

under observation on 31st May during the process of emergence of three examples. The complete sequence for each example was lengthy, and I quote the notes I made during a sequence lasting for 40 minutes:

- 11.48 a.m. Pupa began extrusion from stump.
 12.03 p.m. Pupa commenced to split. Release of adult achieved in 5-6 seconds.
 12.15 p.m. Wings fully expanded and raised dorsally at this time.
 12.28 p.m. Wings lowered to resting position.

SUMMARY

1. Fieldwork in Berkshire and north Hampshire has shown *Conopia sphecoformis* (Denis & Schiffermüller) to be locally abundant in birch.
2. Second year *sphēciformis* larvae which have been isolated in birch stumps construct easily seen "sawdust" cappings, sometimes as raised hummocks, prior to pupation. First year larvae in the birch stumps also close the open ended burrows by a plug.
3. First year larvae may also be found in cut birch poles. The diameter of borings in poles and stumps is a good guide to differentiating between first and second year larvae.
4. *Aegeria culiciformis* (Linnaeus) would appear to have only a one year life cycle, and breeds in tall birch stems when fresh stumps are not readily available.
5. *A. culiciformis* and *C. sphecoformis* occasionally co-habit in the same birch stump.

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SOME NOMENCLATORIAL PROBLEMS IN THE GENUS *PASSALOECCUS* SHUCKARD AND TWO SPECIES NOT BEFORE RECOGNISED AS BRITISH (HYM. SPHECIDAE)

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SYNOPSIS

Some problems affecting the nomenclature of European species of the genus *Passaloeccus* Shuckard are investigated and some outstanding lectotype designations put on record. The British representatives are keyed and figured to include two hitherto unrecognised species.

INTRODUCTION

At its inception the sole purpose of the present paper was what appeared the very simple one of demonstrating that in this country we confuse two species of the solitary wasp genus *Passaloeccus* Shuckard under the name *P. monilicornis* Dahlbom. However, the correct name to use for the hitherto unrecognised species presented somewhat of a problem for although currently known as *P. roettgeni* Verhoeff on the Continent, this name is unquestionably a junior synonym of a much older name which is at present quite incorrectly applied. During the investigation of the repercussions which such an acknowledgement would have, another unrecognised British species was discovered and as a consequence it now seems best to divide the paper into two parts, first dealing with the nomenclatorial matters which affect the European fauna as a whole and afterwards to dilate on the less controversial items which concern the British fauna. I am especially grateful to Drs. Carl Lindroth and Hugo Andersson of the Dept. of Zoology, Zoological Institute, Lund, Sweden for lending type material from Dahlbom's collection; without their friendly cooperation it would not have been possible to investigate a number of problems of paramount importance. In order to establish the relative distributions of the species new to our fauna I have been able to borrow specimens from a great many different sources and I express my gratitude to the following, many of whom have given me the benefit of their knowledge of obscure localities of capture:- Mr. A. F. Amsden, National Museum of Wales, Dr. R. Askew, Dept. of Zoology, University of Manchester, Mr. A. Brindley, Dept. of Entomology, University of Manchester, Dr. M. F. Claridge, Dept. of Zoology, University College of S. Wales and Monmouth, Dr. R. A. Crowson, Dept. of Zoology, University of Glasgow, Mr. W. K. Ford and Miss H. Hooley, City of Liverpool Museum,

Mr. R. Hogg, Carlisle Public Library, Museum and Art Gallery, Dr. J. Smart, Dept. of Zoology, University of Cambridge, Prof. G. C. Varley, Dr. M. Graham and Mr. E. Taylor, Hope Dept. of Entomology, University of Oxford, Dr. A. R. Waterston and Mr. E. C. Pelham-Clinton, Royal Scottish Museum, Edinburgh. Also to Dr. V. Chambers, J. Felton, K. M. Guichard, G. M. Spooner, and P. Yeo for loan or gift of specimens from their private collections. I am grateful also to Professor O. W. Richards for the original suggestion that British *monilicornis* might repay investigation and for lending me his notes on the Curtis types of British aculeates.

Part I

NOMENCLATORIAL PROBLEMS IN THE GENUS *Passaloeocus* SHUCKARD

As so often happens with groups of small closely related taxa first described in the 19th century, the basic names in *Passaloeocus* have received many different interpretations by subsequent authors with the result that a quite chaotic state of affairs has come about. Some of the problems are well known but have been discreetly side-stepped while others have been created by arbitrary decisions based on very subjective reasoning. No lasting stability can be obtained in this manner, however, and since the species in question are economically unimportant and without any literature worth speaking of it has seemed worth while to investigate each species as objectively as possible and to stand by the results no matter how disconcerting they may prove to be. Examination (by O. W. Richards) of the one remaining syntype of *gracilis* (Curtis) has produced a rather devastating result hitherto unrecorded while a decision as to the actual specimen which should be considered as type of *insignis* (Van der Linden) has had to be reached in the face of two opposing schools of thought, each with far reaching effects since this species is the type species of the genus. A study of Dahlbom's original material has produced no great surprises but as a result it is now possible to go some way towards elucidating the "*insignis*"-*turionum-borealis* complex, at least so far as the British species are concerned and *singularis* Dahlbom is confirmed as an available name for *gracilis* auctt. nec Curtis.

(1) *P. monilicornis* Dahlbom, 1842.

It has become generally accepted that as there were quite evidently two species mixed under *monilicornis* when Dahlbom published his *Hymenoptera Europaea Borealia* in 1844, his series must have been equally mixed when he described this species two years earlier. In fact this is so but it cannot be deduced from the original description. Verhoeff (1890), as "first reviser" can be taken to have restricted *monilicornis* to the species whose male has the more strongly moniliform antennae and white pronotal tubercles and has thus tied the

name to the female with a black labrum. Until then, however, Thomson (1870) in Sweden, Saunders (1880) in Great Britain, and André (1888) in France had all treated *monilicornis* ♀ as having a white labrum and Kohl (1905) published a manuscript name of Sparré Schneider's, *monilicornis* var. *dahlbomi*, proposed for the ♀ with a black labrum. When he proposed the name *P. roettgeni* for a male with less moniliform antennal segments and with black pronotal tubercles Verhoeff was unaware that the tubercles in this species may be black or white and that all Dahlbom's males thus coloured belonged not to *monilicornis* as he interpreted this species but to his own *roettgeni*. I have seen a male of *roettgeni* with white tubercles from Dahlbom's material of *monilicornis* determined as this by Faester who must have been unaware of the other characters by which these two can be distinguished. In France, André (1888), Berland (1925) and Ribaut (1952) looked upon black tubercles as uncommon where only *roettgeni* is known to occur and in Germany Schmiedeknecht (1930) was of the same opinion despite Verhoeff's discovery at Remagen am Rhine. In the British Isles, of 63 males examined only 4 have the tubercles white and here this colouring must be looked upon as something of a rarity.

Faester chose a ♀ from Dahlbom's material to be lectotype but it is not certainly part of the original syntypes; it comes from Sanda in Gottland and is dated 30th June, 1841, and is referred to by Dahlbom in 1844 but in the 1842 publication he named the period of occurrence July-August. While this may seem a trifling inconsistency it is an inconsistency none the less and as Faester did not publish his selection it is easy to pick a specimen about which there can be no dispute. I am grateful to Dr. Hugo Anderson for pointing out to me that in his 1842 work Dahlbom intended to give the known limits of the distribution of the species, in the case of *monilicornis* from Skåne in the south to Gotland in the east and Jämtland in the north and that all specimens available to Dahlbom in 1842 and collected within this area can be used for lectotype designation. The selection is not a difficult one because there is one female only which can be used to validate Verhoeff's restriction, that is to say, which has the labrum black. It is interesting that among the existing syntype males there is no individual with the antennal carinae extending to segment 11 and presumably all belong to the species which Verhoeff named *P. roettgeni*. There can be little doubt that Verhoeff made an unfortunate choice.

Passaloeocus monilicornis Dahlbom, 1842:12. LECTOTYPE.

The specimen is a ♀ collected by Zetterstedt and Dahlbom in 1840 in Helsingland, Kårböle, Skansberget and stands in Dahlbom's collection in Lund, Sweden. It carries the following labels:

is the very specimen which Van der Linden had before him when he described his *insignis* and which later Wesmael referred to *monilicornis* Dahlbom. De Beaumont (1964) pointed out that Van der Linden's description stated that the palpi were white, a feature of the female of *roettgeni* Verhoeff but not of *monilicornis* Dahlbom. It is unfortunate that Van der Linden did not put his own determination labels on the specimens concerned but the circumstances are such that one can scarcely query the authenticity of this female. De Beaumont (1964) questioned the validity of Leclercq's selection of a male when the description was so evidently related to the female and was doubtful if under Article 74 of the "Code" the male in question was or was not part of the original material. Under these conditions of uncertainty he preferred to avoid all use of the name *insignis* Van der Linden. If there was any doubt about the interpretation of Article 74 there is none about Article 72, however, which states quite explicitly in section (b) that the type series of a species consists of all the specimens on which its author bases the species, except any that he refers to as variants, or doubtfully associates with the nominal species. . . . In his latin diagnosis Van der Linden treated the male with a ? and subsequently referred to it as placed in the species by Mr. Wesmael, that is to say, not by himself. Since the male cannot be accepted as part of the type series, Leclercq's selection of the male as lectotype cannot be upheld. *P. insignis* (Van der Linden) must be based on the female and since there is no other specimen in Wesmael's collection which can be considered, the female determined as *monilicornis* Dahlbom by Wesmael and later as *roettgeni* Verhoeff by Leclercq must be accepted as its holotype. The implications of this conclusion are not very dramatic except insofar as they effect the status of the (unused) subgenera, about which I shall write later and the interpretation of the species *insignis* auctt. nec Van der Linden, based on the male and treated by Leclercq as a senior synonym of *P. turionum* Dahlbom.

(3) *P. singularis* Dahlbom, 1844.

Under this name Dahlbom described a male with abnormally swollen thoracic "shoulders" which left between them quite a pronounced concavity or trough. In other respects the specimen appeared to be quite normal and Dahlbom suspected that it was no more than an aberrant individual of what he called *P. gracilis* Curtis sensu Shuckard. While it has been generally accepted that this is the correct interpretation of this specimen its priority over *P. tenuis* Morawitz, a name proposed for *P. gracilis* auctt. nec Curtis, has never received consideration, presumably on the grounds that it was evidently a monstrosity. So far as I am aware there is nothing in the "Code" which precludes a specimen later found to be an aberration from being the type of a species and in this particular case "monstro-

- (a) Kårböle Skansberg, 19-20/8-40.
- (b) *P. monilicornis* Dhlb. K. Faester det.
- (c) Museum loan label 1961/41.
- (d) ditto, 1969/464.
- (e) *Passaloeus monilicornis* Dhlb. 1842. ♀. I. H. H. Yarrow, 1969.

By restricting *monilicornis* to the more northern form Verhoeff loses his name *roettgeni* as a synonym of Van der Linden's *insignis* if this species is based on the female as I shall endeavour to show in the next section.

(2) *P. insignis* Van der Linden, 1829.

The present treatment of *insignis* Van der Linden, though contrary to custom, should cause no surprise for it was inevitable that sooner or later the nomenclatorial tangle which has engulfed this species for so many years would have to be unravelled in the light of the International Code of Zoological Nomenclature. De Beaumont (1964) made quite clear the interpretation which should correctly be applied to this species but in order not to upset a somewhat uneasy and undoubtedly only temporary stability he preferred to put the name into a kind of nomenclatorial limbo from which it could cause no further embarrassment. But alas *P. insignis* (Van der Linden) was named by Shuckard as the type species of his genus *Passaloeus* and if the genus is to have any stability its type species cannot be set aside in this manner. It is necessary therefore to come to a conclusion which will be in accord with the "Code" rather than with any one taxonomist's personal whim. Van der Linden based his description of *Pemphredon insignis* on a female and nobody who reads the description can seriously question this. At the same time Van der Linden doubtfully associated a male which Wesmael had placed with the female referred to above. Subsequent workers realized that the female and the doubtfully associated male were not conspecific and Wesmael (1852) wrote that the female specimen used by Van der Linden for his description of *insignis* belonged to the more recently described species *P. monilicornis* Dahlbom, 1842 and he therefore switched the whole concept of *insignis* Van der Linden to the doubtfully associated male. The confusion which has since developed pivots on whether this species should be based on the female or on the male. In an effort to stabilise the situation Leclercq (1954) listed the specimens standing under *P. insignis* Van der Linden in Wesmael's collection and selected a male labelled *insignis* by Wesmael and very probably the original specimen, as lectotype. He also noted that there were two females labelled *monilicornis* by Wesmael, one coming from Lapland (and evidently not part of the original material) and one which he determined as *P. roettgeni* Verhoeff. There seems no reason to doubt that this

sity" is a considerable overstatement, for the specimen is neither crippled nor so deformed as to make exact determination impossible. I have examined this unique specimen kindly sent to me on loan and I can see no reason why the name *P. singularis* Dahlbom, for *P. tenuis* Morawitz and the erroneous but generally accepted interpretation of *P. gracilis* (Curtis), should not be brought into effect.

The holotype is a male from Dahlbom's material in the Museum Entomologicum, Lund, Sweden. It carries the following labels:-

- (a) *singularis* Dahlbom.
- (b) Red label—TYPE.
- (c) Blue Museum loan label 1967-511.
- (d) *Passaloeus gracilis* (Curtis) ♂, det. Merisue.
- (e) Blue Museum loan label 1969-78.
- (f) *Passaloeus singularis* Dahlbom, det. I. H. H. Yarrow.

Though this specimen carries no locality label there is no reason to doubt that it is the original, from Scania in southern Sweden.

The present interpretation of *P. gracilis* (Curtis), based on a study of a syntype, will be found under the next species.

Shuckard's interpretation of *gracilis* (Curtis) is interesting. His description is difficult to understand without seeing the material on which it was based. His supposed "types" were acquired somehow by Edward Saunders and after his death presented by the Rev. F. D. Morice to the Department of Entomology of the British Museum (Natural History). Those labelled *gracilis* are as follows:—

- 1 ♂ with note "tuberculis albis" = *insignis* auctt. nec Van der Linden.
- 2 ♀ (one now headless) = *insignis* auctt. nec Van der Linden. The complete female was subsequently labelled by Saurders as his "type" of *insignis* (Van der Linden).

In addition to the above there are some specimens received in exchange with Shuckard and said to represent the three species *gracilis* (Curtis), *corniger* Shuckard and *insignis* (Van der Linden); all three specimens belong to *corniger* Shuckard. Another specimen, part of the same exchange, is an unnamed male belonging to the species commonly though erroneously known as *gracilis* (Curtis). The probability is, though one could scarcely glean this from his description which evidently was not based on any one of the specimens listed above but was most probably a compilation, that Shuckard correctly interpreted *gracilis* (Curtis) though later authors failed to do so. It is indeed unfortunate that neither Curtis nor Shuckard paid any attention to the furrows which run across the episternum of these wasps, if in fact they ever noticed them, for then Dahlbom, who presumably worked from description only, would not have treated

gracilis (Curtis) in the group with one, not two, transverse furrows, for it was Dahlbom who discovered that the species of *Passaloeus* could be divided into two groups in this way and who gave us our present incorrect interpretation of *gracilis* (Curtis). I shall have more to say of this when dealing with the next species.

(4) *P. gracilis* (Curtis, 1834)

Curtis's collection of British Insects is in Melbourne, Australia. Type material of his British species was brought to London in 1948 so that Holotypes and Lectotypes could be fixed. O. W. Richards worked through the aculeate Hymenoptera and was able to examine one of the two original males of *Diodontus gracilis*. He found that it belonged to the species at that time known to British workers as *Passaloeus insignis* (Van der Linden) and not to the species then known as *P. gracilis* (Curtis). It is easy to be wise after the event but it is hard to see now how it was possible for this species to have been so misinterpreted. Curtis certainly did not make recognition easy by attributing his *gracilis* to *Diodontus*, a genus whose species have a very obviously incised apex of the labrum and he undoubtedly perplexed Continental workers by placing the coloured illustration of *gracilis* alongside line drawings of antennae and mouthparts to illustrate the genus *Diodontus*. Indeed, some authors unfamiliar with the British fauna, for example Dahlbom in Sweden, felt obliged to ignore *gracilis* (Curtis) and to work from Shuckard's interpretation or to be more exact from what they believed was Shuckard's interpretation. As I suggested when dealing with the previous species, Shuckard's (1837) description might have been guaranteed to confuse anybody (see also my observations under *P. corniger* Shuckard). Unfortunately Dahlbom went sadly adrift which he surely need not have done if he had paid more attention to Curtis's coloured illustration than to Shuckard's description, for in this illustration we are shown a male with short, stubby, almost female-like antennae, utterly unlike the much longer, slender and almost filiform antennae of the insect to which he thought Shuckard referred. An important "clue" in Curtis's description is the observation that the apex of the abdomen is ferruginous and the apical spine recurved, for these are features characteristic of *insignis* auctt. but not of *gracilis* auctt. in which the apical segment is scarcely less dark than the rest of the abdomen and the spine is short and almost straight; Verhoeff (1890) noticed its shortness. There are some differences in the colouring of the legs too, especially of the fore legs though here the illustration and the description are not quite in accord. The illustration is an extremely good presentation of the species it was intended to represent and one could not possibly doubt the authenticity of the specimen which Richards examined.

In his notes O. W. Richards identified the male in the Curtis

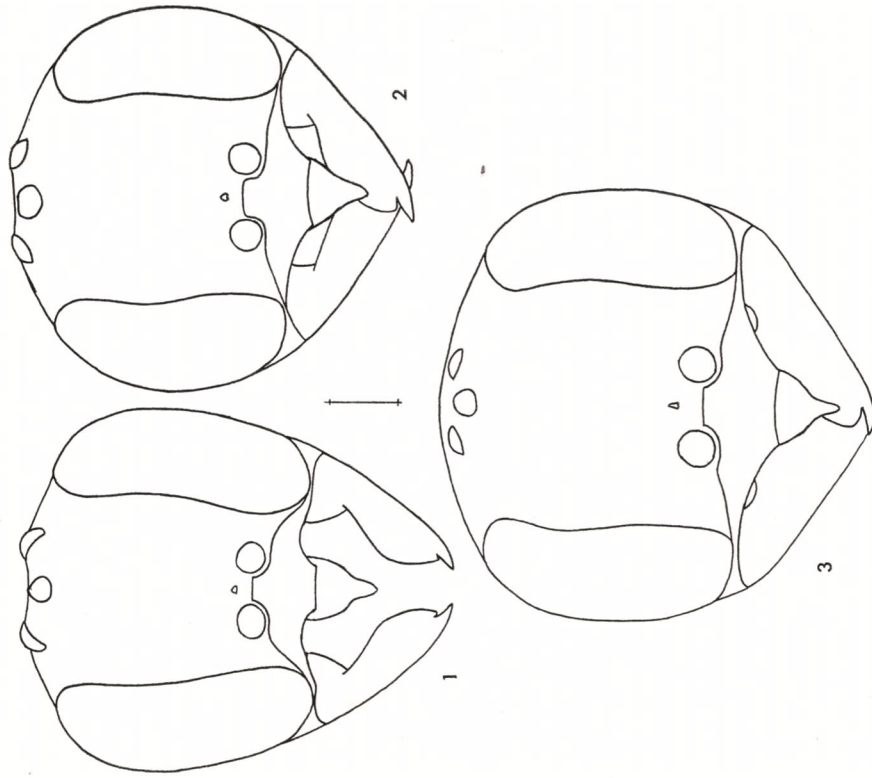
collection as "Type" but I think this should be "Lectotype" since the species was described from two males. The whereabouts of the second male is unknown. A second specimen standing as *gracilis* in the collection is a female with the pencil label . . . 18.6.45, Wilton. It belongs to the species *P. gracilis* auctt. Its date is too late for it to have been part of the original material which in any case came from Glanville Wootton, in Dorset.

Diodontus gracilis Curtis, 1834. LECTOTYPE.

The specimen, a ♂, in the Curtis Collection in Melbourne, Australia, by original publication from Glanville Wootton in Dorset, was seen by O. W. Richards in London in 1948 and labelled "Type". It belongs to the species *Passaloeus insignis* (Van der Linden) sensu E. Saunders, 1880, nec Van der Linden.

(5) The *gracilis* (= *insignis* auctt.)—*turionum* Dahlbom—*borealis* Dahlbom complex.

Having established that *gracilis* (Curtis) is the same as *insignis* of British authors it becomes important to investigate its relationship to *insignis* of Continental authors who attribute this name to Van der Linden's male and to *turionum* Dahlbom as a junior synonym. O. W. Richards (1935:165) wrote that he had examined a female from the original material of *insignis* Van der Linden sent to him from Brussels and two males of *turionum* Dahlbom sent from Lund and he concluded that *turionum* is almost identical with *insignis* and probably a synonym, like *brevicornis* Morawitz, but that the European species needed revision. He stipulated that the British species was *insignis*. Leclercq (1954:291) made it abundantly clear that the female sent to Richards was one labelled *insignis* by Wesmael and while there seems no reason to doubt that this specimen is indeed a female of the species which Wesmael, but not Van der Linden, included in the material of *insignis*, there are no grounds for accepting it as part of the original material seen by Van der Linden. Though Richards had been rather careful about fixing the exact identity of this female, Leclercq was quite positive that it, *turionum* Dahlbom and English specimens named *insignis* all belonged to one species and he identified the female sent to Richards as the Allolectotype of *Passaloeus insignis* (Van der Linden). By my reasoning, previously stated, only the female labelled *monilicornis* by Wesmael can have been seen by Van der Linden and anything labelled *insignis* must be additional material added by Wesmael at some later date. Through the kindness of Dr. Carl Lindroth I have been able to study Dahlbom's material of *turionum* and I find myself unable to agree that this belongs to the same species as *insignis* of British authors and *turionum* Dahlbom sensu Leclercq, of which I have a British specimen. *P. turionum* Dahlbom, as seen from the type material, is a broad-



Figs. 1-3. *Passaloeus*. -1, *gracilis* (Curtis) (syn. *insignis* auctt.) ♂, head. -2, *turionum* Dahlbom ♀, id. -3, *borealis* Dahlbom ♀, id. Scale line=0.25 mm.

headed species like *borealis* Dahlbom, quite unlike *insignis* auctt. which is rather narrow-headed and with upstanding ocelli which tend to emphasize the length of the head. Furthermore, the antennal segments are rather longer in relation to width and in the male the longitudinal carinae on the intermediate segments are less pronounced than in *turionum* and on the thorax the notaulices much

less impressed than in *insignis* auctt. De Beaumont's separation of *turionum* and *borealis* on converging or not converging eyes and strong or weak notaulices is absolutely inapplicable to the types of these two species though it perfectly describes the difference between either of them and *insignis* auctt. (text figs. 1, 2, 3). Wolff (1958) described a *Passaloecus* from Germany as *P. aff. borealis* Dahlbom which he said was intermediate between what he identified as *turionum* and *borealis* and his description fits perfectly the true *turionum* which is, in a sense, intermediate between *insignis* auctt. and *borealis*. Valkeila (1961) remarked that Wolff's *P. aff. borealis* was a common form in Finland which he believed to be no more than a variant of *insignis-turionum-borealis* which he considered conspecific. Maybe further investigation of Scandinavian material is needed to confirm it but once one accepts that *turionum* Dahlbom and *insignis* auctt. are not identical, the whole picture takes shape—*gracilis* (= *insignis* auctt.) is a small species with narrow head, upstanding ocelli and very short antennal segments even in the male and in western Europe ubiquitous,—*turionum* (= *aff. borealis* Wolff) of about the same size but with broader head, less upstanding ocelli (in *turionum* and *gracilis* POL=OOL), rather longer antennal segments and in the male with less pronounced antennal carinae and in both sexes with much less evident notaulices on the mesoscutum and having probably an entirely northern distribution (being known at present only from northern Germany, Norway, Sweden and Finland: in Switzerland de Beaumont (1964) could not positively identify it and in France, including the Pyrenees, Ribaut (1952) did not recognise it) and *borealis*, a larger, even broader-headed species (POL:OOL=2:3), even longer antennal segments with even less evident carinae in the male and with even less evident notaulices, and known from northern Sweden, southern Norway, the Alps and the Pyrenees.

P. borealis is a considerably larger species than the other two (5-6.5 mm: 3.5-5.5 mm) and its broader head could account for the changed POL:OOL ratio and the longer antennal segments for the less prominent flagellar carinae. But it is less likely that increase in size would reduce the notaulices and almost obliterate the short longitudinal rugae at the base of the mesoscutum while at the same time increasing the coarseness of the surface sculpture of the episternum between the two horizontal furrows. Thomson (1870), familiar with the Swedish fauna as well as with Dahlbom's material, treated *turionum* and *borealis* as conspecific and *brevicornis* Morawitz (= *insignis* Van der Linden ♂) as distinct but there are no better grounds to support this than there are for Valkeila's contention that all three are conspecific, with *borealis* perhaps as a subspecies. Morphologically I consider the three forms distinct at species level and I consider their distribution supports this contention.

(6) *P. corniger* Shuckard, 1837.

It seems quite incredible that Shuckard was able to dissertate on the whim of nature which armed with a strong interantennal spine the female but not the male of his *corniger* and the male but not the female of what he called *insignis* (Van der Linden) without apparently even suspecting that he had got the sexes of these two species wrongly associated. It is enlightening that F. Smith (1858) could do no better than perpetuate these mistakes! Shuckard's material of his species consists of 3 females from his 'types' and one female from his exchange (see under *P. singularis* for explanation) all of which agree with his description; another female is labelled 'gracilis Curtis' and a male is labelled *insignis* Van der Linden. A male labelled *cornigera* by Saunders as being from Shuckard's 'types' of *corniger* is of course an *insignis* auctt. and a male sent in exchange as *insignis* Van der Linden is a *corniger*.

Dahlbom (1844) unravelled this curious tangle and *corniger* as a species became based on Shuckard's description of the female for which I now propose a Lectotype.

Passaloecus corniger Shuckard, 1837:191. LECTOTYPE. The selected specimen is one of Shuckard's 'types' acquired by E. Saunders and is now in the Dept. of Entomology, British Museum (Natural History); it carries the following labels:

- (a) *cornigera* Shuck.
- (b) A small red square indicating that it was used by E. Saunders as his 'type' of the ♀.
- (c) *cornigera* apud E.S.
- (d) E. Saunders Coll., F. D. Morice ded. 1910/266.
- (e) A small red ringed Type label.
- (f) *Passaloecus corniger* Shuckard 1837. Lectotype ♀. I. H. H. Yarrow, 1969.
- (g) B.M. Type registration, Hym. 21. 1807.

The specimen has no antennae but is otherwise in good condition; it has no locality label but by inference should come from Battersea Fields.

(7) Subgenera or species groups?

Dahlbom (1844) divided the genus *Passaloecus* into two 'divisions' according to the number of horizontal furrows on the episternum. Verhoeff (1890) treated these two groups as subgenera, naming one *Coeloeus* Verhoeff (with single furrow) with included species *P. gracilis* Dahlbom, *P. roettigemi* Verhoeff and *P. monilicornis* Dahlbom and the other, *Heroecus* Verhoeff (with two furrows) but without naming included species. Pate (1937) made a formal selection of *P. gracilis* (Curtis) as type species of *Coeloeus* Verhoeff and by assigning *P. insignis* (Van der Linden) to *Heroecus* Verhoeff he made

this the type species by monotypy. But Verhoeff named *gracilis* Dahlbom not *gracilis* (Curtis) in his new subgenus *Coeloeocus* and Pate's selection must be considered invalid. *P. gracilis* Dahlbom and *P. gracilis* (Curtis) are now known to be two very different species which do not belong to the same group. Furthermore, it is now established that *insignis* (Van der Linden) was wrongly placed in *Herocerus* by Pate for it has but one horizontal episternal furrow. Now, since *P. insignis* (Van der Linden) was pronounced by Shuckard as the type species of his genus *Passaloeocus*, by Pate's action *Herocerus* Verhoeff becomes a direct synonym and by his invalid selection, *Coeloeocus* Verhoeff, representing the same group of species, is left without a type species. Under the circumstances it seems best to dispose of *Coeloeocus* Verhoeff by making it also a synonym of *Passaloeocus* Shuckard and I therefore propose *Passaloeocus roettgeni* Verhoeff, 1890 = *Passaloeocus insignis* (Van der Linden, 1829) = *Pemphredon insignis* Van der Linden, 1829, as type species of *Coeloeocus* Verhoeff, 1890. The group of species with two horizontal furrows on the episternum is therefore without a subgeneric name and I propose to leave it thus. Species of *Passaloeocus* occur in many different parts of the world and certainly the species of the Oriental Region form a most defined group which is very different from anything truly Palaearctic (*P. abnormis* Kohl, described from eastern Austria is probably an accidental introduction from much further East). The subdivision proposed by Verhoeff took into account only Palaearctic species and is unsatisfactory when the world fauna is considered and under the circumstances 'species groups' offer a more flexible treatment and are to be preferred to the erection of further subgenera.

Part 2

THE BRITISH SPECIES OF *PASSALOEOCUS* SHUCKARD

(1). Synonymy of the British species of *Passaloeocus* Shuckard.

1. *Passaloeocus monilicornis* Dahlbom
P. monilicornis Dahlbom, 1842; Dahlbom, 1844; 1845, pt.; Bold, 1868; Saunders, 1880, pt.; Verhoeff, 1890; Saunders, 1896, pt.; Richards, 1937, pt.; de Beaumont, 1964a.
P. monilicornis var. *dahlbomi* Kohl, 1905 nec Sparre Schneider; Sparre Schneider, 1909; Faester, 1951.
2. *Passaloeocus insignis* (Van der Linden)
Pemphredon insignis Van der Linden, 1829, ♀ nec ♂; Wesmael, 1852; de Beaumont, 1964.
P. monilicornis Dahlbom, 1844, pt.; 1845, pt.; Wesmael, 1852, pt.; Thomson 1870; 1874; Saunders, 1880, pt.; André, 1888, ♀, ? ♂; Saunders, 1896, pt.; Kohl, 1905; Sparre Schneider, 1909; Berland, 1925; Richards, 1937, pt.

3. *Passaloeocus singularis* Dahlbom
P. singularis Dahlbom, 1844; 1845.
P. gracilis (Curtis, 1834) auctt. nec Curtis.
P. tenuis Morawitz, 1864; André, 1888, Kohl, 1905; Berland, 1925; Schmeideknecht, 1930; de Beaumont, 1964a.
4. *Passaloeocus clypealis* Faester
P. clypealis Faester, 1947; Ribaut, 1952; de Beaumont, 1964a.
5. *Passaloeocus corniger* Shuckard
P. corniger Shuckard, 1837, ♀ nec ♂, Dahlbom, 1842; 1844; 1845; Morawitz, 1854; Thomson, 1870; 1874; André, 1888, Saunders, 1896; Kohl, 1905; Berland, 1925; Schmeideknecht, 1930; Richards, 1937; Ribaut, 1952, de Beaumont, 1964a.
P. insignis (Van der Linden) sensu Shuckard, 1837, ♂ nec ♀; Smith, 1858, nec Van der Linden, 1829.
P. cornigera Smith, 1859, ♀ nec ♂; Saunders, 1880.
6. *Passaloeocus gracilis* (Curtis)
Diodontus gracilis Curtis, 1834, ♂.
Passaloeocus gracilis (Curtis); ? Shuckard, 1837; André, 1888.
P. insignis (Van der Linden, 1829) ♂ nec ♀; ? Curtis, 1834; Shuckard, 1837; Dahlbom, 1842; 1844; 1845; Smith, 1858, ♀ nec ♂; Saunders, 1896; Richards, 1935; 1937.
P. corniger Shuckard, 1837, ♂ nec ♀; Smith, 1858, ♂ nec ♀.
P. turionum Dahlbom, 1844; Kohl, 1905; Berland, 1925; Ribaut, 1952; Leclercq, 1954; de Beaumont, 1964; 1964a, nec Dahlbom.
P. brevicornis Morawitz, 1864; Thomson, 1870; 1874; Kohl, 1905.

(2). Notes on the British species of *Passaloeocus* Shuckard.

1 & 2. *P. monilicornis* and *P. insignis*.

Until now these two species have been confused under the name *P. monilicornis* which was first recorded as British from Cumberland (Bold, 1868). Saunders (1880) first included the second species from localities in southern England and later (Saunders, 1904) recorded the first known capture of *P. monilicornis* in Scotland. The distribution of these two species is listed below and shown in a map (text fig. 24). While most of the characters in which these two species differ might seem to be of a subspecific nature and distribution certainly suggests such a relationship, the quite considerable difference in the male antennae points in the other direction and I prefer to treat them as distinct species. Though there seems to be no overlapping of their respective ranges in England, both species occur in Yorkshire and

may do so in Staffordshire and perhaps Derbyshire. I have seen no material from northern Wales but if either species should occur there I would expect it to be the northern *monilicornis*. Both species evidently occur together in southern Sweden but it is not certain that they are truly sympatric and variation of certain characters, such as the colour of the pronotal tubercles of the male, which might be the result of interbreeding occurs also in southern England in populations of *P. insignis* far removed from any contact with *P. monilicornis*. *P. monilicornis* is best defined as an arctic species ranging from Ireland through Scotland and northern England, Norway (Sparre Schneider, 1909), Sweden (Dahlbom, 1844, in part), Finland (Wolff, 1958) to Japan (Tsuneki, 1955) (where however it is probably subspecifically distinct). It is not known from the Alps (de Beaumont, 1964a) nor in the Pyrenees (Ribaut, 1952). *P. insignis* occurs through most of central and southern Europe (where it is perhaps restricted to the higher mountain ranges) and in Japan what is probably a subspecies occurs rarely with *P. monilicornis*. In southern England, occasional females in which the labrum is not white but brownish are known (Perkins, 1923) but these do not have the other characters of *P. monilicornis*.

Of *monilicornis* from the British Isles I have studied 39 females and 30 males and of *insignis* 96 females and 63 males; of the former, females occur during the months of May to September and males during May to August and of the latter, females occur from June to September and males from June to August.

DISTRIBUTION

1. *P. monilicornis* Dahlbom**Scotland**

Inverness: Aviemore, Kincaig, Nethy Bridge.
 Kincardine: Banchory.
 Midlothian: Dalkeith.
 Nairn: Nairn.
 Sutherland: Invershin.

Northern Ireland

Antrim: Shane's Castle*.
 Armagh: Pontzpass*.
 Down: Rostrevor*.

Eire

Cork, West: Glengarrif*.
 Dublin: Howth*; Glensasmole*.
 Kerry, North: Killarney*.
 Kerry, South: Caragh Lake.
 Wicklow: West of Arklow* Eniskerry, Magherabeg*, Rathdrum*, below the Scalp*.

(Records from Ireland marked with an asterisk are taken from Stelfox (1927:293) who usefully notes that all Irish females have the labrum black not white as described in Saunders (1896)).

England

Cheshire: Cotterill Clough, Goyt Valley.
 Cumberland: Bassenthwaite, Durdar.
 Lancashire: Grange over Sands, Witherslack.
 Northumberland: Warden, near Hexam.
 Staffordshire: Hawksmoor, Madeley.
 Westmorland: Melkinthorpe.
 Yorkshire, North East: Lastingham, Mulgrave Wood, Sleights.

2. *P. insignis* (Van der Linden)**England and Wales**

Bedfordshire: Ampt Hill, Colworth, Colworth-Yellow Lane, Cophill, Cophill-Warren Wood, Eversholt, Heath and Reach, King's Wood, Odell Great Wood, Pegsdon, Rushmere Heath.
 Berkshire: Bagley Wood, Sulhamstead Park.
 Buckinghamshire: Brickhill, Waddon Chase.
 Cambridgeshire: Madingley.
 Devonshire: Bovey Tracey, Chudleigh, Dartmoor, Highweek, Newton Abbot, Northam, Paignton, Plympton, Shaugh Bridge, Yelverton.
 Dorset: Glanville Wooton, Lyme Regis, Parley, Wimborne, Witchampton.
 Glamorgan: Candleston, Kenfig, Penarth.
 Gloucestershire: Lea, Lea Bailey, Wotton under Edge.
 Hampshire: New Forest, Southampton.
 Hertfordshire: Bricket Wood, Elstree, Hexton.
 Kent: Bromley, Tunbridge Wells.
 Leicestershire: Benscliffe in Charnwood Forest, Oaks in Charnwood, Woodhouse-Eaves.

Oxfordshire: Bladon, Oxford, Tubney.

Somerset: Downside, Wells.

Suffolk: Brandon, Bury St. Edmunds.

Surrey: Byfleet, Chobham, Clandon, Dorking, Effingham, Holmwood, Wisley, Woking.

Sussex: Sullington.

Warwickshire: Hillmorton near Rugby, Rugby.

Wiltshire: Sopworth.

Yorkshire, West: Collingham.

3. *P. singularis* Dahlbom (= *gracilis* auctt.)

In the British Isles this species occurs from April to September in all the southern counties of England and Wales, becoming rarer

in the midlands and unknown in the north except for a single individual from Grange over Sands, Lancs. Individuals with pale pronotal tubercles occur here and there apparently at random.

4. *P. clypealis* Faester

The addition of this evidently very rare species comes as rather a surprise though it was noticed long ago as a variant of '*gracilis*' with yellow pronotal tubercles first by R. C. L. Perkins who attached a label to a specimen drawing attention to the quite clearly impressed upper horizontal furrow on the episternum and later by G. M. Spooner who noted the peculiarly shaped clypeus (G. M. Spooner, pers. comm.). I have seen the following specimens all of which were captured at Wicken Fen in Cambridgeshire:-

2 ♀, R. C. L. Perkins, captured in about 1899.

1 ♂, G. M. Spooner, 9/vi/1929.

(These three specimens kindly presented to the Dept. of Entomology, British Museum (Nat. Hist.) by Mr. Spooner.)

1 ♀, R. C. L. Perkins.

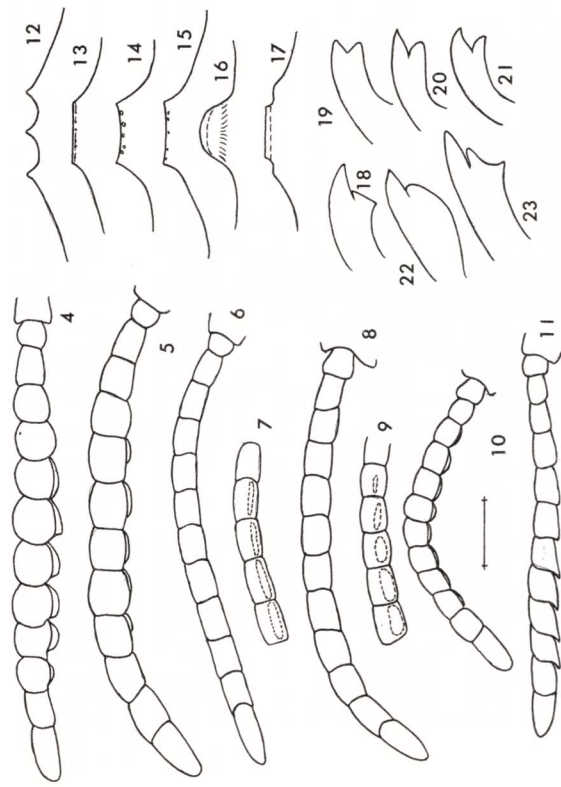
1 ♂, G. J. Kerrich, 28/vi/1936.

(These two specimens are in the University Museum, Cambridge, where they stood under *P. gracilis*).

Nothing is known of the biology of this wasp here or on the Continent but perhaps something may be deduced from the very few records of its occurrence. In Denmark it was described by Faester from Basnaes on the south-west coast of Sjaelland in a district which includes marshland. In Switzerland de Beaumont has found it on the edge of Lake Neuchatel (de Beaumont, 1964) and in southern France the same author has found it at Salses, beside the coastal Lake known as Etang Leucate, between Narbonne and Perpignan (Ribaut, 1952). All records are thus from places associated with water and an obvious thought is that this species probably nests in reeds (*Phragmites*) either in the old borings of noctuid caterpillars or in the old galls of *Lipara* flies. Further collecting in likely places (in the Norfolk Broads in England, the Camargue and the coastal 'étangs' of the Landes in France and in Holland and elsewhere in Denmark) may show that the species is not so rare as at present seems but occurs in places not much favoured by collectors of aculeate Hymenoptera. In Japan, Tsuneki (1955) has described a rather similar wasp, *P. gracilis* subspecies *yamato* Tsuneki which nests in stems of bamboo grass; however only the male has a convex clypeal margin, that of the female being quite straight.

5. *P. corniger* Shuckard

This species occurs throughout the southern counties from May until mid August. Some old records from Ireland were found by R. C. L. Perkins to refer to *P. monilicornis*.



Figs. 4-23. *Passaloecus*. -4, *monilicornis* Dahlbom ♂, antenna. -5, *insignis* (Van der Linden) (syn. *roettigeni* Verhoeff) ♂, id. -6, *clypealis* Faester ♂, id. -7, id., showing tyloidea on segs. 5-8. -8, *singularis* Dahlbom (syn. *gracilis* auctt.) ♂, antenna. -9, id., showing tyloidea on segs. 5-9. -10, *gracilis* (Curtis) ♂, (syn. *insignis* auctt.), antenna. -11, *corniger* Shuckard (Dahlbom) ♂, id. -12, *corniger* Shuckard ♀, clypeus. -13, *gracilis* (Curtis) ♀ (by present interpretation), id. -14, *monilicornis* Dahlbom ♀, id. -15, *insignis* (Van der Linden) ♀, (syn. *roettigeni* Verhoeff), id. -16, *clypealis* Faester ♀, id. -17, *singularis* Dahlbom (syn. *gracilis* auctt.) ♀, id. -18, *monilicornis* Dahlbom ♂, mandible. -19, *gracilis* (Curtis) ♂ (syn. *insignis* auctt.), id. -20, *singularis* Dahlbom (syn. *gracilis* auctt.) ♂, id. -21, *clypealis* Faester ♂, id. -22, *gracilis* (Curtis) ♀ (by present interpretation), id. -23, *corniger* Shuckard ♀, id.

Scale line=0.25 mm.

6. *P. gracilis* (Curtis) (= *insignis* auctt.)

Under the name *P. insignis* this species is well known from June until August in most of the southern and midland counties and is evidently quite common as far north as Lancashire though I have no records from beyond this. As with *P. corniger*, records from Ireland were found to refer to *P. monilicornis*.

All our *Passaloecus* species provision their cells with aphides and they nest in bramble stems, beetle holes in old posts, dead branches etc. and also in galls. *P. clypealis*, as mentioned above, may have somewhat different habits.

(3). KEY TO THE BRITISH SPECIES OF *Passaloecus* SHUCKARD

1. Episternum 2 with an upper and a lower horizontal deeply foveate furrow 5
- Episternum with only the lower horizontal furrow deeply foveate, the upper furrow at most very weakly indicated, usually entirely lacking 2
2. Apical margin of clypeus of ♀ in same plane as rest of clypeus, not sharply upturned (figs. 14, 15); labrum black or ivory white, rarely somewhat yellowish; antennae of ♂ conspicuously moniliform and with very pronounced longitudinal carinae (tyloidea) on the intermediate flagellar segments (figs. 4, 5); mandibles of ♂ somewhat widened apically and widely bidentate, the rather indefinite preapical tooth directed downwards (fig. 18); mesoscutum with numerous short, longitudinal or oblique rugae running forward from the hind margin but otherwise with its surface regularly and finely punctate; basal segments of the gaster not separated by constrictions (Group of *monilicornis*) 3
- Apical margin of clypeus of ♀ sharply upturned (figs. 16, 17); labrum black; antennae of ♂ filiform, sensory tyloidea on intermediate flagellar segments not in form of carinae but flat or scarcely raised reddish areas (figs. 7, 9); mandibles of ♂ narrow apically and bidentate, both teeth directed forward (figs. 20, 21); mesoscutum without basal rugae, its surface very shining and regularly punctate except that on each side of the mid line at about the level of the hind margin of the tegulae there is a more or less circular area of dense minute punctures from which arise hairs which are rather longer than those on the surrounding surface, appearing as tufts when viewed from behind and velvety from above (in pinned specimens these areas are often obscured); gaster quite conspicuously constricted between segments 1 and 2 and 2 and 3 (Group of *singularis*) 4



Fig. 24. The distribution of *Passaloecus monilicornis* Dahlbom and *P. insignis* (Van der Linden) (syn. *P. roettgeni* Verhoeff) in the British Isles.

3. Head of ♀ between top of eye and lateral ocellus flat, the groove which runs alongside the ocellus narrow and its outer edge definite; punctation of head, thorax and gaster very fine, the episternum finely and densely reticulate and almost without traces of punctation, gaster T1 with remote and minute punctures, T2 more closely punctured but the punctures equally fine and the general surface shining and without fine reticulate microsculpture; antennae of ♂ with carinae on segments 4 or 5-11 (fig. 4) & labrum blackish brown, palps yellowish white (♂) or brownish (♀); pronotal tubercles white. ♂: 5.5-6 mm., ♀: 5.5-7 mm. 1. **P. monilicornis** Dahlbom

— Head of ♀ between top of eye and lateral ocellus flat near the eye but curving down into the ocellar groove which has no definite outer edge; punctation of head, thorax, and gaster closer and rather less fine, all parts with a fine reticulate microsculpture, episternum with abundant though shallow punctures; antennae of ♂ with carinae on segments 4 or 5-10, the segments less globular and the carinae shorter than in *monilicornis* (fig. 15) labrum of ♀ ivory white, rarely rather yellowish or brownish, of ♂ brown, palps white, pronotal tubercles white in ♀, brown (but occasionally also white) in ♂. ♂: 4.5-5.5 mm., ♀: 4.5-6 mm. 2. **P. insignis** (Van der Linden)

4. Clypeus of ♀ flat, the apical margin upturned and truncate or slightly concave (fig. 17); head little narrowed posteriorly; mesoscutum not impressed in region of parapsides; tyloidea present on segments 5-9 of ♂ antenna, the more apical ones more or less broadly oval in outline (figs. 8, 9); pronotal tubercles blackish brown, occasionally yellowish or testaceous posteriorly (more often in ♀ than ♂); labrum blackish brown, palps pale (♂) or brown (♀), tarsi of legs 1 and 2 of ♂ of same orange-yellow colour as their tibiae, tibia 3 yellow in basal 1/3rd. ♂ 4-5 mm., ♀: 5-6 mm. 3. **P. singularis** Dahlbom

— Clypeus of ♀ a little swollen, the apical margin upturned and very distinctly convex (fig. 16); head conspicuously narrowed posteriorly; episternum with line of upper horizontal furrow quite conspicuously indicated but not foveate; mesoscutum a little impressed along parapsidal furrows; tyloidea present on segments 5-8 of ♂ antenna, narrow and parallel-sided (figs. 6, 7); pronotal tubercles bright yellow (♀) or whitish (♂), labrum dark brown, palps pale yellow (♂) or brown (♀); tarsi of legs 1 and 2 of ♂ almost white and base of tibia 3 similarly coloured. ♂: 4.5 mm., ♀: 5 mm. 4. **P. clypealis** Faester

5. Episternum 2 with a single vertical foveate furrow, the surface anteriorly adjacent to the furrow smoothly rounded; inter-

antennal spine well developed; antenna of ♂ without evident carinae or flattened areas but segments 4 or 5-11, especially the more apical ones, produced downwards and forwards beneath the base of the segment ahead thus producing a saw-edge effect (fig. 11); clypeus of ♀ tridentate (fig. 12) less obviously so in ♂; mandibles of both sexes tridentate (fig. 23); notaulices very short, narrow and inconspicuous. (Group of *corniger*). Pronotal tubercles yellow (♂), white (♀); labrum and palps yellow (♂), brown or brownish yellow (♀). ♂: 4.5-5.5 mm., ♀: 4.5-6.5 mm. 5. **P. corniger** Shuckard

— Episternum 2 with in addition to the usual vertical foveate furrow a second furrow, more or less parallel to and adjoining the first and formed by the very coarse sculpture of the episternum immediately anterior to it; interantennal spine only weakly developed; antenna of ♂ short and rather thick and with conspicuous carinae on segments 4-11 (fig. 10); clypeus of ♀ apically truncate (fig. 13); mandibles of ♂ rather bluntly bidentate (fig. 19), of ♀ broadly lobed beneath the apical tooth (fig. 22) (Group of *gracilis*). Notaulices very strongly impressed, broad and foveate or crenate, extending well back on to the mesoscutal disk, in some males traceable back to the hind margin; pronotal tubercles usually white (♀), black (♂) but in both sexes variable; labrum black, palps brownish yellow. ♂: 4.5-5.5 mm ♀: 4.5-5 mm. 6. **P. gracilis** (Curtis).

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BOOK REVIEW

Africa's Bane, the Tsetse Fly, by T. A. M. Nash. Collins, 1970 (1969), pp. 224, 10 figs., 8 plates. Price: 42s.

This is the first account of tsetse flies and trypanosomiasis to be written for the general reader. Dr. Nash is Director of the Department of Tsetse Research in the University of Bristol and was formerly Director of the West African Institute for Trypanosomiasis Research.

This is not a text-book and although much of it is written from the author's personal experience it is not an autobiography. It is a lucid introduction to a large and complex biological problem which has taxed medical entomologists for the past 75 years. The book is intended for the beginner 'be he undergraduate, postgraduate, biologist, doctor, veterinarian or humble naturalist'. In his preface the author warns the specialist that while he may learn nothing of his own subject he may learn something about someone else's, and this is certainly true.

Fossil tsetse are known from 50 million years ago and were probably indirectly affecting the future of man even before his appearance on earth, since it is suspected that trypanosomiasis was responsible for the extinction of the horse and camel in prehistoric North America.

After briefly introducing the problem today, Dr. Nash gives an account of the history of tropical Africa in relation to the tsetse fly and trypanosomiasis.

A brief chapter on the structure and life cycle of tsetse is followed by a treatment of the distribution of the various species of tsetse and their vegetational habitats. Included in the latter chapter is a useful table indicating the species of tsetse arranged in their 3 species-groups showing distribution, habitat and medical or veterinary