

Three papers.

Eyes in the Siphunculata. By J. E. WEBB, B.Sc., Ph.D. (Lond.), F.Z.S.,
Department of Natural History, University of Aberdeen.

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(1 Plate and 1 figure in the text.)

INTRODUCTION.

The occurrence of ocelli in the Siphunculata has hitherto been regarded as a comparative rarity. Apart from *Phthirus*, *Pediculus* and *Pedicinus*, three closely related genera found exclusively on Primates, the only forms in which well-developed ocelli have been recognized are *Microthoracius* (see Werneck, 1934, and Ferris, 1935), of which four species are known from Camelidae, and *Pecarococcus javalii* (Babcock and Ewing, 1938) recorded once from the Peccary, *Tayassu tajacu* (*Pecari angulatus*). The elephant louse, *Haematomyzus elephantis* (see Ferris, 1931), possesses doubtful affinities with the Siphunculata and also has eyes. The structure of the ocellus in the Siphunculata has been studied most fully in *Pediculus humanus* first by Müller (1915) and later in greater detail by Wundrig (1936) and Wigglesworth (1941). Wundrig in her paper also showed that *Haematopinus suis*, the common pig louse, possesses minute ocelli ("pseudoocellen") of a structure related not only to that of the ocellus of *P. humanus*, but also to ocelli present in members of the Ischnocera (Mallophaga). The present paper serves not only to confirm Wundrig's discovery of eyes in *H. suis*, but also to bring to notice the presence of ocelli in a number of other genera of Siphunculata in which it was previously believed they were absent. As the sucking lice undoubtedly arose at some time from eyed ancestors, the presence of ocelli in members of this group is held by taxonomists to be a primitive feature of the first importance in tracing intergeneric relationships.

THE STRUCTURE OF THE OCELLUS IN *HAEMATOPINUS SUI*S (L.).

In Siphunculata, the ocelli, when present, are always laterally placed on the post-antennal region of the head. The cornea is simple and protrudes from

Figure 1.

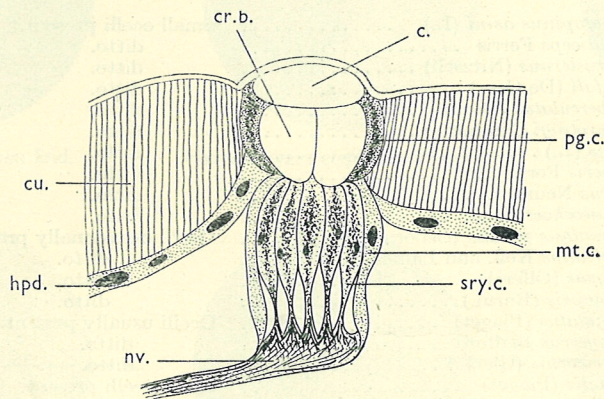


Diagram showing the structure of an ocellus in *Haematopinus suis*.

c., cornea; cr.b., crystalline body; cu., cuticle; hpd., hypodermis; mt.c., mantle cell;
nv., nerve; pg.c., pigment cell; sry.c., sensory cell.

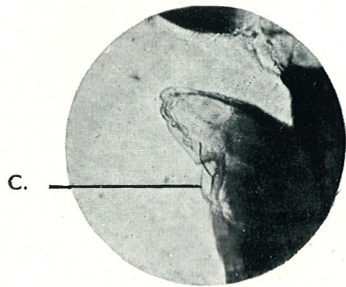
the general body surface as a lens-like structure of greater transparency than the surrounding cuticle. The ocelli in *Haematopinus suis* are usually very small, a fact which may account for the failure of so many workers to note their presence. Each ocellus (see fig. 1) consists of an outer lens-shaped cornea (*c.*) beneath which there are two or possibly four ovoid crystalline bodies (*cr.b.*) surmounting a cluster of pigmented sensory cells (*sry.c.*) ending in nerve fibres (*nv.*). The crystalline bodies and the cornea are enclosed laterally by a layer of densely pigmented cells (*pg.c.*), while the sensory cells are bound together by a sheath of mantle cells (*mt.c.*). This ocellus is of a different type from that of *Pediculus humanus* in which the eye, although simple, lacks the crystalline bodies and consists of a spheroidal thickening of the cuticle beneath which there are numerous sensory cells surrounded by a pigment cup. Although it cannot be stated in the absence of experimental evidence that the ocellus of *Haematopinus suis* is functional, there appears no reason why it should not be so from its structure. On the other hand, the small size of the ocellus and its variability in size within the species suggest that it is vestigial and, therefore, may not be functional.

THE OCCURRENCE OF OCELLI IN OTHER GENERA.

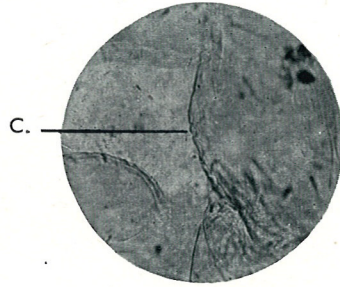
A number of species of sucking lice comprising eight genera were examined for the presence of ocelli and from this survey it appears that ocelli are usually, if not always, present in some genera, but are only occasionally so or are absent in others. Furthermore, even within a single species, some individuals may show quite well-developed ocelli, whereas others are eyeless. The list of species examined for the presence of ocelli is given below. It is unfortunate that in no case was the number of individuals of any one species available for examination more than 10 so that it is impossible to estimate the frequency of occurrence of ocelli; nor is it improbable that, in species recorded here as eyeless, ocelli may be found when a larger series is studied. In Plate I, a series of photomicrographs showing the size and position of ocelli in a number of species hitherto described as eyeless is given and, for comparison with them at the same magnification, photomicrographs of ocelli in species already described as eyed Siphunculata, such as *Microthoracius* sp. and *Pediculus* sp., are also included. It should be mentioned that the specimen of *Haematopinus suis* photographed was exceptional in the large size of the ocelli.

LIST OF SPECIES EXAMINED FOR PRESENCE OF OCELLI.

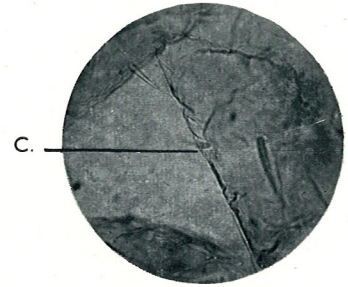
<i>Haematopinus asini</i> (L.)	Small ocelli present.
<i>H. acuticeps</i> Ferris	ditto.
<i>H. eurysternus</i> (Nitzsch)	ditto.
<i>H. bufali</i> (De Geer)	ditto.
<i>H. tuberculatus</i> (Burm.)	ditto.
<i>H. taurotragi</i> Cummings	ditto.
<i>H. suis</i> (L.)	ditto.
<i>H. aperis</i> Ferris	ditto.
<i>H. latus</i> Neum.	ditto.
<i>H. phacochoeri</i> End.	ditto.
<i>Linognathus pedalis</i> (Osborn)	Ocelli occasionally present.
<i>L. africanus</i> Kell. and Paine	ditto.
<i>L. setosus</i> (Olfers)	ditto.
<i>L. stenopsis</i> (Burm.)	ditto.
<i>L. angulatus</i> (Piaget)	Ocelli usually present.
<i>L. aepycerus</i> Bedford	ditto.
<i>L. brevicornis</i> (Giebel)	ditto.
<i>L. tibialis</i> (Piaget)	Small ocelli present.
<i>L. pithodes</i> Cummings	ditto.
<i>L. gnu</i> Bedford	ditto.
<i>L. hippotragi</i> Ferris	ditto.
<i>L. lewisi</i> Bedford	ditto.
<i>L. taurotragus</i> Bedford	ditto.



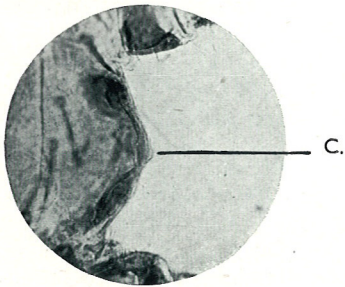
Hæmatopinus suis (L.)



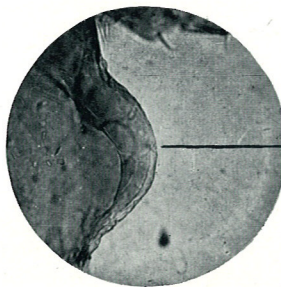
Solenopotes burmeisteri (Fahr.)



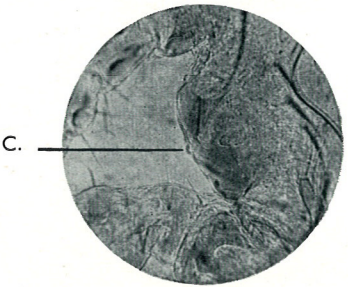
Hybophthirus notophallus (Neum.)



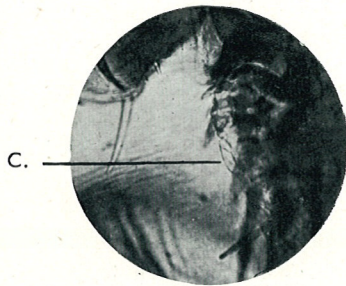
Linognathus africanus Kell. and Paine.



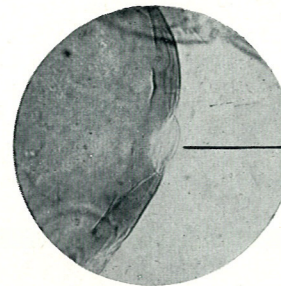
Linognathus gnu Bed.



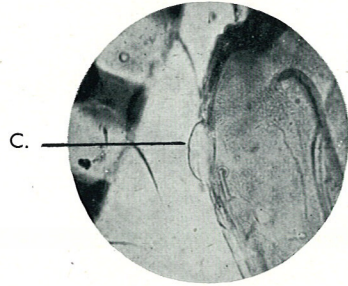
Linognathus tibialis (Piag.)



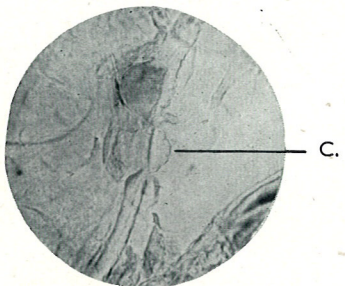
Lepidophthirus macrorhini End.



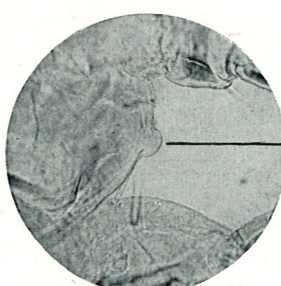
Hæmatomyzus elephantis Piag.



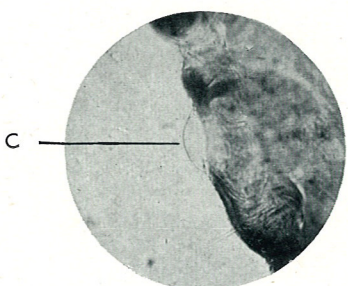
Microthoracius prælongiceps (Neum.)



Pedicinus hamadryas Mjööb.



Phthirus pubis (L.)



Pediculus schäffi Fahr.

Eyes and Eye Rudiments in the Siphunculata and Rhyncophthirina.

<i>L. fractus</i> Ferris	Small ocelli present.
<i>L. limnotragi</i> Cummings	ditto.
<i>L. gazella</i> Mjöberg	No ocelli found.
<i>L. ovillus</i> (Neum.)	ditto.
<i>L. damaliscus</i> Bedford	ditto.
<i>L. fahrenheiti</i> Paine	ditto.
<i>Solenopctes capillatus</i> End.	Ocelli occasionally present.
<i>S. burmeisteri</i> (Fahr.)	ditto.
<i>Ratemia squamulata</i> (Neum.)	No ocelli found.
<i>Prolinognathus leptocephalus</i> (Ehr.)	ditto.
<i>P. caviae-capensis</i> (Cummings)	ditto.
<i>Hybophthirus notophallus</i> (Neum.)	Fairly large ocelli present.
<i>Lepidophthirus macrorhini</i> End.	Large ocelli present.
<i>Antarctophthirus trichechi</i> (Boh.)	Small ocelli present.

CONCLUSIONS.

Although the list of sucking lice examined for ocelli represents only a small portion of the genera comprising the suborder, it is clear that eyed sucking lice are by no means as rare as has been suggested in the past. Doubtless, the absence of eyes, when this can be shown to occur regularly throughout a genus, is an indication that the genus is less primitive in this respect than one in which eyes are constantly present. The sporadic occurrence of eyes in an otherwise comparatively uniform genus such as *Linognathus*, however, casts doubt on the propriety of placing too much weight on the presence or absence of eyes as a character of great taxonomic importance.

LITERATURE.

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EXPLANATION OF THE PLATE.

PLATE I.

Photomicrographs showing the size and position of ocelli in a number of species of Siphunculata hitherto described as eyeless in comparison with those of species already described as eyed and also with those of Rhyncophthirina.

c.—cornea; *Magn.* × 150.