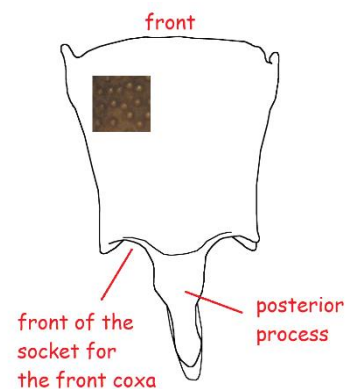
The prothorax has all four of its sections well-sclerotised. The top section, the pronotum is the largest; it is curved and continues around the sides to meet a weak ridge. This is divided into two sections. The front part runs from the outer front corner of the prosternum to just under half the length of the prothorax. The rear part runs into the pointed hind angles. The parts below the ridges are the proepisterna (or hypomera). The lower margin of the proepisterna is marked by a suture which is doubled toward the front. This marks the boundary between the proepisterna and the prosternum.



The front of the **pronotum** is slightly curved while the rear margin has a long process each side forming the hind angles with three concave sections in between them. The surface of all the plates of the prothorax is pitted with punctures, except for the upper surface of the hind angles.

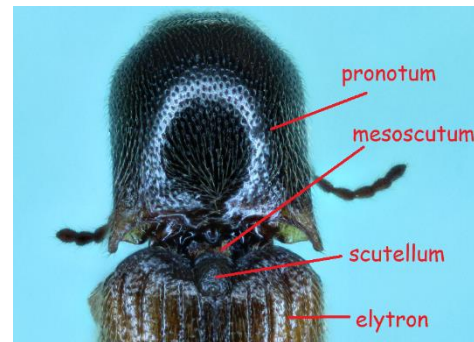


After chemical treatment the **prosternum** can be prised without breakage from the proepisterna. The prosternum has a robust process towards the rear which fits into a cavity in the mesosternum – this is the mechanism that the beetle uses to jump into the air with a clicking sound. On each side of the base of the process is a concavity into which the front of the front coxa fit. The coxa are bounded by membrane to the rear and this means the coxae are open posteriorly.

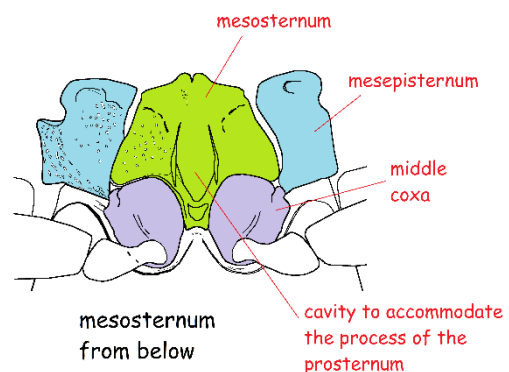
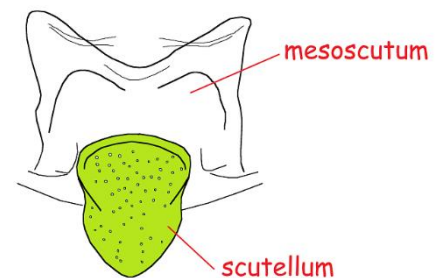


## b) Mesothorax

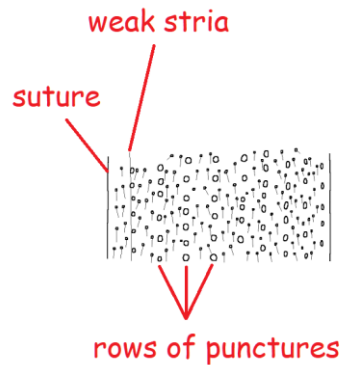
The mesothorax is much smaller than the metathorax behind it. This is because it serves to support the elytra and the muscles inside are used to splay and refold the elytra during flight. The metathorax contains the muscles required for flight. The top of the mesothorax is mostly covered by the elytra and is weakly sclerotised (= weakly pigmented and hardened). An exception to this is the triangular scutellum which can be seen from above between the base of the elytra and the area just in front of it which is visible when the pronotum is tilted forwards slightly. The rest of the top and the upper part of the side of the mesothorax is very weakly sclerotised.



From the underside the mesosternum is a plate between the front and middle legs. It has a process to the rear that extends between the middle coxae and an oval cavity in the middle that accommodates the process from the prosternum. On each side of the mesosternum is another plate, the mesepisternum. Connecting the mesepisternum to the mesoscutum around the side is the mesepimeron which is hardly visible once cleared. The middle coxae are inserted into a socket between the curved rear surface of the mesosternum to the front and the curved front surface of the metasternum to the rear.



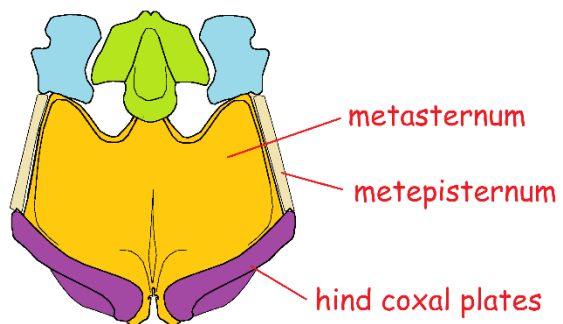
The **elytra** are about four times longer than wide and butt up to one another along the suture. There are ten rows of larger punctures. Before treatment with alkali and hydrogen peroxide all the rows of punctures appear to be in shallow grooves but after this most seem to disappear. The first row of punctures is very close to the suture. The second still has a weak striation (stria) running along it. The tenth row also has a weak striation extending from about half way and runs to the tip where it joins the sutural stria. In between each of the rows of punctures are two irregular rows of much smaller punctures which bear backwardly-directed hairs.



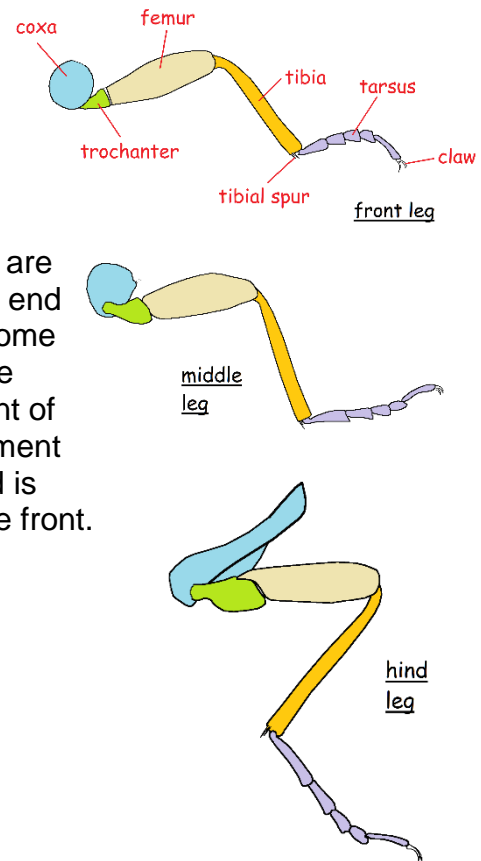
### c) Metathorax

The metathorax is slightly broader than the mesothorax and is almost twice as long. On the sides of the top surface, the flying wings are attached while on the back of the lower surface are inserted the hind legs. The upper part is weakly sclerotised, consisting of two sections separated along the mid-line forming the metanotum. To the rear of these is a narrow transverse rectangular section which is the second tergite of the abdomen.

From the underside the largest plate is the metasternum which is much larger than the mesosternum. It is doubly concave on the front surface to accommodate the coxae of the middle legs. At the back it slants towards the mid-line and is attached to an elongate structure each side which is formed, at least partly, from the hind coxae – this is the hind coxal plate (or metacoxal plate). Along each side is a narrow elongate plate, the metepisternum. Above this on each side is a metepimeron which was entirely decolorised by the hydrogen peroxide.

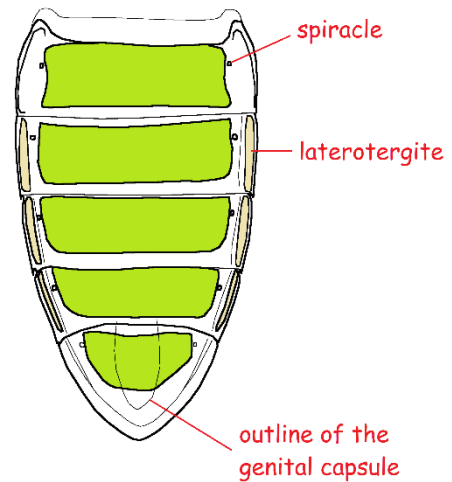


The **legs** consist of nine segments – the coxa which joins the leg to the thorax, a short trochanter, the long femur and tibia and then five small segments of the tarsus. The front and middle legs have the coxa rather rounded while the coxa of the hind legs are united with an elongate plate that runs along the rear edge of the metasternum (the hind coxal plate). There are no bristles on the segments apart from two at the end of the tibiae, termed the tibial spurs. There are some short hairs, particularly on the lower surface of the first two segments of the tarsus. The last segment of the tarsus bears two curved claws. The first segment of the tarsi is relatively longest in the hind leg and is relatively longer in the middle leg compared to the front.



## Abdomen

The abdomen is covered by the elytra on top. When the elytra are removed, there are five tergites present which are much more weakly sclerotised than the sternites underneath. The membranes between the sclerotised plates are broad and they segments are also membranous at the sides. The last tergite is weaker and rather trapezoid and after clearing the oval outline of the genital capsule can be seen through it. Each of the five segments has a spiracle present in the membrane on each side a little before half way. Tergites 2-4 have a narrow laterotergite to the side. There is a poorly-defined laterotergite alongside the first tergite.

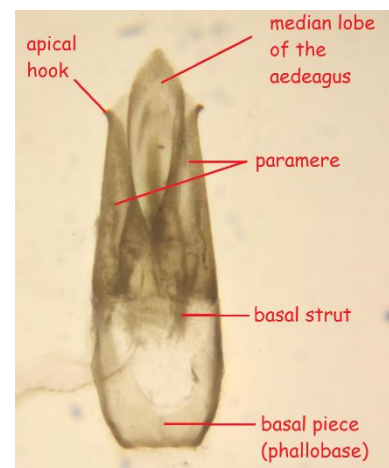
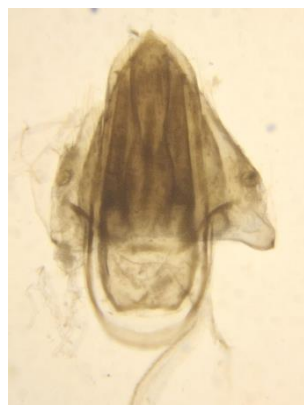


The underside of the abdomen is much more firmly sclerotised. At the front end is an inclined surface that corresponds to the rear edge of the hind coxae. Morphologically this is made out of the first two sternites. There are then five further sternites which are sternites 3-7. Normally these are referred to as ventrites 1-5. Ventrite 1 has a forwardly-pointing process that separates the two hind coxal plates. The fifth ventrite is the longest and is bluntly triangular. The surface is quite densely covered with small punctures each one bearing a small hair directed backwards.



### Male genital capsule

Once the abdomen is cleared with potassium hydroxide solution, the fifth tergite can be separated from the genital capsule. The capsule is shrouded by two membranous structures one on top and one below. These are probably tergite and sternite 8. These can then be teased away from the capsule to reveal a central median lobe or aedeagus flanked by two parameres. The parameres taper to their tips and are curved outwards just before the end forming the apical hook.





## Ovipositor

If the abdomen ends with two small styles extending from the fifth ventrite, this will indicate a female. Unfortunately I didn't clear the female abdomen correctly so the structures are not very obvious. Each style is attached to a coxite which are narrow and close together, broadening basally. The coxites are continued into the abdomen as baculi with the vulva in between. A long rod extends back into the abdomen – the spiculum ventrale, reaching back to ventrites 2-3.

The female abdomen was dry and then wetted using contact lens solution. It was then dissected and some of the soft tissues were isolated. This was a single looped tube with a narrow section running from the vulva leading to the vagina. The tube then becomes broader with a colleterial gland forming a slight swelling on one side. This produces a sticky substance that forms the egg cases. This then leads to a rather narrower blind-ended tube, the bursa copulatrix in which sperm are stored after mating.

