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COLEOPTERA

SCOLYTIDAE AND PLATYPODIDAE

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COLEOPTERA
(SCOLYTIDAE AND PLATYPODIDAE)

By E. A. J. Duffy

Introduction.

Bark beetles* are of major economic importance and world-wide distribution. Well over 2000 species are known, of which about 60 are British. Some of these have only recently become established, and the possibility exists that others may do so in the future. These beetles are well adapted to a subcortical existence and, although they are mainly wood-feeders, some species (e.g., *Thamnurgus*) are known to infest stems of herbaceous plants, woody creepers and even seeds and cones. A few species attack only seasoned wood and are frequently destructive to casks and barrels.

Although serious and widespread damage is caused every year by these beetles abroad, particularly in coniferous forests, extensive outbreaks rarely occur in this country. Perhaps the most destructive British species is the "Pine Shoot Beetle" (*Blastophagus piniperda* L.), which in the past has caused serious damage to pines in the New Forest and other areas. Generally speaking, conifers are susceptible to attack by a far greater number of species than are deciduous trees.

The two families here concerned, namely the Scolytidae and Platypodidae, may be distinguished as follows :

Segment 1 of tarsus shorter than segments 2, 3 and 4 together (figs. 1 and 2). Head appreciably narrower than prothorax (figs. 33–36). Eyes oval, reniform or divided (figs. 12 and 13) .... Scolytidae (p. 1)

Segment 1 of tarsus much longer than segments 2, 3 and 4 together (fig. 40). Head scarcely narrower than prothorax (fig. 39). Eyes round (fig. 39) Platypodidae (p. 16)

SCOLYTIDAE.

Adult Characteristics.

The following are the main characteristics of this family :

Size small, length 0·8–10 mm., but rarely exceeding 4 mm. Form generally elongate, seldom quadrate, usually cylindrical but occasionally hemispherical. Colour always sombre, varying from testaceous to pitchy. Colour as a key character is most unreliable, as all adults of the same brood do not emerge simultaneously and pigmentation develops slowly. The general vestiture comprises either long silky hairs, short bristle-like setae or erect or decumbent squamiform setae. *Head* either salient or (Hylesini) completely concealed from above by pronotum. Rostrum, if present, short and broad. Antennae inserted on sides of head between eyes and mandibles ;

* Also known in the timber trade as "Shothole Borers," "Pinhole Borers" and "Ambrosia Beetles."

scape long, slender, feebly clavate; funicle 1–7-segmented; club large, nearly always compact, very variable in form. Eyes oval, reniform or emarginate, occasionally divided. Mandibles stout, curved, dentate. Labrum usually feebly developed. *Thorax* at most slightly narrower than elytra, usually slightly to strongly elongate, rarely transverse; variable in sculpture, usually asperate or spiculate anteriorly and punctate posteriorly or entirely punctate. Mesosternum large, metasternum long. Anterior coxae nearly always contiguous; intermediate and posterior coxae sub-contiguous. *Elytra* usually elongate and cylindrical; posterior declivity often modified for scraping and shovelling, and then either obliquely truncate or excavate and furnished with spines or teeth. *Legs* rather stout, compressed; anterior tibiae denticulate on outer margin except Scolytini, in which the outer apical angle is produced into a curved tooth; tarsi with segment 5 long; claws simple. Secondary sexual characters are present on the front of the head and on the elytral declivity; in some species (e.g., *Coccotrypes*) the male is blind, diminutive and rarely found.

In general appearance many species resemble certain Bostrychidae and Cisidae owing to similar modifications. They are, however, true Rhyncophora and appear to be closely allied to the Cossoninae. Biologically the Scolytids differ from the remaining Rhyncophora in that they enter their host-plants before ovipositing.

Immature Stages.

The eggs of Scolytids are usually spherical, but are sometimes elliptical or even elongate. The chorion is white and feebly shining and is entirely devoid of microsculpture.

Scolytid larvae are eruciform, apodous and milky white in colour. The maxillary lobes are broadly rounded on their inner margins and the palpi are two-segmented. The abdominal tergites are devoid of ampullae, but each bear three tergal folds. There appear to be five instars, the setae and other cuticular outgrowths of the first-instar larvae differing markedly from those of the succeeding instars. Very few Scolytid larvae have been described. There appear to be no fundamental characters whereby they may be distinguished from larvae of Curculionidae.

Still less is known of the morphology of the pupae. The setae, tubercles and other cuticular outgrowths present on the pronotum and abdomen, when examined, may well afford useful specific and even tribal characters.

Biology.

When attacking the host, the adult beetles first excavate an entrance hole through the bark as far as the surface of the sapwood, except the true wood-boring species, which may penetrate the sapwood for an appreciable distance. The end of the hole is first enlarged by the males of some species into a pairing chamber. Here two or more egg-tunnels are excavated, either transversely, vertically or radially beneath the bark. The eggs are then laid at regular intervals in niches along the tunnels and from these the resulting larvae excavate slender galleries at right angles to the tunnels. The arrangement and pattern of these excavations are often characteristic of certain groups and even species and are thus of diagnostic importance. For example, in *Blastophagus piniperda* Linnaeus the egg-tunnel is simple and longitudinal, whereas in *B. minor* Hartig the tunnel is biradial and transverse. In the genus *Scolytus*, *S. intricatus* Ratzeburg is exceptional in that it is the only species which makes a transverse egg-tunnel.

Before pupation the larvae enlarge the ends of their respective galleries, and the resulting adults have thus only to gnaw their way through the bark to the exterior. Frass-ejection holes (sometimes regarded as aeration holes) are often made in the outer walls of the egg-galleries, extending to the surface of the bark.

The social habits of these beetles are unusual and varied ; for example, in the genus *Scolytus* the male associates with only one female, whereas the males of *Ips* usually copulate with two females. On the other hand, males of *Xyleborus* may associate with fifty or more females. Copulation usually takes place on the surface of the bark or just inside the entrance hole, except in polygamous species, which copulate in the pairing chamber.

Adult feeding tunnels are excavated by immature adults or by females preparing for oviposition. Those of the former are usually constructed away from the egg-galleries.

Both larvae and adults digest starches and sugars and other substances present in the host-plants. Some (e.g., *Xyleborus*) are dependent on the presence of fungal hyphae or ambrosia in the brood-galleries, and the characteristic dark stain so often seen in timber infested with these insects is caused by the mycelium spreading along the galleries. According to some authors, preparation is made by the adults to cultivate the fungi and even to transport them to other trees. Infection occurs, at least in some species, by adults passing the fungus orally, but there is still some controversy as to whether this is true symbiosis.

Most Scolytids feed in a wide range of either coniferous or deciduous trees, and apparently only one British species (i.e., *Xyleborus xylographus* Say) is known to attack either kind indiscriminately. A few species confine themselves to a single host, as for example *Kissophagus hederae* Schmidt in *Hedera* and *Xylocleptes bispinus* Duftschmidt in *Clematis*.

Explanation of Keys.

In recent years more species of Scolytidae have been imported and have become successfully established in this country than of any other family of Coleoptera. On the other hand, some species that have now become cosmopolitan (e.g., *Hypothenemus eruditus* Westwood, *Coccotrypes dactyliperda* Fabricius), although regularly imported, can never become established because their hosts are essentially tropical. As several species belonging to these two categories are more frequently found in this country than are many of our rare native species they have been included in the keys for the benefit of persons connected with the timber trade and food infestation.

The following keys are based largely on those of Balachowsky (1949), but they have been appreciably modified and also adapted to include imported and introduced species. Beyond indicating whether a species is mainly of northern or southern occurrence, the distribution of British species has not been indicated, for these insects are so easily transportable from one area to another that county records are of little significance. All imported species are marked with an asterisk, *, and doubtfully indigenous species are indicated by an asterisk enclosed in brackets, (*). Figs. 33–39 have been prepared by Mrs. C. A. O'Brien, the remaining figures being the work of the author.

Family Scolytidae.

Key to Genera.

1 Front tibia produced apically into a long, curved tooth (figs. 1, 33). Pronotum margined laterally and posteriorly (fig. 33) (Scolytini) **Scolytus** Müller (p. 10)

– Front tibia not produced apically into a tooth (figs. 2, 34). Pronotum not margined laterally and at most only feebly posteriorly (fig. 34) ....2.

2 Head salient, not entirely concealed beneath pronotum and at least partly visible from above (fig. 34). Basal margin of elytra with a granulate carina (fig 34) and/or head produced anteriorly in the form of a short rostrum. Pronotum similarly sculptured throughout (fig. 34). Segment 3 of tarsus bilobed (fig. 34) (Hylesinini)..3.

– Head strongly retracted into and almost entirely concealed from above by the prothorax (figs. 37, 38). Basal margin of elytra without a granulate carina and head never produced anteriorly in the form of a rostrum (figs. 36–38). Pronotum granulate anteriorly (except *Crypturgus*) and punctate posteriorly (figs. 36–38). Segment 3 of tarsus simple (figs. 36–38) (Ipini) ....15.

3 Basal margin of elytra without a granulate carina. Head produced anteriorly in the form of a short rostrum. Apices of elytra never with tufts of long setae ; either with short setae arranged in rows on the interstices or with apical squamiform setae ....4.

– Basal margin of elytra carinate, with a row of protuberant granules (fig. 34). Head seldom produced anteriorly in the form of a rostrum, but if so (*Hylurgus*) then apices of elytra covered with tufts of long fine setae.............................5.

4 Basal margin of elytra almost straight. Pronotum quadrate to strongly elongate, not appreciably narrowed anteriorly. Segment 3 of tarsus narrowly cordate and very slightly broader than segment 2.................**Hylastes** Erichson (p. 10)

– Basal margin of elytra strongly curved on each side of scutellum. Pronotum slightly transverse and strongly narrowed for anterior half. Segment 3 of tarsus broadly cordate, much broader than segment 2. Length 2·3–3·4 mm. *Local. In* Abies, Pinus, Picea *and* Larix........................**Hylurgops palliatus** (Gyllenhal)

5 Row of granules on basal margin of elytra distinctly curved on each side of scutellum and broadly interrupted at suture (figs. 34, 35). Squamiform setae present or absent on pronotum or elytra ....6.

– Row of granules on basal margin of elytra almost straight and not broadly interrupted at suture. Squamiform setae present on pronotum and elytra. Eyes divided. Front with a dense fringe of long golden setae. Length 2–2·5 mm. In Picea *and* Pinus...**Polygraphus poligraphus** (Linnaeus) (= *pubescens* (Fabricius))

6 Antennal club compact, with segments not separated (figs. 4, 5)....................7.

– Antennal club loose, with three distinctly separated segments which are serrate or flabellate (fig. 3). Small black species. Length 1·5–1·8 mm. *In stems of* Genista, Ulex, Cytisus, *etc*..................**Phloeophthorus rhododactylus** (Marsham)

7 Eyes emarginate. Antennal club with segments obliquely divided (fig. 4) and without long fine setae. Apical fourth of elytra bearing, in the male, rows of strongly raised granules on interstices 1 and 3 or 3 only ; these granules much smaller and scarcely raised in the female. Length 1·5–2·2 mm. *In* Cupressus *and* Juniperus ....**Phloeosinus thujae** (Perris)

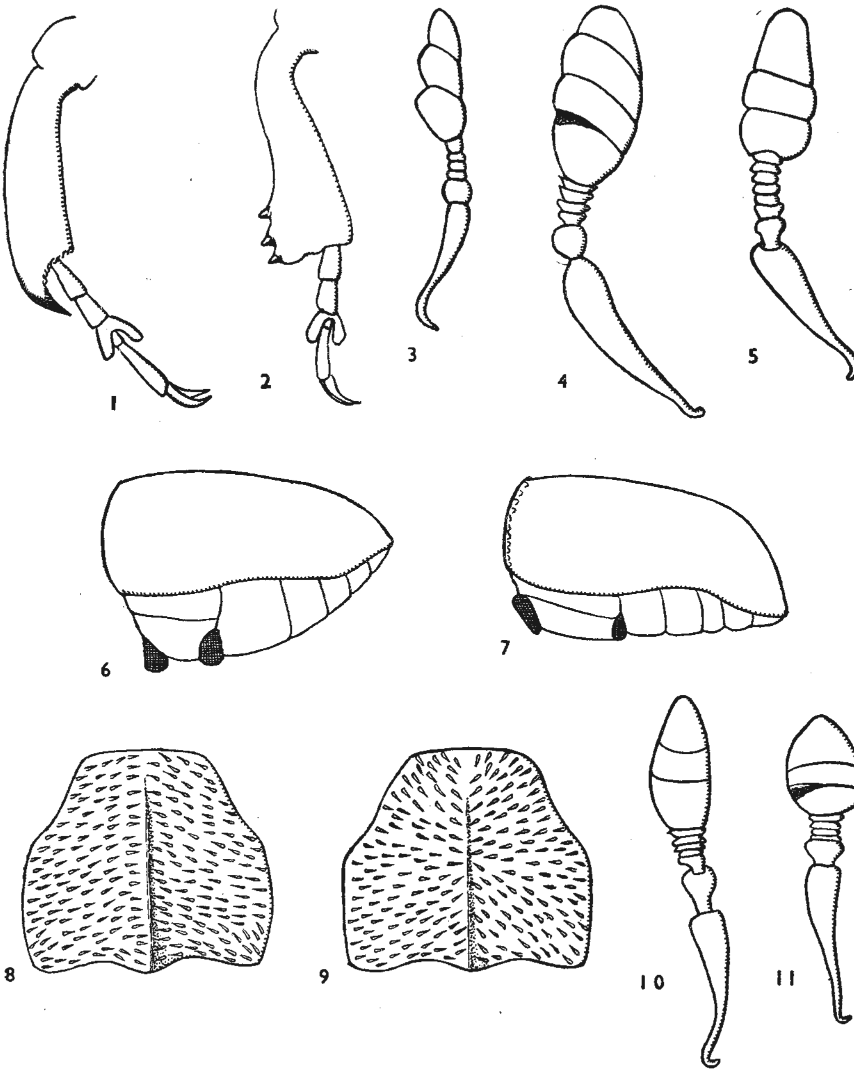
– Eyes not emarginate. Antennal club with segments transversely divided (fig. 5) and bearing long fine setae..8.

8 Anterior coxae distinctly separated by a broad prosternal process. Pronotum, elytra and abdomen or at least one of these, bearing imbricate or scattered squamiform setae (fig. 35)...9.

– Anterior coxae contiguous. Pronotum, elytra and abdomen entirely devoid of squamiform setae. Head produced anteriorly in the form of a short rostrum 14.

9 Abdominal sternites progressively rising posteriorly towards apices of elytra (fig. 6). Elytra sloping downward, thus forming an acute angle with the abdomen when viewed laterally. Funicle of antenna 7-segmented, segment 7 not enlarged...10.

– Abdominal sternites flat, not rising posteriorly (fig. 7). Elytra (viewed laterally) regularly rounded...11.

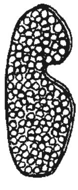


FIGS. 1–11.—1, *Scolytus scolytus* (Fabricius), front leg. 2, *Hylesinus crenatus* (Fabricius), front leg. 3, *Phloeophthorus rhododactylus* (Marsham), antenna. 4, *Phloeosinus thujae* (Perris), antenna. 5, *Leperesinus fraxini* (Panzer), antenna. 6, Same, elytra and abdomen. 7, *Pteleobius vittatus* (Fabricius), elytra and abdomen. 8, *Xylechinus pilosus* (Ratzeburg), pronotum. 9, *Kissophagus hederae* (Schmidt), pronotum. 10, *Trypophloeus asperatus* (Gyllenhal), antenna. 11, *Stephanoderes coffeae* Hagedorn, antenna.

10 Posterior margin of pronotum bluntly angled medially opposite scutellum. Squamiform setae on elytra unicolorous.......................... **Hylesinus** Fabricius (p. 12)

– Posterior margin of pronotum straight. Squamiform setae on elytra of two contrasting colours, forming an asymmetric pattern on each side of suture **Leperesinus** Reitter (p. 12)

11 Antennal funicle 7-segmented..12.
– Antennal funicle 5- or 6-segmented..13.
12 Pronotum and elytra entirely covered with imbricate squamiform setae of two or three different colours forming on the latter a symmetrical design on each side of suture (fig. 35). Length 1·8–2·1 mm. *Local. In* Ulmus *and, occasionally,* Fraxinus..**Pteleobius vittatus** (Fabricius)
– Pronotum and elytra entirely devoid of squamiform setae, which are confined to the meso- and metathoracic episterna, on which they are white, dense and in strong contrast with the remainder of the body. Striae comprising rows of coarse shallow punctures. Interstices granulate, especially on apical fourth, where they are covered with small spiniform or blunt granules. Length 2–2·5 mm. *Local. In dead* Trifolium, Ononis, Ulex, Spartium, *etc.* **Hylastinus obscurus** (Marsham)
13 Squamiform setae on pronotum inclined inwards and perpendicular to the median, longitudinal carina (fig. 8). Antennal funicle 5-segmented. Interstice 1 of elytra densely covered with squamiform setae, which form a pale border along suture. Length 2·1–2·5 mm. *In* Abies, Picea *and, occasionally,* Larix **Xylechinus pilosus** (Ratzeburg)
– Squamiform setae on pronotum inclined concentrically towards the disc, at least on anterior half (fig. 9). Antennal funicle 6-segmented. Interstice 1 of elytra similar to remainder. Length 2–2·2 mm. *Very local. In stems of dead* Hedera helix..**Kissophagus hederae** (Schmidt)
14 Pronotum quadrate to slightly transverse (fig. 34). Elytra with setae sparsely and regularly distributed, never arranged in tufts on apices (fig. 34). Metasternum shorter than abdomen. Abdomen shining............**Blastophagus** Eichhoff (p. 12)
– Pronotum elongate. Elytra with setae irregularly distributed, sparse on basal third and in tufts on apical third. Metasternum as long as abdomen. Abdomen matt. Elytral interstices 1 and 2 strongly depressed for apical fourth. Length 5–5·5 mm. *In* Pinus.................................**Hylurgus ligniperda** (Fabricius)
15 Pronotum entirely punctate, entirely devoid of asperities, spicules and granules. Antennal funicle very short, 1 or 2-segmented......**Crypturgus** Erichson (p. 13)
– Pronotum with at least anterior half with conspicuous raised asperities, granules or spicules distributed irregularly or in rows; puncturation, when present, confined to posterior half behind disc (figs. 36–38)..................................16.
16 Eyes completely divided. Antennal club 1-segmented **Trypodendron** Stephens (p. 13)
– Eyes not divided; oval or simply emarginate. Antennal club at least 2-segmented ....17.
17 Elytra entirely devoid of squamiform setae (figs. 36–38)..............................23.
– Elytra covered with fine squamiform setae..18.
18 Antennal funicle 5-segmented; segment 1 as long as following four together (fig. 10) ....19.
– Antennal funicle 3- or 4-segmented...20.
19 Antennal club lanceolate, oblong, without a septum between segments 1 and 2 (fig. 10). Declivity of elytra obliquely sloping...**Trypophloeus** Fairmaire (p. 13)
– Antennal club oval, with a septum (interrupted medially) between segments 1 and 2 (fig. 11). Declivity of elytra rounded............ ***Stephanoderes** Eichhoff (p. 14)
20 Antennal funicle 3-segmented in male, 4-segmented in female; segment 1 longer than following three together. Club with a septum between segments 1 and 2. Elytra and abdomen bearing numerous short, triangular, squamiform setae. Length 1–1·2 mm. *Found in an old book (imported from Egypt ?). Also imported in* Cocos *from Ceylon*...........................**(*)Hypothenemus eruditus** Westwood
– Antennal funicle 4-segmented in both sexes; segment 1 equal to or shorter than following three together. Club without a septum..................................21.
21 Eyes distinctly emarginate (fig. 12). Antennal funicle with segment 4 strongly broadened. Asperities on anterior margin of pronotum not projecting beyond margin. Pronotum and elytra with pubescence as well as decumbent squamiform setae ....**Cryphalus** Erichson (p. 13)
– Eyes not emarginate (fig. 13). Antennal funicle with segment 4 scarcely broadened and of same breadth as segment 3. Asperities on anterior margin of pronotum projecting beyond margin..22.
22 Elytra distinctly more than twice as long as combined basal width. Transverse asperities on pronotum not extending posteriorly beyond middle of disc. Antennal



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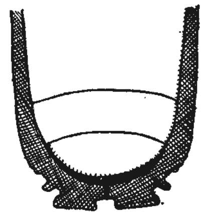

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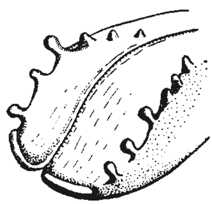

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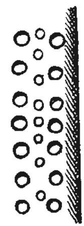

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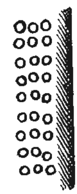

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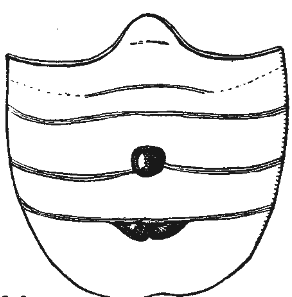

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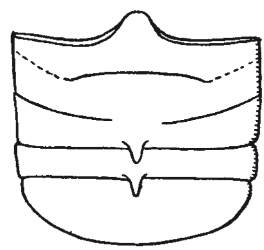

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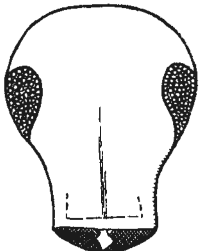
FIGS. 12–21.—12, *Cryphalus abietis* (Ratzeburg), eye. 13, *Ernopocerus fagi* (Fabricius), eye. 14, *Ips sexdentatus* (Boerner), elytra (ventral aspect). 15, *Xylocleptes bispinus* (Duftschmidt), elytra (ventral aspect). 16, *Ips sexdentatus* (Boerner), elytral declivity. 17, *Onthotomicus erosus* (Wollaston), elytral declivity. 18, *Dryocoetes autographus* (Ratzeburg), elytral puncturation. 19, *Coccotrypes dactyliperda* Fabricius, elytral puncturation. 20, *Scolytus ratzeburgi* Janson, abdominal sternites (male). 21, *S. scolytus* (Fabricius), abdominal sternites.

club with articulating margins curved on outer face. Length 1·5–1·8 mm. *In* Fagus, Quercus *and* Betula......**Ernopocerus** (=*Ernoporus* pars) **fagi** (Fabricius)

– Elytra not or scarcely more than twice as long as combined basal width. Transverse asperities on pronotum extending posteriorly beyond middle of disc almost to posterior third. Antennal club with articulating margins straight on outer face. Pronotum and elytra with decumbent squamiform setae, the erect setae in longitudinal rows on elytra. Length 1–1·5 mm. *In* Tilia parvifolia *and* Hibiscus **Ernoporus tiliae** (Panzer)

23 Apical margins of elytra approximate on their ventral faces (fig. 14). Apical third of elytra abruptly and deeply excavated and bearing (at least in the male) lateral teeth which vary in size and number..24.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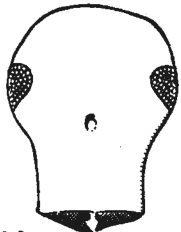
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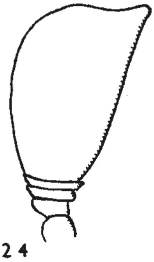
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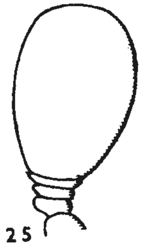
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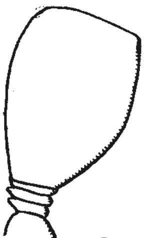
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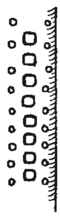
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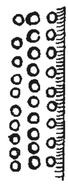
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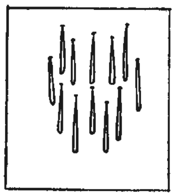
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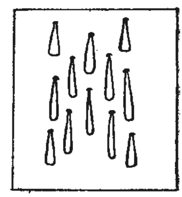
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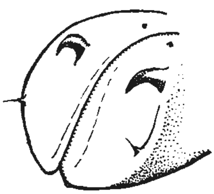
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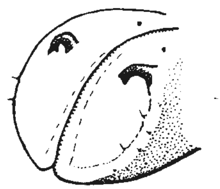
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FIGS. 22–32.—22, *Hylastes ater* (Paykull), front of head. 23, *H. angustatus* (Herbst) front of head. 24, *Trypodendron domesticum* (Linnaeus), antennal club. 25, *T. lineatum* (Olivier), antennal club. 26, *T. signatum* (Fabricius), antennal club. 27, *Dryocoetinus villosus* (Fabricius), elytral puncturation. 28, *D. alni* (Georg), elytral puncturation. 29, *Stephanoderes coffeae* Hagedorn, elytral setae. 30, *S. cassiae* Eichhoff, elytral setae. 31, *Pityogenes quadridens* (Hartig), elytral declivity. 32, *P. bidentatus* (Herbst), elytral declivity.

– Apical margins of elytra not approximate ventrally (fig. 15)........................25.

24 Declivity of elytra obliquely sloping, explanate or feebly raised towards the apices (figs. 16, 36). Anterior tibiae distinctly narrower than mid-tibiae (fig. 34). Segment 2 of antennal funicle only slightly shorter than segment 1 **Ips** Degeer (p. 16)

– Declivity of elytra subvertical, not explanate or raised towards apices (fig. 17). Anterior tibiae scarcely narrower than mid-tibiae. Segment 2 of antennal funicle distinctly shorter than segment 1...............**Onthotomicus** Ferrari (p. 16)

25 Pronotum partly or entirely but irregularly covered with very small punctiform granules or concentrically spiculate for anterior third, in which case the discal area bears both granules and punctures, but on the remainder of the pronotum only granules are present ....26.

– Anterior half of pronotum bearing short transverse asperities arranged in concentric and parallel rows as far as disc, where they are replaced by microscopic granules and distinct punctures, which are also distributed posteriorly over remainder of pronotum (figs. 37, 38)..31.

26 Form short. Pronotum scarcely longer than broad and elytra less than twice length of pronotum. Antennal club obliquely truncate (scarcely in *Coccotrypes*), lenticulate, with articulations visible only on outer face..........................27.

– Form elongate. Pronotum distinctly longer than broad and elytra at least twice as long as pronotum. Antennal club rounded.......................................29.

27 Puncturation of striae coarser than that of interstices (fig. 18)......................28.

– Puncturation of striae similar to that of interstices (fig. 19). Anterior tibiae with 3 or 4 strong teeth on outer margin. Length 1·5–2·2 mm. *Cosmopolitan species. Imported in seeds of various palms* (Livingstonia, Chamoerops, *etc.*) ***Coccotrypes dactyliperda** (Fabricius)

28 Pronotum behind disc with large conspicuous punctures, the interspaces flat. Apical third of elytra without a well-defined groove parallel to suture. Length 3–4·3 mm. *Rare. In* Abies, Pinus, Picea *and* Larix **Dryocoetes autographus** (Ratzeburg

– Pronotum entirely granulate or rugoso-punctate, the interspaces raised. Apica third of elytra with a deep groove parallel to suture. *In deciduous trees* **Dryocoetinus** Balachowsky (p. 14)

29 Antennal funicle 4-segmented. Club with articulation indistinct. Punctures on elytral interstices as large as those on striae. Length 1·6–2 mm. *Rare. In dead dry branches, especially those of* Corylus ; *also in* Quercus, Pyrus, Rhamnus, *etc*...**Lymantor coryli** (Perris)

– Antennal funicle 5-segmented. Club with articulation distinct....................30.

30 Granules of anterior third of pronotum punctiform, feebly raised and never hooked (fig. 37). *Male* elytra abruptly declivous and bearing a pair of teeth at beginning of declivity (fig. 37). *Female* elytra regularly declivous. Pronotum without a depression behind disc. Length 2·5–3·5 mm. *Local. In woody stems of* Clematis vitalba....................................**Xylocleptes bispinus** (Duftschmidt)

– Granules of anterior third of pronotum hooked and punctures distributed as far as disc, where they are absent. *Male* and *female* elytra similarly declivous and without teeth. Pronotum with a feeble but distinct, broad, transverse depression behind middle of disc............................**Taphrorychus** Eichhoff (p. 14)

31. Elytra quadrate to slightly transverse (fig. 38). Pronotum depressed, flat, without an elevated disc (fig. 38). Disc with posterior third very finely and sparsely punctured and shining, at least medially. Black, antennae and legs yellow. Length 2–2·5 mm. *Rare. In* Quercus, Ilex, Pyrus, Fagus, Ulmus, Corylus, *etc.* ♂ **Anisandrus dispar** (Fabricius)

– Elytra elongate. Pronotum not depressed, disc elevated............................32.

32 Antennal club thick, obliquely truncate apically on outer face ; sutures visible only on outer face. Elytra with 5 very distinctly punctured striae on disc, the punctures placed close together (separated by scarcely more than their own diameter), those on interstices (when present) much smaller than those on disc and placed much further apart..33.

– Antennal club strongly compressed, evenly rounded ; sutures visible on both faces. Elytra either confusedly punctured or with 8 or 5 punctured striae on disc ; if the latter then punctures placed well apart (separated by more than twice their own diameter)..35.

33 Anterior coxae widely separated by an antecoxal process. Sides of elytral declivity finely margined. Length 0·5–1·8 mm. *Occasionally found in imported orchids* (Dendrobium *spp.*)................................***Xylosandrus morigenus** Blandford

– Anterior coxae contiguous. Sides of elytral declivity not margined...............34.

34 Pronotum quadrate. Segment 1 of antennal funicle narrower than segment 5. Elytra slightly elongate. Black, antennae and legs yellow. Length 3–3·5 mm. *Rare. In* Quercus, Ilex, Pyrus, Fagus, Ulmus, Corylus, *etc.* ♀ **Anisandrus dispar** (Fabricius)

– Pronotum elongate. Segment 1 of antennal funicle broader than segment 5. Elytra strongly elongate. Length 2–2·5 mm.........**Xyleborus** Eichhoff (p. 14)

35 Apical third of male elytra bearing 1–3 strongly curved spines which in the female are greatly reduced. Front tibiae distinctly narrower than mid-tibiae. Posterior margin of pronotum not bordered.........................**Pityogenes** Bedel (p. 15)

– Apical third of elytra devoid of spines in both sexes. Front tibiae as broad as mid-tibiae. Posterior margin of pronotum finely bordered **Pityophthorus** Eichhoff (p. 14)

Genus **Scolytus** Müller.

This genus comprises over thirty species, of which nearly half are European, the remainder having been described from North, Central and South America, and from Java. The commonest species, *S. scolytus* Fabricius, is responsible for the destruction annually of large numbers of elm trees throughout the country. *S. rugulosus* Müller is known to attack perfectly healthy trees.

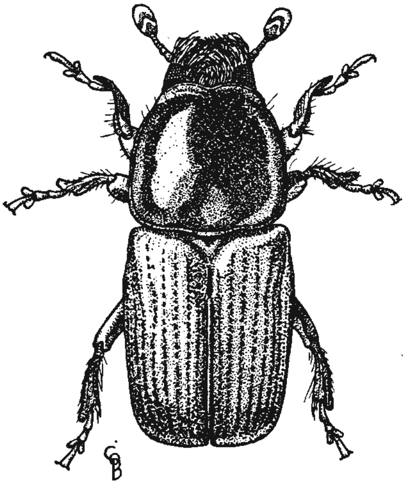
1 Second abdominal sternite (in both sexes) bearing a basal or median, strongly protuberant process ....2.
– Second abdominal sternite (in both sexes) without a process (figs. 20, 21) ....3.
2 Posterior margins of abdominal sternites 2, 3 and 4 each with a pair of lateral teeth. Apical truncature of abdomen oblique. Length 2–3·3 mm. *In* Ulmus, Pyrus, Prunus, Quercus, Populus, Rhamnus, *etc*..................**multistriatus** (Marsham)
– Posterior margins of abdominal sternites without lateral teeth. Apical truncature subvertical. Length 2–4·5 mm. *Imported from North America* ***dimidiatus** Chapuis
3 Elytra not narrowed towards apices ; apices smooth (fig. 33). Posterior margin of sternite 1 strongly raised or carinate..4.
– Elytra narrowed towards apices ; apices serrate. Posterior margin of sternite 1 not or feebly raised. Length 1·8–2·7 mm. *In* Pyrus, Prunus, Rosa, *etc.* **rugulosus** Müller
4 Abdominal sternites 3 and 4 with median tubercles (figs. 20, 21).......................5.
– Abdominal sternites 3 and 4 without tubercles..6.
5 Posterior part of sternite 3 with a stout, rounded, shining, median tubercle (fig. 20). Posterior part of sternite 4 with a much broader bilobate tubercle (fig. 20). Head with longitudinal rugae forming a median keel. Length 5–6·5 mm. *Scotland. Exclusively in* Betula....................................♂ **ratzeburgi** Janson
– Posterior part of sternites 3 and 4 each with a small peg-shaped tubercle (fig. 21). Head finely and densely punctured (fig. 33). Length 3–6 mm. *Chiefly in* Ulmus, *but also in* Fraxinus, Quercus, Populus, *etc*...............**scolytus** (Fabricius)
6 Frons without a distinct median carina. Length less than 4 mm......................7.
– Frons with a distinct median carina. Interstices of elytra smooth and shining. Length 5–6 mm. *Scotland. Exclusively in* Betula...........♀ **ratzeburgi** Janson
7 Puncturation of pronotum fine and sparse on disc, scarcely more dense laterally, where the punctures are larger and densest around anterior angles. Length 3·5–4·5 mm. *Chiefly in* Pyrus, Prunus, Ulmus, Crataegus **mali** (Bechstein) (= *pruni* Ratzeburg)
– Puncturation of pronotum much coarser and denser laterally than on disc, the punctures being contiguous or confluent. Elytra much less shining than pronotum. Length 2·4–3·6 mm. *Mainly in* Quercus, *but also in* Castanea, Ulmus, Fagus, Populus, *etc*..**intricatus** (Ratzeburg)

Genus **Hylastes** Erichson.

In this genus over 40 species are known from Europe, Asia and North America. A few species have also been described from Central and South America and from New Zealand and elsewhere.

According to Blair (1949) the series of *H. cunicularius* Erichson in the British Museum (Nat. Hist.) was divided by Eggers into two species, one of which he had proposed to describe as new. Neither Blair nor the present author can find justification for this separation. On the other hand, *H. brunneus* Erichson, a former variety of *H. ater* (Paykull), is here regarded as a distinct species (*see also* Blair, 1949).

1 Front with a protuberant median carina extending from middle as far as clypeus (fig. 22). Length at least 3 mm...2.
– Front without a median carina or entirely granulate or with a short rectilinear impression in middle (fig. 23). Length at most 3 mm...............................4.



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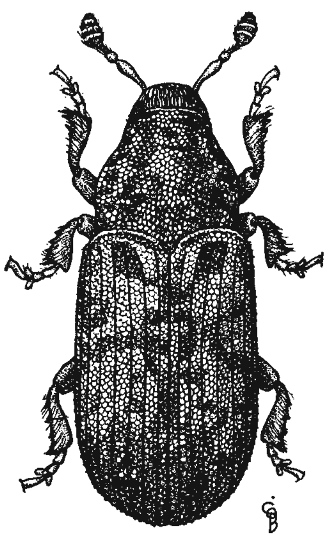

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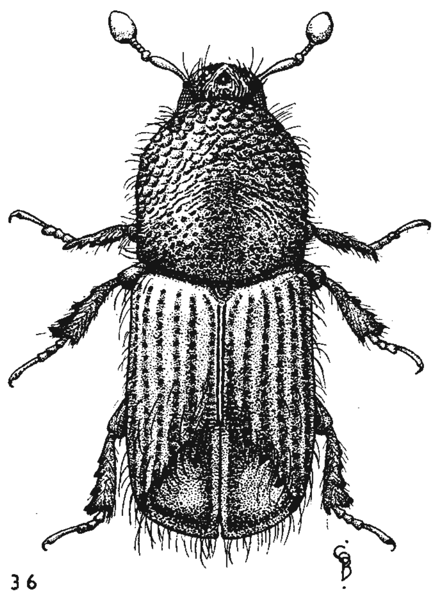

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FIGS. 33–36.—33, *Scolytus ratzeburgi* Janson (male). 34, *Blastophagus piniperda* (Linnaeus) (male). 35, *Pteleobius vittatus* (Fabricius) (male). 36, *Ips typographus* (Linnaeus) (male).

2 Pronotum elongate, widest behind middle or parallel-sided for basal half. Elytral interstices sparsely reticulate..3.
– Pronotum quadrate to slightly transverse, widest before middle. Elytral interstices densely reticulate. Length 3·2–4·5 mm. *Local. In* Picea **cunicularius** Erichson
3 Pronotum strongly elongate and parallel-sided for basal half. Elytral interstices dull, microscopically reticulate between punctures. Length 3·5–4·5 mm. *Southern species. Common. In branches, stumps and roots of* Pinus **ater** (Paykull)
– Pronotum less elongate, broadest behind middle. Elytral interstices shining and smooth between punctures. Length 4·5–5·5 mm. *Northern species. In* Pinus **brunneus** Erichson
4 Elytral interstices with a single row of granules, accompanied by a single row of obliquely-set setae for their entire length. Pronotum black, elytra brown and matt. Length 2–2·5 mm. *Very local. Exclusively in* Pinus **attenuatus** Erichson
– Elytral interstices with, at least at base, two rows of granules and setae arranged in 1 or 2 rows. Entirely black..5.
5 Front with a short sulcus in middle (fig. 23). Pronotum slightly elongate. Elytral interstices not broader than striae and with 2 rows of granules. Length 2·5–3·2 mm. *Southern species. Local. In* Pinus *and* Picea.........**angustatus** (Herbst)
– Front without a median sulcus. Pronotum quadrate. Elytral interstices broader than striae, with granules uneven. Length 2·5–3·4 mm. *Local. Chiefly in* Pinus, *but also in* Ulmus *and* Fraxinus.................................**opacus** Erichson

Genus **Hylesinus** Fabricius.

This genus is represented by only the following two palearctic species :

1 Elytra with short, sparse, squamiform setae along outer margins ; sutural margins slightly raised and sparsely covered with slender squamiform setae ; interstice 1 coarsely granulate. Basal transverse carina of elytra scarcely distinguishable from rugosity of interstices. Length 4·5–6 mm. *Local. Chiefly in* Fraxinus, *but also in* Quercus, Juglans, *etc*....................................**crenatus** (Fabricius)
– Elytra with long, suberect, bristle-like setae along outer margins. Sutural margins very strongly raised and densely covered with coarse, squamiform setae ; interstice 1 flat and smooth. Basal transverse carina of elytra clearly defined. Length 2·5–3·5 mm. *Local. In twigs of* Fraxinus...........**oleiperda** (Fabricius)

Genus **Leperesinus** Reitter.

This genus is represented by only two palearctic species :

1 Squamiform setae on elytra very dense, almost or completely concealing the rows of granules on interstices. Pale squamiform setae much more numerous than the dark setae. Femora and tibiae reddish brown. Length 2·5–3 mm. *In slender branches of* Fraxinus..**orni** Fuchs
Squamiform setae on elytra less dense, the granules on interstices conspicuous. Pale squamiform setae much less numerous than the dark setae. Femora and tibiae black. Length 2·5–3·2 mm. *Mainly in* Fraxinus.........**fraxini** (Panzer)

Genus **Blastophagus** Eichhoff (= *Myelophilus* Eichhoff).

This genus consists of five palearctic species, of which only two are European. All species are apparently confined to coniferous trees.

1 Interstice 2 of elytra longitudinally depressed for at least apical fourth ; this depression devoid of setiferous granules (fig. 34). Length 3–5 mm. *Local. Mainly in* Pinus, *but also in* Picea, Abies *and* Larix. *Tunnels under bark longitudinal* **piniperda** (Linnaeus)
– Interstice 2 of elytra not depressed ; setiferous granules completely distributed. Length 3·8–4·5 mm. *Scotland. Rare. Mainly in* Pinus *but also in* Abies *and* Picea. *Tunnels under bark transverse*..................................**minor** (Hartig)

Genus **Crypturgus** Erichson.

The twelve palearctic species of this genus are all known to attack coniferous trees.

1 Pronotum and elytra dull. Pronotum parallel-sided, at least for posterior half. Punctures of elytral striae transversely impressed. Elytral interstices densely setose. Length 1·2–1·5 mm. *Imported from Europe. In* Pinus, Abies *and* Picea ; *usually in trees already attacked by other Scolytids*.........**cinereus** (Herbst)
– Pronotum and elytra shining. Pronotum with sides rounded. Punctures on elytral striae round and regularly spaced. Elytral interstices sparsely setose. Length 1–1·4 mm. *In* Picea, Abies *and also* Pinus *and* Larix **pusillus** (Gyllenhal)

Genus **Trypodendron** Stephens (= *Xyloterus* Erichson).

Only three species of this genus are known :

1 Antennal club slightly produced and pointed apically (fig. 24). Pronotum entirely black. Interstice 5 of elytra not as dark as first. Length 3–3·5 mm. *Local. In* Quercus *and* Fagus..**domesticum** (Linnaeus)
– Antennal club oval or subrectangular, not pointed apically (figs. 25, 26). Pronotum only partly black, base reddish. Interstice 5 of elytra as dark as first..........2.
2 Antennal club rounded apically (fig. 25). Elytral striae with rows of punctures regularly arranged even on the sides of the elytra. Elytral declivity matt. Interstice 5 of elytra almost black. Length 3–3·5 mm. *Very local. In* Abies, Picea, Pinus *and* Larix .... **lineatum** (Olivier)
– Antennal club angular apically (fig. 26). Elytral striae with rows of punctures on sides of elytra sinuate or irregular. Elytral declivity shining. Length 3–3·5 mm. *Very local. Mainly in* Quercus *and* Fagus......**signatum** (Fabricius)

Genus **Cryphalus** Erichson.

Over thirty species of this genus are known, of which only two are indigenous to this country. Other species, however, are frequently imported from the tropics in stored products.

1 Transverse asperities of pronotal disc extending posteriorly as far as basal third or fourth ; disc highest behind middle. Elytra with both suberect and decumbent squamiform setae...2.
– Transverse asperities of pronotal disc not extending beyond anterior half ; disc highest in front of middle. Elytra with all squamiform setae suberect. Length 1·8–2 mm. *Imported in nutmegs from the West Indies*............ ***buscki** Hopkins
2 Elytra with erect or suberect squamiform setae stout, clavate and much broader than decumbent squamiform setae. Posterior third of pronotal disc with decumbent squamiform setae. Length 1–1·5 mm. *Imported from Africa in* Arachis *and* Ficus...***pallidus** Eichhoff
– Elytra with erect or suberect setae very slender, not clavate, not or scarcely squamiform and narrower than decumbent squamiform setae. Posterior third of pronotal disc granulate...3.
3 Elytra with distinct striae, at least towards base. Setae on elytral interstices very short, about 2–4 times as long as the decumbent setae on striae. Length 1–1·6 mm. *Rare. In* Abies *and* Picea...........................**abietis** (Ratzeburg)
– Elytra with striae very indistinct. Setae on elytral interstices much longer (8–10 times) than the decumbent setae on striae. Length 1·5–2 mm. *Rare. In* Picea **piceae** (Ratzeburg)

Genus **Trypophloeus** Fairmaire.

Ten palearctic species of this genus are known, all of which attack mainly *Salix*.

1 Squamiform setae on elytra continuing right to apices on all interstices. Length 1·3–2·5 mm. *In dry branches of* Populus *and* Salix...........**asperatus** (Gyllenhal)

– Squamiform setae on elytra interrupted on interstice 2 at the beginning of the elytral declivity but continuing right to apices on remaining striae. Length 1·6–2·6 mm. *Exclusively in* Populus........................**granulatus** (Ratzeburg)

Genus **Dryocoetinus** Balachowsky (= *Dryocoetes* Eichhoff pars).

This genus is so far represented by only the following two species :

1 Striae with large subquadrangular punctures which are much larger than those on interstices (fig. 27). Pronotum and elytra entirely dark brown. Pronotum granulate anteriorly, rugose-punctate posteriorly. Length 2·5–3·5 mm. *Local. In* Quercus, Fagus *and* Castanea...................................**villosus** (Fabricius)

– Striae with smaller round punctures which are only slightly broader than those on interstices (fig. 28). Pronotum dark brown, elytra reddish brown. Pronotum entirely granulate. Length 2–2·3 mm. *Rare. In* Alnus, Fagus *and* Corylus **alni** (Georg)

Genus ***Stephanoderes** Eichhoff.

Many species belonging to this genus have been described from tropical regions. Their habitats are varied, but some of those that infest seed pods are occasionally imported into this country. Owing to the nature of their habitat some species have become cosmopolitan.

1 Squamiform setae of elytra long, slender and bristle-like (fig. 29). Length 1·3–1·7 mm. *Imported from Africa, Java and Sumatra in coffee beans.* ***coffeae** Hagedorn

– Squamiform setae short, stout and clavate (fig. 30). Length 0·9–1·2 mm. *Imported from Africa and Asia in pods of* Cassia *and in* Crotalaria, Myristica, *etc.* ***cassiae** Eichhoff

Genus **Xyleborus** Eichhoff.

Many species of this genus are known from the palearctic region and a few from the oriental region.

1 Posterior area of pronotum distinctly punctured and shining. Male pronotum with a deep excavation on anterior half. Length 2–2·7 mm. *Southern species. Very local. In* Quercus, Castanea *and also* Fagus *and* Ulmus **dryographus** (Ratzeburg)

– Posterior area of pronotum extremely finely punctured, shagreened and dull. Male pronotum without an excavation on anterior half. Length 2–2·4 mm. *Southern species. Very local. In* Quercus, Ulmus, Acer *and* Pinus **xylographus** (Say) (= *saxeseni* (Ratzeburg))

Genus **Pityophthorus** Eichhoff.

European species of this genus are confined to coniferous trees.

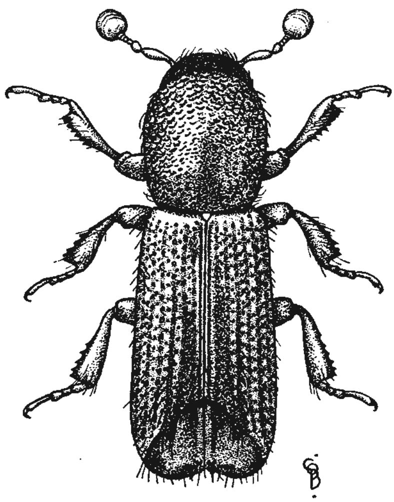
1 Elytral declivity with the row of spinules indistinct and area between spinules and suture shallowly depressed, longitudinally rugose and dull. Length 1–1·2 mm. *Local. In* Pinus *and* Picea...**pubescens** (Marsham)

– Elytral declivity with the row of spinules distinctly setiferous and area between spinules and suture deeply depressed longitudinally, smooth and shining. Length 1·6–2·2 mm. *In* Pinus ....**lichtensteini** (Ratzeburg)

Genus **Taphrorychus** Eichhoff.

The distribution of this genus is exclusively palearctic. All known species apparently infest only deciduous trees.

1 Setae on elytral declivity arising from minute basal tubercles. Length 1·9–2·4 mm. *Mainly in* Quercus, *but also in* Ulmus, Fagus, Castanea, Corylus, *etc.* **villifrons** (Dufour)



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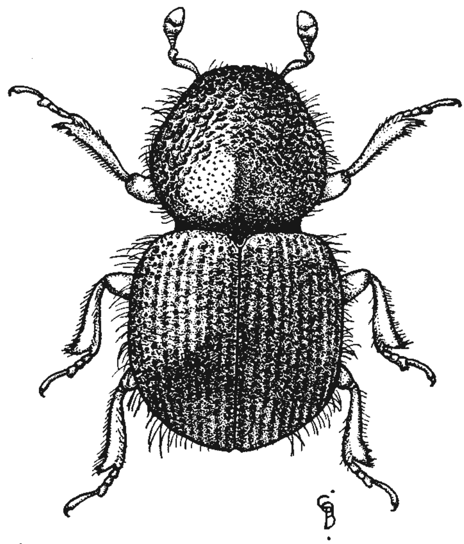

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FIGS. 37–38.—37, *Xylocleptes bispinus* (Duftschmidt) (male). 38, *Anisandrus dispar* (Fabricius) (male).

– Setae on elytral declivity simple basally. Pronotum with a feeble, broad, transverse depression behind disc. Length 1·5–2·6 mm. *Rare. Home Counties. In* Fagus, Quercus, Ulmus, Populus *and* Juglans........................**bicolor** (Herbst)

Genus **Pityogenes** Bedel.

This genus is mainly palearctic in distribution but a few species occur in America.

1 Elytral declivity in both sexes oblique, beginning near middle of elytra and delimited laterally by 3 tubercles of equal length and each bearing a straight, spiniform, setose tooth. Female with front bearing a very deep round impression.........2.

– Elytral declivity in both sexes delimited laterally by 3 tubercles bearing 1–3 spines, of which the second is always the largest and is strongly curved downward (figs. 31, 32). Female with front simple..3.

2 *Male* : Suture of elytral declivity glabrous and teeth (viewed laterally) equidistant. *Female* : Clypeal area in front of median depression pale, dull and pubescent or spiculate, in contrast with the surrounding area. Puncturation of elytral striae 1 and 2 indistinct. Length 2–3 mm. *Rare. In* Pinus, Picea, Abies *and* Larix ....**chalcographus** (Linnaeus)

– *Male* : Suture of elytral declivity bordered on each side by a row of very short setae ; distance between anterior and median teeth (viewed laterally) less than that between median and posterior teeth. *Female* : Clypeal area in front of median depression not differing from surrounding area. Puncturation of elytral striae 1 and 2 distinct. Length 1·8–2·4 mm. *Rare. Scotland. In* Pinus **trepanatus** (Nördlinger)

3 *Male* : Median tooth of elytral declivity large, curved, with a sharply defined tooth behind it (fig. 31). *Female* : Front without lateral impressions and clypeal area pubescent. Elytral declivity with 2 or 4 minute spinules (sometimes absent). Length 2–2·5 mm. *Scotland. Rare. In* Abies *and* Picea **quadridens** (Hartig)

– *Male* : Median tooth of elytral declivity large, often obliquely truncate or bidentate apically, with area behind it bearing minute spinules (fig. 32). *Female* : Front with a pair of shallow lateral depressions delimiting anteriorly the clypeal area which is triangular and pubescent. Spinules absent on elytral declivity. Length 2–2·5 mm. *Local. In* Pinus *and* Picea.......................... **bidentatus** (Herbst)

Genus **Ips** Degeer.

Species of this genus are exclusively palearctic and are confined to coniferous trees.

1 Lateral margin of elytral declivity bearing more than 3 pairs of teeth which are unequal in size, the posterior pair never the largest (figs. 16, 36). Front with a tubercle at base of clypeus..2.

– Lateral margin of elytral declivity bearing only 3 pairs of teeth, the posterior pair the largest. Front without a tubercle at base of clypeus. Posterior tooth bidendate in male, simple in female. Length 2·2–3·5 mm. *Northern species. Local. In* Pinus *and* Larix...................................... **acuminatus** (Gyllenhal)

2 Lateral margin of elytral declivity bearing 4 pairs of teeth ; apical margin broadly explanate (fig. 34). Frontal tubercle at base of clypeus large, conical. Length 4·2–6 mm. *Rare. In* Picea, Abies *and* Pinus.............. **typographus** (Linnaeus)

– Lateral margin of elytral declivity bearing 6 pairs of teeth ; apical margin narrowly explanate (fig. 16). Frontal tubercle small, indistinct. Length 6·5–8·2 mm. *Rare. In* Pinus.. **sexdentatus** (Boerner)

Genus **Onthotomicus** Ferrari.

All European species of this genus are confined to coniferous trees.

1 Second tooth on elytral declivity more strongly developed than the others and broadly triangular (fig. 17). Length 3–3·5 mm. *In* Pinus **erosus** (Wollaston)

– Second tooth on elytral declivity the same size as the others and spiniform.........2.

2 Distance between first and second teeth on elytral declivity less than distance between the first pair of teeth. Length 2–6·3 mm. *In* Pinus **suturalis** (Gyllenhal)

– Distance between first and second teeth of elytral declivity greater than the distance between the first pair of teeth. Length 3–3·5 mm. *Local. In* Pinus *and* Larix **laricis** (Fabricius)

PLATYPODIDAE.

Adult Characteristics.

Members of this family closely resemble those of the Scolytidae, from which they may be distinguished by the following characters : *Head* broad, not concealed from above by prothorax (fig. 39). Eyes round, subconvex. Head scarcely narrower than prothorax. Antenna short, scape robust, club usually large, compressed. *Thorax* elongate, with sides emarginate (fig. 39). Coxae conical ; metasternum very long. *Elytra* elongate, cylindrical and oblique or rounded apically (fig. 39). *Abdomen* with the five visible sternites unequal in length. *Legs* (fig. 40) short with femora dilated ; tarsi long, slender ; first tarsal segment prolonged, much longer than segments 2–4 together ; claws simple.

Larval Characteristics.

The larvae of Platypodidae, so far as are known, closely resemble those of Scolytids, but may be distinguished from them by the one-segmented maxillary palpi, the trilobate abdominal hypopleura and the presence of asperities or spicules on the pronotum. In the larva of *P. cylindrus* Fabricius the abdomen is truncate posteriorly and the thorax is gibbous and bears locomotory spines.

Biology.

Platypodids, like other ambrosia beetles of the Scolytidae, are, with the possible exception of *P. cylindrus* Fabricius, which infests stumps of *Quercus* and *Fagus*, unusual and differ in several respects from those of Scolytids. The galleries are simple, cylindrical, of an almost uniform diameter throughout and extend deeply into the heartwood. Both adults and larvae move about actively from one gallery to another.

Family Platypodidae.

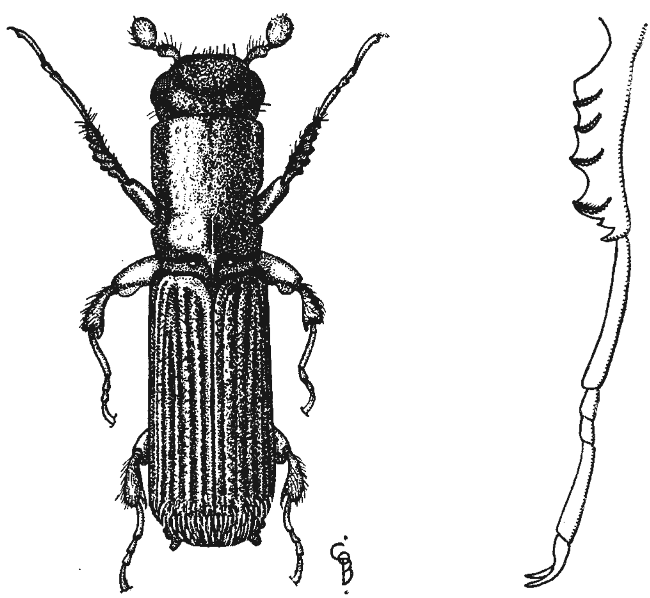
Genus **Platypus** Herbst.

1 Elytral interstices flat, smooth, shining. Male elytra without a pair of subapical marginal teeth. *Imported species*..2.

– Elytral interstices elevated, subcostate, matt (fig. 39). Male elytra with a pair of subapical marginal teeth (fig. 39). Length 5–5·5 mm. *Native (Southern) species. In felled* Quercus, Fagus *and* Fraxinus.............................**cylindrus** (Fabricius)

2 *Male* with elytra acutely attenuated apically. Apical fourth of elytra not declivous in either sex. *Female* with elytra without paramedian tubercles. Length 4–4·8 mm. *Imported from Africa*............***penetralis** Sampson (= *solutus* Schedl)

– *Male* with elytra broadly rounded apically. Apical fourth obliquely declivous in both sexes. *Female* with a pair of paramedian conical tubercles on apical fourth. Length 4–5 mm. *Imported from Malaya*.................***curtus** Chapuis



39 40

Figs. 39–40.—39, *Platypus cylindrus* (Fabricius) (male). 40, Same, front leg.

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