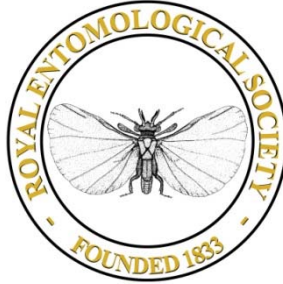


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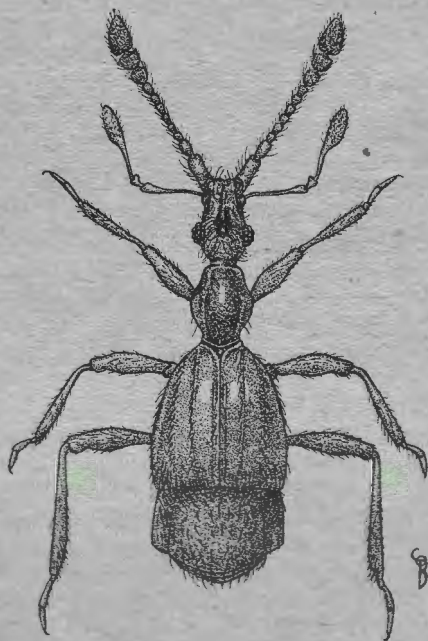
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COLEOPTERA
(PSELAPHIDAE)

By

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COLEOPTERA

(PSELAPHIDAE.)

By E. J. PEARCE.

INTRODUCTION.

THIS is the first "booklet" ever published dealing exclusively with the British Pselaphidae. In this family, following Jeannel and others, I have included our two British species of *Claviger*. This genus has often been regarded as sufficiently distinct to warrant the creation of a separate family, the Clavigeridae, to contain it and its allies. Many coleopterists now regard *Claviger* and its allies as very specialized but degenerate Pselaphidae. This view has much in its favour.

The nearest previous approach to a *Handbook* of our British Pselaphids is Denny's *Monographia* of 1825, which, however, also included the Scydmaenidae. Denny's work is still occasionally obtainable, but inevitably is now very out-of-date. Moreover some of its plates are as misleading as they are pictorially artistic! Denny listed 27 species of Pselaphidae; but at that time what we now know to be the two sexes of a single species were thought to represent two distinct ones; and in the genus *Pselaphus* there were then included two additional specific names which are now known not to represent valid species.

The British Pselaphidae (including *Claviger*) number some 50 species. The number of genera represented by this total is a more debatable question; Kloet and Hincks in their *Check List* (1945) recognize 15 genera, not including *Claviger*. I am sure that we have to guard against what seems to be a common modern tendency—the considerable multiplication of the number of genera, especially when they contain but one species.

As I have already referred to the 1945 *Check List*, it may be as well to point out that one species (added to the British list as *Tychus ibericus* Mots.) must be expunged from it; and another that was added to the British list (though not included in the *Check List*), viz. *Bythinus* (= *Bryaxis*) *clavicornis* Panz., also does not really occur in Britain. The full evidence for both these withdrawals is given in Pearce, E. J., 1953, *Ent. mon. Mag.* **89**: 273–274. It will be noticed that I have quite deliberately made a considerable number of concessions with a view to aiding inexperienced amateurs, for whom this family inevitably presents a difficult proposition. I have had particularly in mind students at the various field-centres who attempt the identification of their captures. To them I hope this handbook will prove of special usefulness.

A NOTE ON (1) PHYLOGENY AND (2) LIFE-HISTORY.

1. Phylogeny.

As keys are "artificial" aids to identification, and do not pretend to give a true indication of phylogenetic relationships, I append a short note on the phylogeny of the Pselaphidae. There has not been universal agreement as yet as to the order of the genera, if we, for example, commence with the presumably more "primitive" forms, and form a series proceeding "upwards"; and it is evident that much more study must be given to the subject. Jeannel (1950) begins with *Faronus* (which is not British), and places in close juxtaposition to it *Claviger*, the most specialized of all our myrmecophilous species. From this he passes to the Euplectini: *Bibloporus*, *Biblopectus*, *Euplectus*, *Plectophloeus*, *Trimium*, *Trichonyx*, concluding with *Amauronyx*. The Pselaphini commence with *Bythinopsis*, and continue with *Bryaxis* Kug. (*Bythinus* Leach), *Rybaxis* Saulcy (*Bryaxis* Leach), *Brachygluta*, *Reichenbachia*, *Tychus*, *Batrisodes*, and conclude with *Pselaphus*. While there are differences of opinion as to the position of individual genera, this order has received fairly widespread agreement. When we come to the order of species within the larger genera there is still more uncertainty as to the placing of particular species. The incompleteness of our knowledge does not always enable us to say with certainty that such and such is a more primitive character than another; nor is there always general agreement as to what precisely constitutes a "valid" genus, or indeed a "valid" species. Until this knowledge and agreement are forthcoming, serious divergences of opinion on these questions are inevitable.

2. Life-history.

Extremely little is known about the life-history of this family, as is stressed by Jeannel (1950). He gives figures of the larvae presumably of *Euplectus confluentis* and *Batrisodes monstrosus* (op. cit., fig. 12, p. 24). There is almost unlimited scope for research in this field, and it seems certain that the larvae do not normally occur with the adults, or they would have been more widely known by now.¹ Besuchet (1955) states explicitly that the larvae of *Biblopectus* are unknown, and considers that they must be found at much deeper levels of the habitat than the imagines. He has found very few immature imagines in this genus. I have found only one *Biblopectus* myself in this condition. It was found at the end of September, and so coincides with the later autumn period, in which all such immature Pselaphid imagines as I have taken invariably have occurred, indicating

¹ When I wrote the above paragraph I overlooked a paper of which M. Besuchet had kindly sent me a copy (Besuchet, C., Larves et nymphes de *Plectophloeus*, 1952, *Mitt. schweiz. ent. Ges.* 25: 251-256). In this paper he points out that the larvae are now known of four species of Pselaphidae (*Euplectus confluentis* Lec., *Batrisodes monstrosus* Lec., *Claviger testaceus* Preys. and *Chennium bituberculatum* Latr.). To these he has now added *Plectophloeus fischeri* Aub., and he describes and figures both the larvae and the pupae of this species. It is of interest that some of the larvae and also the pupae were found at a considerable depth from the surface of the ground, up to 20-35 cm. below it. Recently (September, 1956) in a letter, he informs me that he has now discovered a number of larvae of *Trichonyx sulcicollis* (Reich.) taken with the imagines, and that he will be describing this larva also.

that this is a period when widespread emergence of adults takes place. So far I know of no evidence supporting a comparable emergence of imagines in the spring and early summer.

The imagines are found all the year round ; but, as is the case with many other Coleoptera, there is often a big decline in their numbers in July and August. They are always much more difficult to find in times of drought. Thick moss and grass tussocks collected at the height of the winter will often produce a good harvest of specimens, if they are kept at room temperature for a day or two, and examined under warm conditions.

The Pselaphidae are predacious, feeding chiefly on mites, wingless insects of the soil, etc., small larvae, etc., and are pugnacious little beetles.

A NOTE ON METHODS OF (1) KILLING, (2) MOUNTING AND SETTING,
(3) DISSECTING PSELAPHIDAE WITH A VIEW TO FACILITATING
IDENTIFICATION

It is outside the scope of these *Handbooks*, generally speaking, to deal with such matters as these in detail. But the correct mounting of such small and difficult material as this family consists of is a great aid to identification, itself a major purpose of these *Handbooks*. Moreover I have had to spend so much time cleaning and remounting material sent to me by others for naming, that I venture to give some advice, based on what I have learnt in the hard school of experience. It also includes useful hints I have picked up from others. What is here written, of course, applies to many other families of Coleoptera, but in the case of the Pselaphidae is specially important. It may be taken as amplifying the useful information contained in *A Coleopterist's Handbook*, 1954, published by the Amateur Entomologists' Society.

In at least three of the genera (*Euplectus*, *Biblopectus*, *Bryaxis* (Kug.)) the correct identification of the species is nearly always difficult, and a highly comparative undertaking. Sometimes it is not possible satisfactorily to determine the females, especially if they are unaccompanied by males taken from the same locality and habitat.

When specimens are really carefully mounted and have their appendages rendered easily visible without any twisting, stretching or distortion, are free from adhering gum, grease and dirt, and are mounted quite upright, straight and flat, this is no waste of time, nor any supposed "unscientific" pandering to artistic effect. It is a great positive time-saver when it comes both to sexing the material (frequently an indispensable preliminary) and to naming it.

If the following procedure is observed over killing and mounting, much time and temper alike will be saved, and identifications greatly facilitated.

1. Killing.

(a) *For immediate mounting and setting.*—In my experience nothing beats a few drops of water freshly brought to boil. Assemble the specimens in a small heat-resisting narrow steep-sided glass phial, or an egg cup; these should be quite dry and clean. Exclude all extraneous material. (Only a few species, notably certain of the genera *Brachygluta* and *Reichenbachia* can climb up vertical, dry clean glass. When these are present the phial or egg cup must be kept covered till the last moment.) On to the specimens

pour a small quantity of absolutely boiling water. As soon as possible afterwards lift them out with a fine brush and lay them on dry clean white blotting paper. Then, almost at once, transfer them to a vessel of clean cold water. They can be left in this until immediately prior to mounting. This, and the setting, must follow immediately with this method of killing. I never kill more than a dozen or so specimens at any one time. The transfer to cold water is very important, as it somehow secures that the material remains remarkably clean and free from grease, etc. afterwards, and by this whole procedure the specimens are perfectly relaxed for setting. They should be laid once more on the dry clean blotting paper immediately prior to mounting.

(b) *Killing when it is not convenient for mounting and setting to follow at once.*—A good and convenient killing agent is ethyl or amyl acetate. A very few drops, absorbed by some suitable material such as clean white blotting paper, is quite sufficient. Never use cotton wool: specimens tend to burrow into it, and their claws stick in it, so that damage easily occurs when they are later removed. They may also be killed by the fumes from laurel leaves, suitably prepared. After at least an hour or longer in the killing agent, the specimens are transferred to twists of tissue paper within which are of course included full locality data. They may then be stored (for a fortnight or more if need be) in laurel, and will remain relaxed. The best results will only be obtained if the twists of paper containing specimens are well insulated from actual contact with the laurel itself by the interposition of several thick wads of tissue paper and blotting paper. These "stock jars" of material must, of course, be kept tightly corked, and left in a cool, dry place and never exposed to strong sunlight or "sweating" will ensue.

2. Mounting and Setting.

The purpose of these operations should always be remembered: the facilitation of preservation, identification, storage and reference. However killed, the procedure for mounting and setting is the same. Use the minimum of gum necessary; if Leprieur's is used, it should be very much diluted. The greatest care must be taken to keep the gum well away from the upper surface of the specimens. Having spread a little gum thinly on the mounting card (preferably Bristol board for the final mount if the specimens are later transferred), pick up the specimen by the tip of the gum-moistened brush applied to the ventral surface. Lay it upper-surface upwards on the gum-smear on the card so that it is straight and flat; with skill it is possible so to draw out the brush from underneath as to bring out the appendages at the same time, particularly if a suitable needle held in the other hand aids the process. I always fix the card firmly first so as to leave both hands free, and for this reason the lens should have a stand to hold it (if a dissecting microscope is not used). The most important legs to have well visible in most of the Pselaphidae are the middle pair. The maxillary palpi, as well as the antennae, are also very important in many of the genera. At the outset, a little too much gum is worse than too little: more can always be added each side of the specimen. Great care should be taken that the specimen lies quite flat, likewise the appendages, without undue stretching or tilting over to one side.

It is desirable to have some examples of every species mounted ventral surface uppermost. The reversing is best done after normal mounting and the specimens have had time to dry. Simply damp the gum around the specimens with water, then, when ready for removal, lift off with fine forceps and turn over. This is preferable to immersing the whole card plus specimens in water. Too often this leads to some dissolved gum sticking on to the upper surface and the pubescence becoming matted, if any particular reversal is required as a temporary measure only. However, dirty specimens can be cleaned by the skilful use of a fine brush plentifully moistened with clean cold water, the excess water being drawn away from the specimen by blotting paper. Several, and even quite vigorous applications will sometimes be necessary. Hot water can be employed first, but always finish with cold. There is no objection to mounting a number of similar specimens on the same card if they were taken from the same locality at the same time; it is, in fact, often positively advantageous. It is, of course, essential to ensure that specimens and their locality data never become separated.

3. Dissecting.

In some genera (e.g. *Biblopectus*) removal of the male genital apparatus (aedeagus, sometimes termed aedeagophore) is often requisite to establish the specific identity. This dissection is best done when the material is fresh killed; but it can be quite well done after the due relaxation of dry material,² and in the case of material preserved in liquid, e.g., Barber's fluid. Very fine pointed needles are necessary for this dissection. The best are made from tungsten wire sharpened in boiling sodium nitrite crystals. I have now extracted the aedeagus of many of our Pselaphidae, using a very powerful hand lens mounted on a stand, but of course the use of a good dissecting microscope is vastly preferable.

Procedure.—The male, lying on its back, should be placed in a suitably shaped depression made in a plasticine block. This assists in immobilizing it. I also often place a narrow cellophane strip across its lower middle, the ends of this pinned firmly down at some distance from the specimen. With the fine needles cut round the edge of the last three or four sternites and so expose the aedeagus, which is always large in proportion, and nearly filling that region of the body cavity. Ease it, and lift it out very carefully. Afterwards, any extraneous matter can be cleaned off with a very fine brush, if necessary, or the whole macerated for a while in cold dilute potash. Be careful to orientate the structure correctly (see following note) when mounting it (in a little gum) beneath the relevant specimen. It is well to keep the specimen well damped with water during the dissection. This helps to prevent pieces flying off and being lost should any damage occur during the operation.

² For softening dried material for dissection, Jeannel (1950: 16) recommends rapidly passing the insect through boiling glacial acetic acid; while Besuchet (1955: 155) places the fragment containing the aedeagus, and requiring dissection, in Faure's fluid (50 c.c. distilled water; 20 c.c. glycerin; 50 gr. chloral hydrate; 30 gr. gum arabic). Specimens macerated in cold water will swell up and in time extrude the aedeagus spontaneously; but it is necessary to change the water regularly, and it may be necessary to puncture the specimen when it is required to "shrink" it back to normal size.

A NOTE ON THE ORIENTATION AND MOUNTING OF THE AEDEAGUS.

One characteristic of the Pselaphidae, which is an unusual feature, is that in some genera (e.g. *Brachygluta*, *Bryaxis* Kug., etc.) the aedeagus is strictly bilaterally symmetrical, whilst in others (e.g. *Tychus*, *Biblopectus*, etc.) it is pronouncedly bilaterally asymmetrical. The orientation of the aedeagus, when removed, is rendered simpler by the fact that the dorsal surface of the basal capsule normally has markedly steep and convex sides, marking the entrance to the usual central concavity, and in lateral view the organ appears very "hump-backed". The ventral surface, on the other hand, is steeply sloped to a rounded or pointed sack-like bottom. In side view this characteristic is quite apparent, and enables one to place the organ correctly with the dorsal surface uppermost, though owing to its shape it easily falls over on its side.

Personally I much prefer to mount the organ dry (which does not injure it) in a tiny patch of gum close behind the male from which it has been removed. I find this better than mounting it separately in some suitable medium on a slide, in which its final position may not prove entirely satisfactory, and from which it cannot easily be shifted as required. Furthermore the specimen and its aedeagus are kept in the closest possible proximity when it is mounted below the specimen.

Unfortunately, in the difficult genus *Euplectus* I find that the aedeagus is not an entirely satisfactory structure for discriminating between the species. It is less heavily sclerotized than in some of the other genera; it is not so easy to orientate correctly; and it is sometimes tiresome to disentangle without damage from the contiguous membranous and fatty tissues. In the difficult genus *Biblopectus* it is of real value for separating the species, and I have figured it for them all. In this genus the velum aedeagi (or operculum) which covers the male genital orifice should be removed carefully at the same time, and mounted beside the aedeagus, as it also provides valuable features.

In figuring the aedeagus in *Biblopectus* and *Rybasis* (figs. 12-17, 33-34) I have followed the conventional way of doing so; but of course in the abdomen of the insect the organ lies in the reverse position, with its apex (top of the drawing) pointing downwards towards the tip of the abdomen.

TYPES OF HABITAT AS AIDS TO IDENTIFICATION.

It is, of course, notoriously rash to state categorically that a particular species "is never found under such and such conditions"; but, broadly speaking, certain generalizations about occurrence can safely be made. However, it must always be borne in mind that single (and presumably vagrant) specimens will occasionally occur away from what wide experience has shown to be their normal and proper habitat.

For the most part the Pselaphidae are remarkably constant and stable over the normal conditions for their occurrence; and whilst they will sometimes entirely fail to appear when expected to, and when conditions look very favourable, they are very rarely found in any profusion away from their normal habitats. These habitats always provide somewhat moist and dark conditions, and are therefore characteristically associated with at least some degree of shade and cover, such as is supplied by trees and bushes,

especially when these occur at the edges of bogs, swamps, on the banks of pools and rivers, etc. The general habitats always worthy of search are these: thick, deep, damp mosses, especially around the bases of trees and tussocks, and in grass on logs (moss growing on stones and rocks is usually unproductive, and *Sphagnum* growing unmixed with grass or other mosses can be curiously disappointing); grass tussocks, especially those of the narrow-leaved grasses; tussocks standing apart and at the edge of swampy places are usually richer than those farther in and in closer proximity to one another; heaps of decaying vegetable refuse; manure and straw heaps and hot-beds (the coarser the straw the better it is likely to be); under thick bark and in rotten wood, especially elm, oak, beech, birch and some conifers, particularly Scots pine; grass roots, especially in salt marshes, are sometimes productive; and a few species have been reported from the nests of moles and birds. The latter would seem to form an exception to the general rule about moist conditions; as are the few British species of the family that are intimately (and not just occasionally) associated with certain ants' nests. A few species are found not infrequently amongst decaying leaves, especially in damper spots on the floor of beech and oak woods, but this I believe is only true of such species as seem tolerant of a wide range of habitats, e.g. *Tychus*, some species of *Bryaxis* and *Brachygluta*.

As an aid to identification it is safe to make the following statements about the usual habitats of particular genera or species:

The species of *Bibleptectus* (except *minutissimus*) are almost invariably confined to thick deep moss in bogs and swamps, or to grass tussocks. *B. minutissimus* occurs only at the roots of the smaller grass tussocks, etc., on the sandy and fine shingle beds of rivers, and sometimes in flood refuse (into which it has almost certainly been washed from these situations).

Brachygluta depressa (*waterhousei* Brit. auctt.) and *B. helferi* are the only two British species that are invariably associated with salt marshes and tidal refuse, and do not occur away from halophile habitats, except when adventitiously transferred elsewhere in flood refuse.

Euplectus piceus, *E. nanus* and *Bibloporus bicolor* are always found under bark, or in rotten wood.

Euplectus infirmus and *E. karstenii* are associated with the same conditions, and though *E. falsus* Bedel (*tomlini* Joy) is reported from birds' nests, I have so far only found it under bark.

E. sanguineus and *E. signatus* occur almost invariably in hot-beds and manure heaps, in which situation *E. karstenii* is sometimes also found.

Pselaphus dresdensis is always found in very deep, thick moss; usually in bogs and swamps, but sometimes also in sand pits.

Brachygluta pandellei Sauley (*cotus*) I have only taken in very thick, deep moss (not *Sphagnum*) mixed with very fine grass in shady places on one river bank.

Trichonyx sulcicollis seems normally confined to rotten elm trunks.

Plectophloeus nitidus is found under bark and in rotten wood, usually very old red oak.

THE STRICTLY MYRMECOPHILOUS BRITISH PSELAPHIDAE.

A good many species are found occasionally in ants' nests, and in the main thoroughfares leading from the nest itself; but only the following can be

regarded as normally and exclusively myrmecophilous, it being the exception to find more than isolated individuals apart from ants :

Species.	Ant host(s).
<i>Claviger longicornis</i> Muell.	<i>Lasius mixtus</i> (Nyl.), <i>L. umbratus</i> (Nyl.). More rarely with <i>L. niger</i> (L.) or <i>L. flavus</i> (F.).
<i>C. testaceus</i> Preys.	<i>L. flavus</i> (F.), <i>L. alienus</i> (Foerst.), <i>L. niger</i> (L.).
<i>Amauronyx maerkeli</i> (Aubé)	<i>L. fuliginosus</i> (Latr.), <i>L. flavus</i> (F.), <i>Formica fusca</i> L., <i>Myrmica</i> spp.
<i>Bythinopsis glabrata</i> (Rye)	<i>Ponera coarctata</i> (Latr.). More rarely <i>L. flavus</i> (F.).
<i>Batrisesodes delaportei</i> (Aubé)	<i>L. brunneus</i> (Latr.).
<i>B. adnexus</i> (Hampe)	<i>L. brunneus</i> (Latr.).
<i>B. venustus</i> (Reich.)	<i>L. brunneus</i> (Latr.), <i>L. fuliginosus</i> (Latr.), <i>Formica rufa</i> L., and <i>F. fusca</i> L. More rarely <i>Myrmica</i> spp.

A NOTE ON NOMENCLATURE.

The Pselaphidae have certainly not escaped their fair share of nomenclatural and taxonomic tangles, and especially in the genera *Biblopectus* and *Euplectus* these have been very involved indeed. There are still many doubtful points over both the speciation and the synonymy in *Euplectus*.

For the most part I have followed the list of genera and species given in Kloet and Hincks (1945), differing from it (apart from certain necessary additions) only in the following main particulars : (1) By the inclusion of *Claviger* Preyssler under the Pselaphidae ; (2) by the suppression of *Plectophloeus nubigena* (Reitter) as a British species ; (3) by the substitution of *Euplectus falsus* Bedel for *E. tomlini* Joy, as Jeannel (1950) ; (4) in revising the list of species of *Biblopectus* ; (5) in substituting *Batrisesodes delaportei* for *laportei* ; (6) in the substitution of *Brachygluta pandellei* (Saulcy) for *B. cotus* (Saulcy), as Jeannel (1950), and *B. depressa* (Aubé) for *B. simplex* (Waterhouse) = *B. waterhousei* (Rye), *B. depressa* having many years' priority (Jeannel, 1950).

My main differences from Jeannel (1950) are as follow : (1) by disagreement with the necessity for the creation of a new genus (*Euplectoides* Jeannel) for the (in my opinion) doubtfully distinct species *E. pearcei* Jeannel, 1954 ; (2) by necessary revisions in the genus *Biblopectus* Reitter in accordance with Pearce and Besuchet (1955) ; (3) by rejection of the need for the creation of a new genus *Fagniezia* Jeannel, 1950, for the species *Reichenbachia impressa* (Panzer) ; (4) by rejection of *Bryaxis* Leach, 1817, as the right name for the genus including our two species *longicornis* (Leach) and *laminata* (Motschoulsky) for the reasons given below ; this involves non-acceptance of *Arcopagus* Leach, 1817 for *curtisii* (Leach) and its allies. I regard *Bryaxis puncticollis* (Denny) and *B. validus* (Aubé) as distinct species, and I do not concur with the placing of *B. macropalpus* (Aubé) and *B. burrellii* (Denny) in a separate genus ; and while I appreciate the very marked differences between the two species of *Pselaphus* Herbst, I do not consider them adequate

to justify the placing of *P. dresdensis* Herbst in a different genus, *Pselaphaulax* Reitter.

The case of *Bryaxis* Leach is very tangled. Jeannel (1950) reinstated it on the ground that *Bryaxis* Kugelann, 1794 was inadequately designated; but, as Grensted (1954) has pointed out, *Bryaxis* Kug. cannot simply be ruled out of court as a mere *nomen nudum*. Both a description and a named species, *B. schneideri*, exist; and, though Kugelann's specimen of *B. schneideri* cannot apparently at present be located, it does not therefore necessarily follow that it does not exist. It seems to me that *Rybaxis* Saulcy must therefore come into use in place of *Bryaxis* Leach, as in Kloet and Hincks (1945).

There are, of course, a great many additional tribes, etc., that have been brought into use in recent years; but so far as our species are concerned these seem an unnecessary complication, so I have omitted them.

ACKNOWLEDGMENTS.

I very much doubt if it would have been possible for me to finish this *Handbook*, so constantly has its completion been interrupted by the urgent claims of other work, were it not for the generous offers of help which I received and now gratefully record. To Mrs. C. A. O'Brien I owe the clear, accurate and original drawings of all the whole beetles figured, together with some of the drawings of portions of specimens (figs. 1-11; 29-32; 36-41). For the remainder of the figures I am responsible. Much of the *Handbook* has been read in manuscript by Dr. W. D. Hincks, Dr. B. M. Hobby, Mr. W. Potter and others, and I have tried to take note of and profit by their suggestions.

Mr. Ernest Lewis has very kindly typed out almost the whole of the "fair copy", and in so doing made many useful suggestions and criticisms. To M. Claude Besuchet I owe permission to make use of his excellent figures of the aedeagi and other structures in *Biblopectus*, upon which figs. 12-17 and 24-28 are based; and he has helped me very much in the elucidation of the various taxonomic and other problems posed by that difficult genus. Dr. Hincks and Mr. E. B. Britton kindly made available for study material contained in the various collections which come under their charge; and to various other correspondents I owe gratitude for placing specimens at my disposal for study. The general Editor of the *Handbooks*, the Registrar of the Royal Entomological Society and others have also helped me by answering questions and forwarding information. To all these, and to others who have rendered me much assistance, I gladly place on record my thanks.

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CHARACTERISTICS OF THE PSELAPHIDAE.

This family belongs to the suborder Polyphaga, and falls within the extremely numerous super-family Staphylinoidea. The latter includes many species of very small size, including the most minute of all the Coleoptera. The Pselaphidae are a numerous family of mostly diminutive beetles. They are world-wide in their distribution, but are found in their greatest profusion in the humid forest areas of the tropics. Many species live in ants' nests, but only a few of our British species can be regarded as exclusively associated with ants. The majority of the Pselaphidae are brown or yellowish in colour ; but in temperate zones many are darker or almost black, occasionally with reddish or even bright red elytra. The family is notable for its extreme diversity of form, and by the frequent great development of the maxillary palpi, which sometimes almost equal, or equal, the antennae in length.

According to Jeannel (1950), confirmed *in litt.* by Besuchet, the maxillary palpi are composed of five segments ; so distinguishing this family from all other Coleoptera. The fifth (terminal) segment is, however, usually very difficult to see (except in *Tyrus*, which does not occur in Britain) and normally is only represented by a very minute cone or tubercle. A very careful examination is necessary to reveal the presence of this minute terminal segment. The first (basal) segment is likewise usually very small and inconspicuous. The second is always long and usually glabrous, and the fourth (the club) very large, strongly pubescent and sometimes affording valuable characters for distinguishing the sexes and the species, especially in certain genera of the Pselaphini.

In many genera the secondary sexual characters of the males are very pronounced, either owing to great development of certain segments of the antennae and/or palpi, or to the possession of conspicuous spines or spurs

on the legs (especially the middle and third pairs) and elsewhere. In a number of genera the femora of the legs (and especially the middle pair) are noticeably thickened. In none of the genera do the elytra cover more than a small portion of the hind-body.

The following diagnosis holds good for all the British representatives of the family :

Antennae 11-segmented (except in *Claviger* which has only six segments, the first two being very small and deeply recessed in the antennal cavity); thickened towards apex and definitely clubbed; last apparent segment of maxillary palpi much longer than the others and variously modified; upper surface usually with characteristic deep foveae in various positions (commonly a pair on vertex between eyes; on pronotum; sometimes at base of elytra, on sides of mesosternum, etc.); abdomen consisting of never more than five segments projecting below the elytra, these segments being horny, and hardly if at all flexible; tarsi with but three segments, of which the first is extremely small and often difficult to see; tarsi furnished with usually but a single strong claw (in *Tychus*, *Trichonyx*, *Amauronyx* and, more conspicuously still, in *Batrisodes*, there is a very stout attendant bristle in close juxtaposition to the claw. This, when viewed from some aspects, is easily mistaken for a second claw). Some groups of the family have a second claw, but this is true of no British genus.

The British species of Pselaphidae are easily divisible into two subfamilies as follows :

- 1 Eyes wanting; antennae 6-segmented, the first two segments very small and inconspicuous, the first segment invisible from directly above and deeply recessed into the antennal cavity; maxillary palpi greatly reduced and consisting apparently of only a single, or two very minute, segments; abdominal tergites 4-6 strongly connate and fused into one large plate which is deeply excavated in the middle and furnished with "licking spots" or trichomes; species exclusively myrmecophilous (fig. 1).....CLAVIGERINAE (p. 11)
- Eyes usually prominent and clearly visible from directly above; antennae 11-segmented, inserted on the front above the mandibles, having the basal segments prominent and not recessed; maxillary palpi always conspicuous and sometimes very long, consisting apparently of three to four clearly visible segments; abdominal tergites not fused, sometimes marked by depressions or foveae, but not deeply excavated, trichomes absent.....PSELAPHINAE (p. 12)

Genus *Claviger* Preysslcr.

Two British species, both exclusively myrmecophilous. In both, the males have the tibiae of the middle pair of legs armed on their inner side with a small but stout tooth.

- 1 Head broader, not narrowed towards base; antennae much shorter and only slightly clubbed, with the intermediate segments very strongly transverse, much broader than long; pronotum and elytra somewhat shining, with diffuse pubescence (fig. 1). *Male*: femora as well as tibiae armed with a spur. Length 2-2.3 mm.

testaceus Preysslcr

In the nests of Lasius flavus (F.) and occasionally L. alienus (Foerst.), especially in chalky, sandy and limestone coastal districts in the south. Not uncommon under stones in the early summer with these ants. It occurs as far north as N. Wales, and Joy records this species for Munster, but I have failed to "pin-point" this Irish record more exactly than near Waterford.

- Head much less broad and distinctly narrowed towards base; antennae much longer, with an abrupt club, having the intermediate segments very elongate, much longer than broad; pronotum and elytra dull, with close and long pubescence. Length 2.5-2.7 mm.....**longicornis** Mueller

In the nests of Lasius umbratus (Nyl.) and sometimes L. mixtus (Nyl.), which usually occur under deeply embedded stones in limestone districts. Very rare; the farthest west record being for near Sully, Glamorgan; and the most northerly for near Oxford.

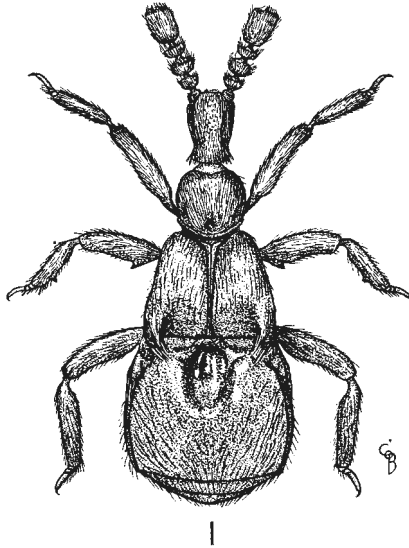


FIG. 1.—*Claviger testaceus* Preys.

The subfamily Pselaphinae is divisible into two tribes having the following characteristics :

- 1 Bases of coxae of hind pair of legs closely adjacent and often actually contiguous, with coxae prominent and often conical ; form much more linear, basal half to two-thirds of hind body almost as wide as apex of the elytra (*Trichonyx*, fig. 3, the largest, and one of the rarest of our species is the only exception to this), apical portion not nearly so strongly curved downwards ; maxillary palpi never more than one-third the length of the antennae (figs. 2, 4, 6, 7) . . . EUPLECTINI (p. 12)
- Bases of coxae of hind pair of legs widely separated ; coxae less prominent and not conical ; form never linear, apical portion of hind body very strongly curved downwards ; maxillary palpi (especially in *Tychus*, *Pselaphus*, *Bryaxis* (Kug.) and *Bythinopsis*) half, or more than half, the length of the antennae (figs. 29, 30, 31, 32, 38, 39, 40, 41) PSELAPHINI (p. 22)

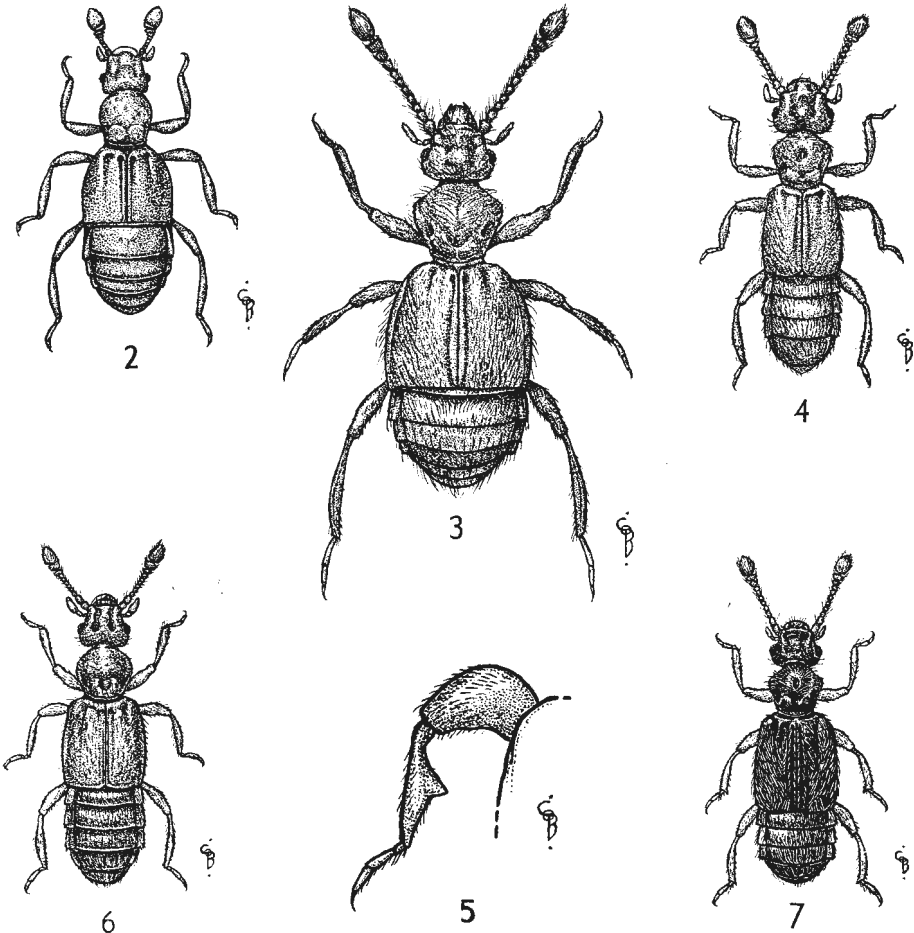
EUPLECTINI.

- 1 Antennae very short, evidently shorter than combined length of head and pronotum ; segments 3-10 markedly transverse ; segments 9-10 distinctly asymmetrical, segment 10 contiguous throughout most of its breadth with base of apical segment and forming part of club. The male seems usually darker in colour ; has more prominent eyes, and has the pronotum and elytra slightly longer than the female. The short antennae, and indeed the whole appearance of the species, mark it out as very distinct from all other British Pselaphidae. Length 1.0-1.3 mm. (fig. 2)

Trimium brevicorne (Reichenbach)

One of the most local of all our species, with the records spaced very discontinuously. The last published record is for Chiddingfold, Surrey, in moss, 1913 (Donisthorpe) represented by two specimens in his collection. Also recorded from Cobham Park, Kent ; Scarborough district, Yorks. (Lawson), many years ago, not uncommonly from a locality now destroyed. Mr. E. G. Bayford informs me that he took one specimen in 1901, probably under bark, near Doncaster, Yorks., in a locality now built over. There is an old (Waterhouse) record for "Bishop's Wood", which I cannot place with certainty, and Fowler gives Norfolk, Suffolk, and Lincs., without specifying localities. I have never taken it myself, and the rather vague expression "in moss" seems the only clue to its precise habitat.

- Antennae about equal to combined lengths of head and pronotum ; segments 3-10 not so markedly transverse ; segment 10 not contiguous throughout most of its breadth with club, but distinctly separate from it 2
- 2 Last (apparent) segment of maxillary palpi very elongate, much longer than broad (fig. 3) ; sides of segment almost straight ; whole beetle much larger. Length 2.0-3.5 mm. ; form the least linear of all our Euplectini 3
- Last (apparent) segment of maxillary palpi much less elongate ; its sides very often strongly rounded ; whole beetle smaller (length 2.0 mm., or much less. The only exception to this is the very rare *Euplectus brunneus* which sometimes exceeds 2.0 mm. in length) ; form always much more linear (figs. 4, 6, 7) 4



FIGS. 2-7.—(2) *Trimium brevicorne* (Reich.). Note very short antennae ; (3) *Trichonyx sulcicollis* (Reich.). Note very elongate apical segment to maxillary palpi ; (4) *Euplectus infirmus* Raff., female ; (5) *Bibloporus bicolor* (Denny), male, middle leg showing triangular tooth to tibia, characteristic of the male only ; (6) *Bibloplectus pusillus* (Denny), female ; (7) *Euplectus piceus* Mots., male.

- 3 Size much larger (length 2.8-3.5 mm.); head with eyes distinctly narrower than pronotum; elytra with scattered but close punctures (fig. 3). The largest British Pselaphid, and one of the rarest. The male has the femora and intermediate tibiae slightly thickened. **Trichonyx sulcicollis** (Reichenbach)

In old elm stumps and trunks and under bark, sometimes with ants. Recorded for some twelve English counties south of a line drawn from the Severn to the Wash; also recorded from Hereford (one specimen by sweeping at Tarrington); and there are old and perhaps doubtful records for Carlisle and York, though it is difficult to imagine any other species being mistaken for this.

- Size much smaller (length 2.0-2.3 mm.); head with eyes about equal in breadth to pronotum; elytra with obsolete and rather sparse puncturation. In the male the trochanters of the intermediate pair of legs are armed with a small blunt tooth

Amauronyx maerkeli (Aubé)

Almost exclusively found with ants under stones and in moss, especially with Lasius fuliginosus (Latreille), L. flavus (Fabricius) and Formica fusca Linnaeus. More rarely found with Myrmica spp. It has once been found in a mole's nest. Recorded from seventeen English counties and vice-counties, of which SE. Yorks. is the furthest north and S. Devon the furthest west.

- 4 Head with eyes distinctly narrower than pronotum; maxillary palpi very short; hind body less elongate. Male with intermediate femora strongly thickened and armed with a sharp spine at base; intermediate tibiae strongly dilated to form a triangular tooth with the point projecting inwards (fig. 5); length 1.1-1.3 mm.

Bibloporus bicolor (Denny)³

Not uncommon under bark and in rotten wood, especially elm, beech, oak and some conifers. Very widely distributed as far north as Ross-shire, and there are Irish records for Kerry and Wicklow.

- Head with eyes as broad as pronotum; maxillary palpi longer; hind body more elongate (figs. 4, 6, 7). 5

- 5 Pronotum with the single median impression almost centrally placed (fig. 6)

Bibleptectus Reitter (p. 17)

- Pronotum with two smaller median impressions, one each on apical and basal portions, placed one above the other, the apical one being much the smaller (figs. 4, 7). 6

- 6 Eyes very small, recessed into sides of head and only just visible from directly above; the two segments of hind body immediately below elytra without any striae or impressions. Male without apical spur to middle tibiae. Length 1.0-1.2 mm.

Plectophloeus nitidus (Fairmaire)

Very rare, in old (red) oak trees, wood frass, etc. For a number of years two species of Plectophloeus Reitter have been recorded as British; but careful enquiry indicates P. nubigena (Reitter) has apparently been recorded as British in error, so that all our examples are really referable to P. nitidus. The two species are very similar and difficult to differentiate. All the specimens in British collections labelled P. nubigena that I have seen are really P. nitidus. If all the records are referable to this latter species there are four records for it: Sherwood Forest, Notts.; Windsor Forest, Berks.; Blenheim Park, Oxford; and Moccas Park, Hereford.

- Eyes larger and sometimes prominent, clearly visible from directly above; the two segments of hind body immediately below elytra always bearing lateral striae or impressions. (N.B.—These can sometimes be partly obscured by long pubescence. They are most easily seen with strong light coming from the side, and with the specimen suitably tilted.) Males with apical spurs to middle tibiae (figs. 4, 7)

Euplectus Leach (p. 15).

(in which I have included **Euplectoides** Jeannel).

³ For some time I have thought it likely that we possess more than one species of *Bibloporus*; Mr. W. O. Steel considers that this is the case, and that the second British species is *B. hoghundi* Palm. He has the matter under investigation and will publish his results in due course.

Genus **Euplectus** Leach(including *Euplectoides* Jeannel).

It is almost impossible to draw up a really satisfactory key to this genus. It is almost essential to have some authentically-named specimens in front of one as a basis for identifications. Further, confusion and disagreement over both the speciation and the synonymy have reached a high degree of complexity. It may well be that the efforts made by Mr. Potter, others and myself, to try to clear matters up, will not prove to be the "last word". We are agreed that at present we are unable to recognize more than eleven undoubted British species. Of these, *E. nanus* seems clearly to comprise a kind of "species complex"; while *E. piceus* is also prone to very considerable variation. In the case of *E. nanus* there are two chief "forms", but one tends to grade into the other, and there appears to be insufficient justification for regarding the "extremes" of variation as separate species. The larger and rarer "form" of *nanus*, and the smaller and commoner, were separated by Denny as early as 1820 into *E. reichenbachia* and *E. kirbyi*. In 1866 these two were still in Waterhouse's list as separate species; but in that year Fowler suppressed *E. kirbyi* as only a "form" of the former, now known to us as *nanus*. *E. carolae* Allen (1940) represents a recent attempt once more to break up the *nanus* "complex", an attempt which leaves me unconvinced. In 1955, in the New Forest, I found a considerable number of *nanus* in the same portion of a decayed beech. This series included examples of both "forms" of the species. The fact that they occurred together, while not in itself furnishing proof of infra-specific affinity, nevertheless may be a significant pointer; and it is not an isolated instance.

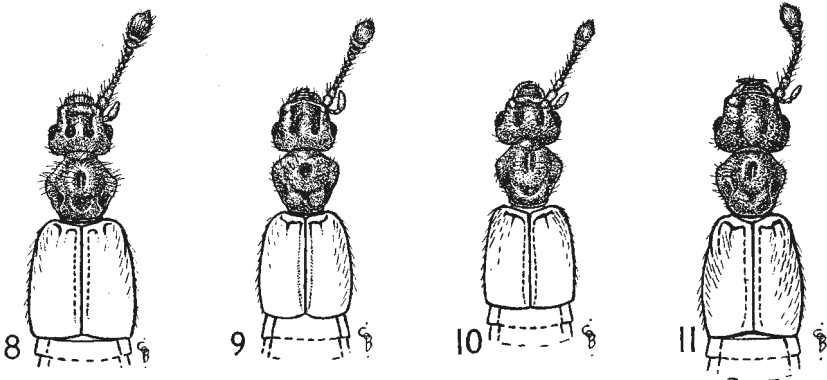
E. bescidicus Reitter has been introduced as British, I believe in error, the specimens so named being in fact *E. decipiens* Raffray. I have also seen British material labelled *E. bohemicus* Machulka et auctt., a designation I cannot accept, as all that I have seen are, in fact, what we know as *brunneus* Grimmer. As stated earlier, I do not regard the aedeagus as a very satisfactory character in this genus, but those desiring to work with it will find figures given in Jeannel (1950: 101-126).

Except during the autumn period of widespread emergence when pale specimens not infrequently occur, colour is a valuable aid to the separation of the species. I have therefore used it to some extent in the following key. I have also used habitat conditions as a subsidiary aid. The most commonly found species are the first met with in this key.

The males are always armed with an inward and downward projecting spur to the middle pair of tibiae, but in some species it is very inconspicuous. Its size and position is sometimes useful as a character. There are also differences over the sculpturation of the abdominal sternites; but I have not used this character in this key.

- 1 Colour very dark testaceous to pitchy-black; length 1.3-1.7 mm.; head with eyes never broader than pronotum 2
- Colour rufo-testaceous or lighter; length and breadth of head with eyes, not restricted to the above limits. 4
- 2 Head with four deep circular depressions equally spaced, two in front and two behind, only very rarely showing any tendency to become coalescent; general form shorter and broader; elytra very broad and long; females with apical abdominal segment strongly and usually evenly rounded, only very rarely bluntly pointed at apex. 3

- Head with two deep almost straight longitudinal furrows strongly convergent towards front of head; general form much more linear; females with apical abdominal segment somewhat triangularly elongated, with apex usually bluntly pointed; elytra shorter in proportion. Male tibial spur long and conspicuous. Length 1.3-1.6 mm. **nanus** (Reichenbach)
(Two main "forms"—one larger and rarer, and the other smaller and commoner. *reichenbachia* Denny; *kirbyi* Denny; *carolae* Allen.)
Chiefly under bark and in rotten beech, birch, oak, elm, etc. Not uncommon in England and Wales as far north as Durham.
- 3 Size larger (length 1.4-1.7 mm.); antennae much longer; normal habitat under bark and in rotten wood (fig. 7). **piceus** Motschulsky
(Also a variable species, showing considerable variation over the degree of coalescence of the head depressions. Jeannel has separated off *Euplectoides pearcei* as a distinct genus and species (type locality: Moccas, Herefords.). For this he has relied on a single male specimen, which Mr. Potter and I can only regard as a somewhat aberrant *E. piceus*, pending further material becoming available).
Common in the U.K. as far north as Perthshire, and also the south of Ireland.
- Size smaller (length 1.4-1.5 mm.); antennae distinctly shorter; pronotum and elytra often more lightly coloured; normal habitat in manure, hot-beds and haystack bottoms. **sanguineus** Denny
The commonest British Euplectus, occurring as far north as Edinburgh. Some scattered Irish records.
- 4 Size larger (length 1.7-2.2 mm.); head very large and robust in proportion 10
- Size smaller, never exceeding 1.7 mm., and usually less (the largest being the very distinct *E. decipiens* which has a very restricted distribution). 5
- 5 Length 1.2-1.4 mm.; colour distinctly paler, with elytra often slightly paler still. . . 6
- Length 1.5-1.7 mm.; colour distinctly darker, whole upper surface concolorous. . . . 8
- 6 Length 1.2-1.4 mm.; base and sides of pronotum with small scattered punctures. Usual habitat manure heaps and vegetable refuse; antennae shorter (fig. 8) **signatus** (Reichenbach) ⁴
- Not uncommon as far north as Berwick. No Irish records.*
- Length 1.2-1.3 mm.; base and sides of pronotum with larger punctures. Usual habitat under bark and in rotten wood. 7



FIGS. 8-11.—Head and pronotum, etc., to show comparative dimensions: (8) *Euplectus signatus* (Reich.); (9) *E. infirmus* Raff.; (10) *E. karstenii* (Reich.); (11) *E. falsus* Bedel (*tomlini* Joy).

⁴ Recently I have received a fine series of this species from Mr. P. Harwood, taken some years ago in *F. rufa* nests in the Aviemore district of Inverness-shire. This, at present, is the most northerly record in Britain.

- 7 Antennae longer; edges of head with very large punctures; base of pronotum moderately punctured; sides of pronotum not very sharply convergent towards base. Antennae longer (fig. 9); male tibial spur just above apex of middle tibiae (figs. 4, 9) (*after v. infirmus* Brit. auctt.) **infirmus** Raffray
Not common; scattered records as far north as Yorks.; and I have taken it in Wales (Glamorgan and Cardigan) and Co. Waterford, Eire.
- Antennae shorter; edges of head with somewhat smaller punctures; base of pronotum very strongly convergent towards base; male spur at extreme apex of middle tibiae (fig. 10)..... **karstenii** (Reichenbach)
Common and widely distributed; scattered records (including Ireland) as far north as Inverness.
- 8 Head with eyes very broad, slightly but distinctly wider than pronotum; pronotum with a long and very deep central groove. Head and pronotum very thickly punctured; elytra very broad. Antennal segments 3-10 distinctly transverse (fig. 11). Length 1.4-1.6 mm..... **falsus** Bedel⁶ (*tomlini* Joy)
In birds' nests and under bark and in rotten wood. Somewhat rare. Present records are all south of a line drawn from the Severn to the Wash, except for Rumney, Mon., and Cos. Kerry and Waterford, Eire.
- Head with eyes about equal in width to pronotum; pronotal central longitudinal groove much shorter..... 9
- 9 Size larger (length 1.6-1.7 mm.); antennae very long (about equal in length to *duponti*, these two species having about the longest antennae of all our species); head and pronotum with small but close scattered punctures; anterior pronotal depression very long and narrow; head depressions very deep and somewhat coalescent (*duponti* auctt. nec Aubé; *bescidicus* Reitter nec Raffray.)
decipiens Raffray
In moss, etc., very rare. The only authentic British specimens I have seen are from Yarnton, Oxon.; and Aviemore, Inverness-shire.
- Size smaller (length 1.4-1.6 mm.); a long and narrow species with elytra specially narrow and short; eyes rather prominent; pronotum heavily and closely punctured, having the anterior depression almost circular; head depressions noticeably shallower than in *decipiens*..... **punctatus** Mulsant
Decidedly rare. In rotten wood, and occasionally in other situations. Scattered records as far north as Co. Durham; also Co. Kerry in Eire.
- 10 Form very robust; elytra broad and considerably expanded behind towards base; head shorter than in the preceding species; antennae rather short in proportion to size of the beetle; front of head very strongly punctured; general colour almost dark rufous. Length 1.8-2.2 mm.
(duponti Fowler in part) **brunneus** Grimmer.
Very rare. Under bark and in rotten wood, etc. I have only seen authentic British examples from Arden Hall, Cheshire, where it occurred profusely in an old log; and a single male from the Lawson Collection, presumably from the Scarborough district of Yorks.
- Form much more linear and parallel-sided; antennae much longer than in *brunneus*; anterior pronotal depression rather long and narrow; basal pronotal depression very broad; elytra much narrower than in *brunneus* with sides gradually and evenly rounded; front of head slightly punctured; general colour testaceous or light testaceous. Length 1.7-2.0 mm.... (*aubeanus* Reitter) **duponti** Aubé⁶
In decaying vegetation, moss, etc. Owing to previous misidentifications the only localities I am certain of are Ashton Moss, Lancs., Bexley, Kent, and Killarney, Co. Kerry.

Genus *Biblopectus* Reitter.

The late Canon Fowler not unjustifiably described the genus *Euplectus* as "one of the hardest genera in the whole range of the Coleoptera". This verdict applies with almost greater force to *Biblopectus*. Before the work of

⁵ Recently I have taken in Co. Waterford two specimens which Mr. Potter and I agree belong to this species, but which are unusually small for it.

⁶ Recently I have seen a specimen from Cumnor Sandpit, Berks.

identification can begin it is essential that the specimens first be sexed. This fortunately, is easily done, the males having the following main characteristics: (1) the possession of a very distinct spur at the apex of the inner face of the tibiae of the middle pair of legs; (2) strongly swollen or incrassate femora, especially to the middle pair of legs; (3) a moveable hinged covering, the velum aedeagi, sometimes called the operculum, protecting the opening through which the aedeagus itself is extruded. This velum aedeagi provides valuable features for the separation of the species, and it is often possible to see its shape if the specimen is laid on its back and the tip of the abdomen is very strongly illuminated with concentrated light, and also suitably tilted. In freshly-emerged specimens its outline tends to be obscured by dense pubescence. To see this velum aedeagi clearly it is essential to have very strong and concentrated light striking it at the correct angle.

Some of the females cannot always satisfactorily be determined, especially if they are taken unaccompanied by males with which, on general grounds, they can almost certainly be associated. The only British species that are immediately and readily identifiable with a strong lens are *B. minutissimus* (both sexes), which is quite different in its habitat, general appearance and colour from all our other species; and *B. spinosus* (female) which is the only larger and very dark coloured species having a short but very distinct projecting spine to the apical abdominal segment (tergite), clearly visible from above. Fortunately, in the British species the shape of the end of this tergite in the females provides a good character, only *B. tenebrosus* and *B. pusillus* being very similar in this respect (see figs. 24-28).

Sometimes the apex of the female copulatory apparatus is slightly extruded, having the appearance of a little protruding spike. This must not be mistaken for the shape of the apical tergite itself. Careful examination in lateral view, as well as from directly above, will obviate this.

Though size is generally a notoriously unsafe guide to specific affinity, in this genus it is of real value; slight variations in size are therefore very often a valuable pointer. For this reason accurate means for measuring the length of specimens is essential. If in a series of specimens looked at through only a moderately powered lens certain examples are noticed to be distinctly larger or smaller than the others, and are of the same sex, this will often subsequently be found to have been a true indication that more than one species is present.

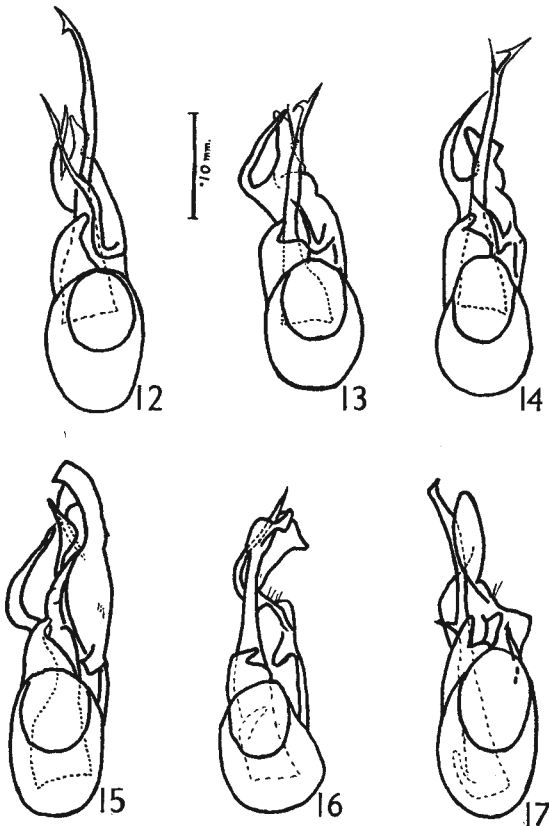
A small number of females occur which, so far as the shape of the apical abdominal tergite is concerned, cannot with certainty be referred either to *pusillus* or *ambiguus*, but which, on general grounds, clearly belong to one or other of these species. *B. ambiguus* is the larger of the two, and has distinctly broader elytra. These characters then must decide the matter. The apical spine to female *spinosus* hardly seems to vary at all, and is always distinct and robust; moreover *spinosus* is much the largest British species.

The keys that follow, together with the revised speciation and synonymy, must replace those given in my 1951 paper on the genus. The earlier sections of that paper, particularly (c)—that dealing with the characters used for separating the species—are, I believe, still valid and useful. Through the co-operation of M. Besuchet of Lausanne, the synonymy and speciation of the Palaearctic representatives of the genus are at last finally established after a long period of growing confusion.

KEY TO MALES.

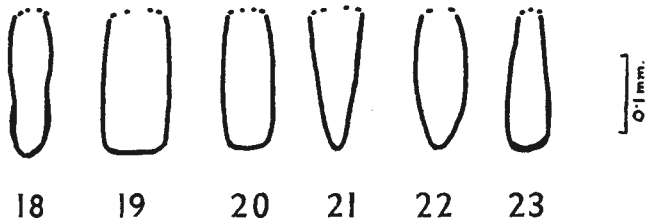
This key uses the general morphology and the form of the velum aedeagi (or operculum). For precise definition it is strongly advisable to refer to the more detailed description given under each species, and to the form of the aedeagus itself.

- 1 Size larger (length 1.2–1.3 mm.); general colour dark pitchy-brown; velum aedeagi not broader at apex than at base.....group **ambiguus** 2
- Size smaller (length 0.9–1.1 mm.); general colour light to dark testaceous; velum aedeagi much broader at apex than at base..... 5
- 2 Pronotum somewhat transverse; velum aedeagi almost three times longer than broad, the sides curved and waisted towards apex (figs. 12, 18) (*margaretae* Sharp, 1916; *linderi* Besuchet, 1953.)..... **tenebrosus** (Reitter, 1880)
- Pronotum not so transverse, velum aedeagi not so elongate, sides quite straight.... 3

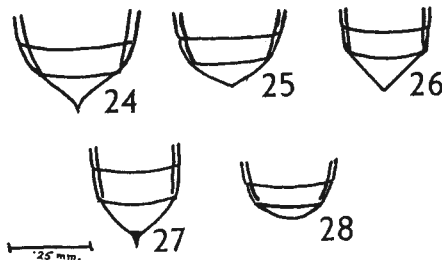


FIGS. 12–17.—Dorsal view of aedeagus of species of *Biblopectus*: (12) *B. tenebrosus* (Reitter); (13) *B. spinosus* (Raff.); (14) *B. ambiguus* (Reich.); (15) *B. delhermi* Guill.; (16) *B. minutissimus* (Aubé); (17) *B. pusillus* (Denny). (All partly after Besuchet.)

- 3 Size larger (length 1.2–1.3 mm.); velum aedeagi twice as long as broad. sides parallel (figs. 13, 19) (*ambiguus* sensu Pearce, 1951, Palm, 1953; *pseudambiguus* Besuchet, 1953) **spinus** Raffray, 1914
 – Size smaller (length 1.1–1.2 mm.); velum aedeagi much narrower in proportion to length 4
- 4 Antennae shorter; sides of velum aedeagi parallel and straight, apex broadly rounded (figs. 14, 20) (nec sensu Pearce, 1951; *championi* Jeannel, 1950; *corsicus* Jeannel, 1950) **ambiguus** (Reichenbach, 1816)
 – Antennae longer; sides of velum aedeagi very strongly convergent towards apex, which is bluntly pointed (figs. 15, 21) (*pusillus* sensu Jeannel, 1950; *intermedius* Pearce, 1951) **delhermi** Guillebeau, 1888
- 5 Eyes smaller; colour light or medium testaceous; velum aedeagi broader throughout its length than in *pusillus*, sides slightly rounded (figs. 16, 22) (nec sensu Jeannel, 1950; *garneysi* Fowler, 1879.) **minutissimus** (Aubé, 1833)
 – Eyes larger; colour much darker; velum aedeagi narrower throughout its length; sides straight and converging towards base (figs. 17, 23) (nec sensu Pearce, 1951; *affinis* Guillebeau, 1888; *reitteri* Guillebeau, 1888; *minutissimus* sensu Jeannel, 1950; *academicus* Pearce, 1951; *therondi* Besuchet, 1953) .. **pusillus** (Denny, 1825)



FIGS. 18–23.—Velum aedeagi (or operculum covering the male genital orifice) in *Biblopectus*: (18) *B. tenebrosus* (Reitter); (19) *B. spinus* (Raff.); (20) *B. ambiguus* (Reich.); (21) *B. delhermi* Guill.; (22) *B. minutissimus* (Aubé); (23) *B. pusillus* (Denny).



FIGS. 24–28.—Apical abdominal segments (tergites) of *Biblopectus* females: (24) *B. spinus* (Raff.); (25) *B. ambiguus* (Reich.); (26) *B. delhermi* Guill.; (27) *B. minutissimus* (Aubé); (28) *B. pusillus* (Denny). (All partly after Besuchet.)

KEY TO FEMALES.

To be used with great caution, because the females cannot always be exactly determined, and of four Palearctic species they are as yet unknown.

- 1 Size larger (length 1.1–1.3 mm.); coloration dark pitchy-brown or almost black **ambiguus** group 2
 – Size smaller (length 0.9–1.1 mm.); coloration light to dark brown 5
- 2 Pronotum generally transverse; last abdominal tergite triangular but with the apex strongly rounded **tenebrosus** (Reitter)
 – Pronotum not so transverse; last tergite never rounded at the apex 3

- 3 Size larger (length 1.2–1.3 mm.); last tergite very strongly acuminate, armed with a distinct spine (fig. 24)..... **spinosus** Raffray
 – Size smaller (length 1.1–1.2 mm.); last tergite not so strongly acuminate and without a distinct spine..... 4
 4 Antennae longer; last tergite longer, with very straight sides strongly converging to a blunt point (fig. 26)..... **delhermi** Guillebeau
 – Antennae shorter; last tergite much shorter, sides slightly rounded but pointed at apex (fig. 25)..... **ambiguus** (Reichenbach)
 5 Last tergite very long, and terminating in a long spine; colour light testaceous (fig. 27)..... **minutissimus** (Aubé)
 – Last tergite extremely short, and gradually rounded at apex, no trace of any spine; colour much darker (fig. 28)..... **pusillus** (Denny)

MORE DETAILED DESCRIPTIONS AND DISTRIBUTION.

In general it may be said that *B. minutissimus* is the only species that normally does not occur in damp moss. Its usual habitat is at the roots of small grass tussocks growing in sandy places and in fine shingle beds on the banks of rivers. It is therefore sometimes found in numbers in flood refuse. It appears to be extremely local.

All the other species normally occur in thick damp moss (especially *Hypnum*, *Climacium*, and sometimes *Sphagnum* when mixed with other mosses) in bogs and marshes; but *B. pusillus* seems to have a decided predilection for grass tussocks.

B. tenebrosus (Reitter).—Head as wide as the pronotum; segments 6–8 of antennae generally somewhat transverse; pronotum very distinctly transverse; both head and pronotum with deep and close puncturation. Length 1.2–1.3 mm.; *male*: velum aedeagi fig. 18, aedeagus fig. 12; *female*: last abdominal tergite rounded and spineless, very similar to *pusillus*, from which it is distinguished by its shorter elytra.

DISTRIBUTION.—*I have only seen undoubted specimens of this species from the New Forest area, Brockenhurst, Hurn, S. Hants.*

B. spinosus Raffray.—Large and robust; elytra only rarely slightly more lightly coloured than rest of upper surface; head often slightly narrower than the pronotum; segments 6–8 of antennae as broad as long; pronotum as long as broad, puncturation of head and pronotum finer than in *tenebrosus*. Length 1.2–1.3 mm.; *male*: velum aedeagi fig. 19, aedeagus fig. 13; *female*: last abdominal tergites as in fig. 24; apex armed with a very distinct terminal spine.

DISTRIBUTION.—*Probably widespread: Edenhall, Cumberland; St. David's, W. Wales; Moccas, Hereford; Slapton Lea, Devon, etc.*

B. ambiguus (Reich.).—Elytra sometimes slightly lighter in colour than rest of upper surface; head as broad as the pronotum; species rather specially robust and darkly coloured; segments 6–8 of antennae distinctly globular. Length 1.1–1.2 mm.; *male*: velum aedeagi fig. 20, aedeagus fig. 14; *female*: last abdominal tergite with a very minute pointed tubercle, varying in size (fig. 25).

DISTRIBUTION.—*Widely distributed and sometimes occurs in profusion (Kenfig Marsh, Glam.; St. David's, Pemb.; Magor, Mon.; Skipwith, Yorks.; Shapwick, Somerset; New Forest, Hants.; Kirkcudbright, Scotland).*

B. delhermi Guill.—Antennae slightly longer than in the other species; general form rather narrower in proportion to length; elytra rather long in proportion to breadth. Length 1.0–1.1 mm., *male*: velum aedeagi fig. 21, aedeagus fig. 15; *female*: last tergite very distinct in shape, almost triangular and pointed but without trace of any spine (fig. 26).

DISTRIBUTION.—*Decidedly rare: Water Eaton, Oxon.; Kennet Valley, Berks.; Magor, Mon.; Chippenham Fen, Cambs.; St. Peter Port, Guernsey.*

B. minutissimus Aubé.—Easily distinguished by its testaceous coloration, smaller size, and distinctive habitat; appendages very pale testaceous; puncturation of head and pronotum slight. Length 0.95–1.1 mm.; *male*: velum aedeagi (fig. 22) somewhat similar in shape to *pusillus*, but usually much more widely rounded towards base; aedeagus large in proportion to size of beetle (fig. 16); *female*: last abdominal tergite armed with a very long and distinct spine (fig. 27).

DISTRIBUTION.—*Rare and very local, but occasionally occurs profusely in small tussocks and under stones in sandy river banks and in flood refuse; Repton, Derby; Great Salkeld, Cumberland; Winton Mill, Co. Durham; Oxford.*

B. pusillus Denny.—About the same size as the preceding, or slightly larger. Elytra often slightly lighter in colour than the rest of the upper surface. Pubescence usually specially dense. *Male*: velum aedeagi (fig. 23) somewhat similar to that of *minutissimus*, but narrower throughout its length, and gradually expanded towards apex; aedeagus fig. 17; *female*: last tergite spineless and very similar to that of *tenebrosus*, but broader, and very evenly rounded (fig. 28). Elytra distinctly longer than in *tenebrosus*.

DISTRIBUTION.—*Widespread: Yarnton, Oxon.; Pincheston, Pemb.; Sully Island, Glam.; Magor, Mon.; Grantchester, Cambs.; Walkerburn, Peebles, etc.*

PSELAPHINI.

- 1 Antennae arising from two proximate tubercles; maxillary palpi half, or more than half, the length of the antennae (figs. 29–30; 38–41).....2
- Bases of antennae much more widely separated; maxillary palpi one-third or less the length of the antennae (figs. 31–32, 36, 37).....5
- 2 Maxillary palpi with the apparent last segment greatly elongated and club-shaped, strongly narrowed to its base and attached by a long “stalk” to the next segment; preceding segments very long and attenuated and only expanded at their articulations; hind-body at its widest distinctly wider than the elytra at their widest (fig. 41).....**Pselaphus** Herbst, (p. 29)

(In *Pselaphus* I have included *P. dresdensis* Herbst, which is sometimes placed in another genus, *Pselaphaulax* Reitter.)

- Maxillary palpi with the last apparent segment much broader in proportion to length and usually hatchet-shaped or rounded securiform, preceding segments shorter and thicker (figs. 29–30, 38–40). Hind body always narrower than elytra at their widest.....3
- 3 Penultimate segment of maxillary palpus including its “stalk” only slightly shorter than last (apparent) segment; first visible segment of hind body (tergite) much longer than the following tergites, its sides almost parallel, or only very slightly narrowed behind. Male fifth segment of antennae greatly enlarged (fig. 29), and the intermediate legs have a long, backward-projecting spine to the trochanters. In both sexes the colour of the elytra varies; usually they are black, sometimes they are suffused with red; and very rarely they are unicolorous red. Length 1.0–1.5 mm.....**Tychus niger** (Paykull)

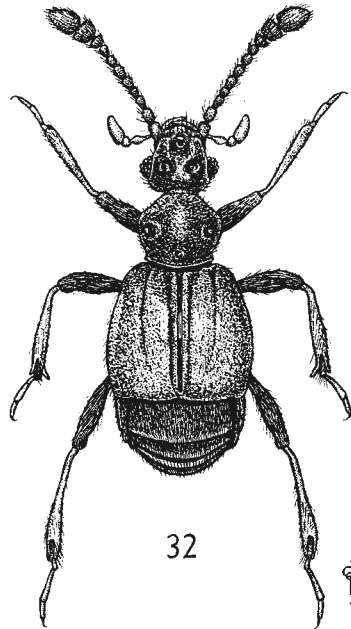
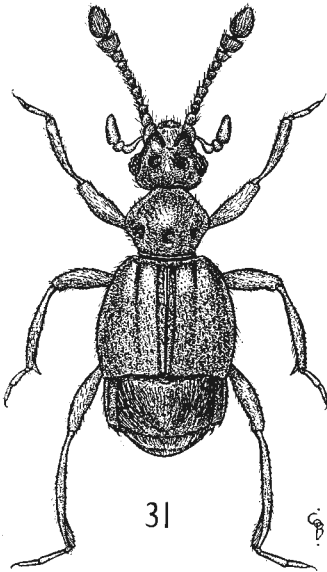
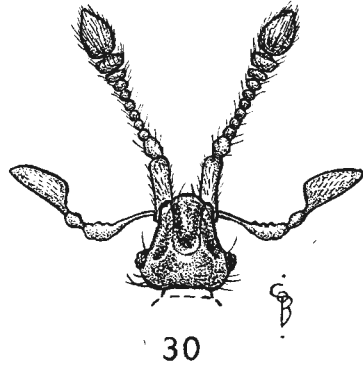
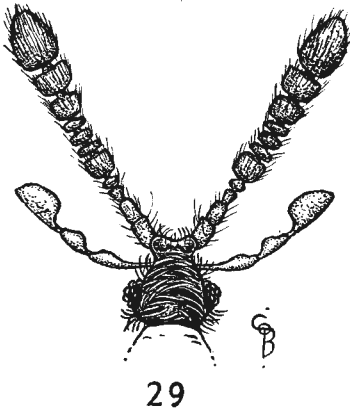
One of the commonest of all our species, and found in a wide variety of habitats. The farthest north records are for Haddington and Renfrew; there are scattered Irish records.

- Penultimate segment of maxillary palpus very much shorter than the last (apparent) segment; first visible tergite about equal in length to the following one, its sides much more strongly narrowed behind (figs. 30, 38–40).....4
- 4 Basal segment of antennae very long and narrow, as long as, or longer than the three following segments (fig. 30); elytra impunctate; species strictly myrmecophilous. Colour pale testaceous, unicolorous except for eyes. Length 1.25–1.3 mm. Male usually larger than the female, head with wide longitudinal shallow frontal depressions on vertex; legs, especially femora, somewhat thickened, but this is variable. Sainte-Claire Deville (1909) points out that there are two “forms” of the female, one with larger and one with smaller eyes. The British examples so far all belong to the smaller-eyed or microphthalmic “form”.....**Bythinopsis glabrata** (Rye)

In and about the nests of Poneræ coarctata (Latreille), and more rarely with Lasius flavus (Fabricius). The former is largely a subterranean ant, difficult to find, with a very restricted distribution in the British Isles. It is most often found under stones and bits of debris in mossy hollows in chalk districts, in May and June. Brachythecium purum Dix. is a favourite moss. All the undoubted records for this beetle are in the south and south-east of England: Dorset; Isle of Wight; Seaford, Sussex; Broadstairs and Charing, Kent; Box Hill, Surrey; Welwyn Garden City, Herts. (locality since destroyed by building).

- Basal segment of antennae only slightly longer than broad, not exceeding in length the next two segments; elytra with scattered punctures; species not myrmecophilous (figs. 38–40) (= *Bythinus* Leach et Brit. auctt., *Bolbobythus* Raffray)

Bryaxis Kugelann (p. 27)



FIGS. 29-32.—(29) *Tychus niger* (Payk.), male head and appendages. Note enlarged fifth segment of antenna, characteristic of the male only; (30) *Bythinopsis glabrata* (Rye), head and appendages of male. Note deep grooves characteristic of head of the male; (31) *Brachygluta helferi* (Schm.-Goeb.), male. Note spurs at apices of middle tibiae; (32) *Reichenbachia impressa* (Panz.), male.

- 5 Head between antennae without deep round foveae. Antennae with segments 3-10 quadrate or transverse..... **Batrisodes** Reitter (p. 24)
 - Antennae with segments 3-10 elongate (figs. 36-37) (= *Bryaxis* Leach et Brit. auctt., nec Kugelann.)..... **Rybaxis** Sauley (p. 26)
 - Head between antennae with deep round foveae..... 6
 6 Pronotum with three foveae of equal size and depth (fig. 31) **Brachygluta** Thomson (p. 24)
 - Middle pronotal fovea very much smaller than the two lateral ones (fig. 32) **Reichenbachia** Leach (p. 25)
 (I have included *R. impressa* (Panzer) in this genus, though it is placed by Jeannel in a separate genus *Fagniezia*.)

Genus **Batrisodes** Reitter.

(*Batrisus* auctt.)

The males of all our three species have the last two segments of the antennal club considerably enlarged, and the head is broader than in the females; the intermediate femora are armed with a minute spine at about their middle. Two of the species are very strictly myrmecophilous, while the third (and least rare) one is normally found associated with ants.

- 1 Antennae more slender with segments 5-7 very strongly transverse; size larger (length 2.2-2.4 mm.)..... **delaportei** (Aubé) (sometimes spelt *laportei*).
Extremely rare; in the nests of Lasius brunneus (Latreille), and only known in these islands from Windsor Forest, Berks.
 - Antennae more robust with segments 5-7 quadrate; size smaller (length 2.0-2.1 mm.)..... 2
 2 Shoulders of elytra terminating in a small pointed tooth; head of male armed with a long, thin, bent horn..... **adnexus** (Hampe)
Extremely rare; habitat the same as preceding species.
 - Shoulders of elytra very obtusely angled; head of male simple **venustus** (Reichenbach)
Rare, and usually found with the ants Lasius brunneus (Latreille) and L. fuliginosus (Latreille). But it has occurred away from ants under bark and in rotten wood, especially oak. There are records for some twenty English counties, Cumberland being the farthest north.

Genus **Brachygluta** Thomson.

All the males of the five British species, with the one exception of *haematica*, have the tibiae of the middle pair of legs armed with a stout incurved spur near the inner apex. The antennae are also slightly longer in the males. In this genus colour is a useful diagnostic feature. I have very rarely taken freshly-emerged (and therefore pale) specimens. I have also used habitat as a guide to specific identity, as the two salt marsh species (*depressa* and *helferi*) are entirely confined to coastal districts, as the records unanimously testify.

- 1 Elytra strongly broadened behind; first visible tergite markedly transverse; unicolorous pitchy-brown or black, elytra very rarely red or dark red. Length 1.6-1.9 mm..... **fossulata** (Reichenbach)
In moss and tussocks especially in woods and on banks; common and widely distributed as far north as the Solway, and up to Co. Antrim in Ireland.
 - Elytra less strongly broadened behind; first visible tergite less markedly transverse; elytra nearly always bright red or at least always suffused with red..... 2
 2 Species unicolorous red or brownish-red, elytra sometimes lighter, colour not tending to much variation..... 3
 - Species with pitchy to black upper surface, only the elytra usually dark red, or dark red suffused with black, colour subject to greater variation..... 4

- 3 Unicolorous red with darker band across apices of elytra; terminal segment of maxillary palpi testaceous or pale testaceous; male with apical margin of first visible tergite dilated at each side and incised in the middle, tibiae of intermediate legs without spur; habitat: moss, decaying wood, etc., not found in salt marshes. Length 1.8–2.0 mm. **haematica** (Leach)

Widely distributed as far north as the Solway and Northumberland; there is a grouping of records in SW. Ireland, and it is recorded from St. Kilda.

- Unicolorous red, or reddish-testaceous, sometimes almost pitchy, elytra usually lighter with somewhat darker band across apices; terminal segment of maxillary palpi dark testaceous or almost pitchy; male with first visible tergite simple, tibiae of intermediate legs armed near apex with a very conspicuous incurved spur; habitat: grass roots and decaying tidal debris, strictly confined to salt marshes and situations near the sea or brackish water. Length 2.0 mm.

(*simplex* (Waterhouse); *waterhousei* (Rye)) **depressa** (Aubé)

Entirely confined to southern coastal districts, but there are records for all seaboard counties from Pembroke to Essex except Carmarthen, Glamorgan, Monmouth and Somerset. It has also occurred at Portmarnock, Co. Dublin.

- 4 Terminal segment of maxillary palpi testaceous or pale testaceous, and more elongate than in the following species; tergites less distinctly punctured; never found under halophile conditions; size slightly larger. Length 1.5–1.7 mm.

(*cotus* Saulcy and others) **pandellei** (Saulcy)

Very rare and extremely local, but sometimes occurs in numbers, in thick moss in sandy places on the banks of rivers. For many years it was only known from the Solway district (Water of Ken, Beattock, Lockerbie) where it has not now been taken for many years. Recently it has occurred profusely near Llanafan, Cards., W. Wales. (See Pearce, E. J., 1953, Ent. mon. Mag. 89: 94.)

- Terminal segment of maxillary palpi dark testaceous to pitchy, and broader in proportion to length; tergites more distinctly punctured; habitat strictly halophile or at least brackish; size smaller (fig. 31). Length 1.3–1.5 mm.

helferi (Schmidt-Goebel)

Very widely distributed and often abundant in brackish marshes at the roots of grasses, etc., around the coast from S. Yorks. to Glamorgan; but there are as yet no records for Cornwall, Somerset and Monmouth. There is an isolated record for Kinross and Fife, and there are Irish records for Co. Kerry, Sligo and Donegal.

Genus *Reichenbachia* Leach.

Two British species; in both, the males have the tibiae of the middle pair of legs armed with a stout incurved spur near the apex of their inner face, and the antennae are slightly longer than in the female. Very pale specimens (i.e. those that have recently emerged) not infrequently occur, and can cause confusion if colour alone be unduly relied upon.

- 1 Head and pronotum thickly and densely punctured; the whole upper surface almost unicolorous rusty-red. Elytra without a basal pore between sutural and dorsal striae. Length 1.3–1.6 mm. **juncorum** (Leach)

In moss and grass tussocks (but not usually Juncus!) especially on the banks of rivers and ponds, common and widely distributed throughout the British Isles as far north as Ross-shire, where it becomes very much rarer.

- Head and pronotum almost smooth and very obsoletely punctured; whole upper surface black with bright red or partly red disc to elytra. Elytra with a small additional pore situated between the pores at the bases of the sutural and dorsal striae (fig. 32). Length 1.4–1.7 mm. **impressa** (Panzer)

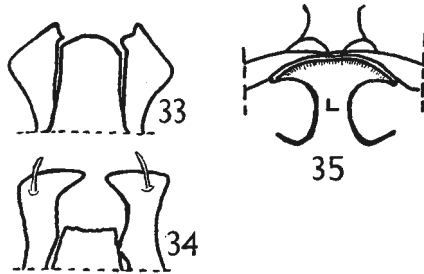
(Jeannel, 1950 has created a new genus for this species only—*Fagniezia*.)

Much rarer than the preceding, and found in similar situations. But it is widely distributed as far north as Northumberland. Three records exist for the SW. of Ireland, and it has been recorded from St. Kilda, though there is no certain record for the Scottish mainland.

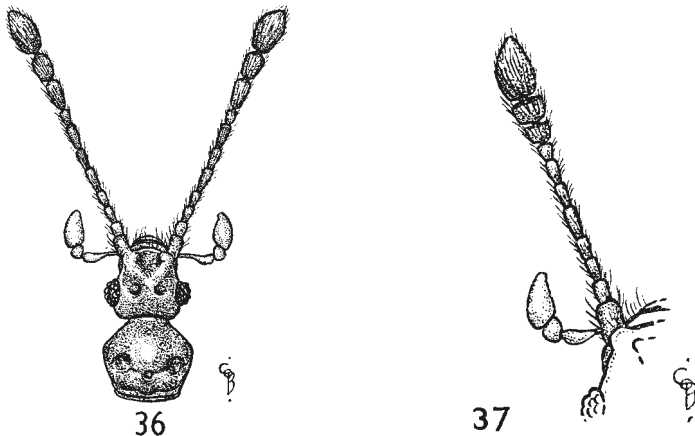
Genus **Rybaxis** Saulcy.

The males of the two British species are easily distinguished as follows :

- 1 Larger (length 1.8-2.1 mm.) ; more robust ; metasternum with a large forward-projecting, strongly raised process dilated at the apex to form a lunar-shaped lobe having recurved backward-pointing edges (fig. 35) ; median furrow of metasternum shorter ; styles (*sic* Jeannel) of aedeagus very strongly sclerotized, narrowed at base, but strongly dilated towards apex to form a large triangular expansion, bluntly acuminate outwardly, and having a spur internally just short of apex, no bristles (fig. 33).....**laminata** (Motschulsky)



FIGS. 33-35.—*Rybaxis laminata* (Mots.) and *R. longicornis* (Leach): (33) dorsal view of distal portion of aedeagus of *R. laminata*, to show triangular apices to styles ; (34) the same of *R. longicornis*, to show different shape of styles, with single bristle to each ; (35) metasternal area of *R. laminata* male, to show raised metasternal process (L) characteristic of the males of this species.



FIGS. 36-37.—(36) Head appendages and pronotum of *R. longicornis* male, to show longer antennae of male, and basal pronotal depressions joined by a transverse furrow which distinguishes *Rybaxis* from *Brachygluta* and *Reichenbachia* ; (37) *R. longicornis*, shorter antenna of female.

- Smaller (length 1.5-1.8 mm.); and narrower in proportion. Metasternum simple and without any process, median furrow deeper and longer; aedeagus narrower and more elongate; basal capsule more membranous, styles long and somewhat waisted, pitted in the basal area, distal portion enlarged and transversely truncated, with an inward pointing projection, one erect bristle is borne by each style near the apex (fig. 34).....(*sanguinea* auctt.) **longicornis** (Leach)

(Unfortunately no absolutely reliable character has yet been discovered for separating the females of these two species, but this sex in *longicornis* is smaller and less robust, and has slightly narrower elytra. In the males of both species the antennae are considerably longer than the same organs in the females (figs. 36-37). Both species (and both sexes) vary enormously in colour, especially with regard to the elytra, every shade occurring between bright red and jet black, these latter being much the rarer. The extreme colour forms have been given names, but as every intermediate shade occurs they seem to me to serve little purpose, and are therefore better ignored.)

Both species occur not uncommonly in moss, tussocks, etc., especially on or near the banks of pools and streams and in marshes, and are frequently found together, though longicornis seems the commoner species. The most northerly records for the genus in Britain are for SE. Yorks. in England; the Isle of Man; and Co. Down in Ireland.

Genus **Bryaxis** Kugelann.

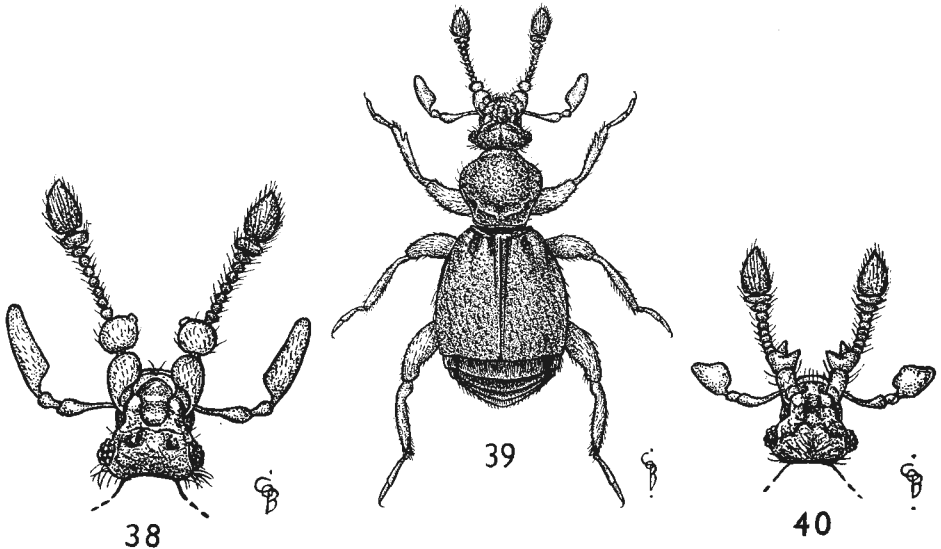
(*Bythinus* Leach et auctt.; *Bolbobythus* Raffray; *Arcopagus* Leach.)

There are six undoubted British species. Uncertainty exists as to the exact number for various reasons. Jeannel (1950) lists *B. securiger* (Reichenbach) as British, figuring the aedeagus (p. 217), which is very distinct, and very unlike that of any (other) British species, or of any British example I have ever seen or dissected. He records *B. securiger* for Bradfield, Berks. (Joy). Mr. Potter and I are convinced that this is due to a misidentification. I have differed from Jeannel in regarding *B. puncticollis* (Denny) and *B. validus* (Aubé) as distinct, if very closely allied, species. I consider that he has given insufficient weight to the character provided by the size and prominence of the eyes in these two species. While somewhat variable, it is a reliable character for the separation of both the sexes of these two species from one another. There are also slight but useful aedeagal and antennal differences.

Difficulties arise from the fact that in two species (*macropalpus* and *burrellii*) males without the fully-developed antennal characteristics commonly occur. In four of our species these male antennal characteristics are of great value; and in *bulbifer* and *curtisii* they are invariably present. Further, an added complexity is the widespread occurrence with us of a small-eyed female which I cannot at present satisfactorily place, and which is unknown to Dr. Jeannel and M. Besuchet. It seems most often to be associated with *burrellii*, and probably is referable to the var. *britannica* of Machulka (1935). Should this in fact prove so, it would provide a parallel instance to *Bythinopsis glabrata* (Rye) (p. 22), which has both macro- and micro-phthalmic females, though only the latter form of female is found in Britain. This small-eyed female of (?) *B. burrellii* has extremely variable palpi, even allowing for the fact that in this genus several of the species, during the process of drying after mounting, tend to lose the original shape of the last (apparent) segment of the palpi. Especially in newly-emerged examples this segment sometimes collapses inwards like a deflated football, or otherwise shrivels up. I know of no way of preventing it happening. It is usually quite evident when this has

happened; it is nevertheless important to note the original shape carefully. *B. macropalpus* and *burrellii* are the two species most subject to this distortion. In nearly all the species the males have more prominent eyes than the females. This is usually particularly noticeable in *curtisii* and *bulbifer*. Rye (1866) stated that females were much commoner than males; I have by no means found this invariably to be the case.

- 1 Size larger (length 1.5-1.7 mm.); antennae much longer in proportion (fig. 38)....2
- Size smaller (length 1.0-1.4 mm.); antennae much shorter in proportion (figs. 39, 40).....3
- 2 Last (apparent) segment of maxillary palpi long or round ovate, sides rounded, general colour dark testaceous to pitchy-black; males with first segment of antennae greatly enlarged and somewhat rectangular, apex somewhat serrated; second segment also enlarged, but without any small rounded "peg" projecting from inner surface.....*bulbifer* (Reichenbach)
One of the commonest of our Pselaphidae; found in moss and grass tussocks, etc., over the whole of Britain, but no records yet for the Orkneys and Shetlands.
- Last (apparent) segment of maxillary palpi hatchet-shaped or securiform (fig. 38) with sides straight or almost straight; general colour testaceous or dark testaceous, never black; males with first segment of antennae much enlarged, sides rounded; second segment similar but much more strongly rounded, almost globose, and with a small projecting conical peg near apex of inner surface (fig. 38)...*curtisii* (Leach)
Not uncommon in moss, under bark, etc., as far north as Inverness-shire; also SW. Eire.



FIGS. 38-40.—(38) Head and appendages of *Bryaxis curtisii* (Leach) male, to show hatchet-shaped apical segment to maxillary palpi, and formation of second antennal segment, characteristic of all males of the species; (39) *Bryaxis validus* (Aubé), male. Note greatly thickened legs, and prominent eyes; (40) Head and appendages of *Bryaxis burrellii* (Denny), male, to show form of maxillary palpi, and lunar-shaped projection to inner surface of second segment of antenna found in males that are fully developed in this respect.

- 3 Size larger (length 1.3-1.4 mm.); head and most of pronotum densely and heavily punctured; last (apparent) segment of maxillary palpi somewhat variable, but usually with almost straight sides; however, these are sometimes slightly rounded; whole segment always broadly rectangular in shape (fig. 39); males without projecting keels or ridges to inner surface of second segment of antennae.....4
- Size smaller (length 1.0-1.2 mm.); puncturation of head and pronotum much less dense; last (apparent) segment of maxillary palpi very variable in shape but most commonly with strongly rounded sides; males which have fully-developed antennal characters exhibiting a conspicuous keel or ridge to inner surface of second segment5
- 4 Eyes large and prominent (fig. 39); size slightly larger (length 1.3-1.4 mm.); general colour testaceous or slightly darker; form robust; *males*: legs, especially femora, greatly thickened (so sometimes designated as form "*incrassipes*"), second segment of antennae globular in both sexes; *females*: first segment of antennae somewhat enlarged; legs not specially thickened.....**validus** (Aubé)
Habitat and distribution as for bulbifer.
- Eyes distinctly smaller and less prominent; size smaller (length 1.3 mm.); general colour dark testaceous to almost pitchy; form much less robust; *males*: antennal characters much less pronounced, second segment of antennae oval rather than globular; legs normal in both sexes.....**puncticollis** (Denny)
Habitat and distribution as for bulbifer.
- 5 [The females of these last two species are very similar, but *macropalpus* females are practically always larger (length 1.0-1.2 mm.); *burrellii* females (the commoner species) are smaller (length 1.0-1.1 mm.). In *macropalpus* the last (apparent) segment of the maxillary palpi is somewhat larger and very convex.]
Males: first segment of antennae very nearly parallel-sided; second segment (in fully developed specimens) with a strong upward-projecting keel to inner side of segment, but which is not prolonged into a backward-pointing extension; last (apparent) segment of maxillary palpi large, with sides evenly rounded (*securiger* Denny nec Reichenbach; *distinctus* Chaudoir.) **macropalpus** (Aubé)
Habitat variable; moss and rotten wood, sometimes in nests of small mammals. Scattered records as far north as Westmorland. No certain Irish record.
- *Males*: first segment of antennae distinctly widened towards apex; second segment (in fully developed specimens) with a lunar-shaped crescent-like keel to inner surface, variable in size, but usually projecting in a sharp extension at each end; last (apparent) segment of maxillary palpi smaller than in the preceding species and produced into a tubercle on the inner side, giving the whole segment a strong resemblance to a boxing glove. (All males have this latter characteristic (fig. 40).
burrellii (Denny)
Usual habitat moss on the ground in woods; sometimes in grass tussocks, etc. Not uncommon as far north as Sutherland. I have seen Irish specimens from Co. Kerry.

Genus **Pselaphus** Herbst.

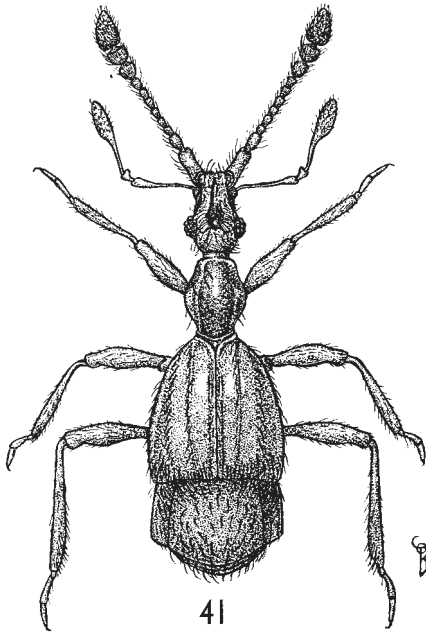
In both British species the males have slightly more elongate antennae than the females. The second, and far rarer, British species is very distinct from the first, and by some has been placed in a different genus, *Pselaphaulax* Reitter. I am not convinced, however, that there is sufficient justification for this step.

- 1 Apical segment of maxillary palpi sprinkled all over with minute black tubercles, and not grooved throughout its length; pronotum more elongate, hind margin about equal in width to front margin; no foveae at base of elytra; general colour reddish-yellow to dark red (fig. 41). *Male*: first sternite with a large but shallow depression in the middle. Length 1.5-1.9 mm.....**helsei** Herbst
In moss and tussocks, especially in bogs, etc. Very widely distributed throughout the British Isles as far north as Sutherland.

- Apical segment of maxillary palpi smooth and without tubercles, but grooved throughout its length; pronotum less elongate, with hind margin much broader than front margin; two very distinct foveae at the base of each elytron; general colour much darker than in *heisei*. *Male*: first sternite without median depression, but the metasternum is longitudinally grooved in the middle. Length 1.5-2.0 mm.

dresdensis Herbst

This species used to be regarded as a very great rarity; actually it is not uncommon in very wet moss, particularly Climacium dendroides W. and M.; Hypnum cordifolium Hedw., etc., in large bogs, and sometimes in damp sandpits; but it is exceedingly local, and can be very sluggish in its movements. There are some eighteen county and vice-county records, of which Cumberland (Newton Reigny Moss) is the most northerly in England, and Co. Armagh in Ireland. It has also occurred in the Isle of Man. (See Pearce, E. J., 1946.)



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FIG. 41.—*Pselaphus heisei* Herbst.

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