

Pronotum slightly broader than long, of about equal width at base and apex, widest in the middle; surface covered with a network of intervening lines which tend to form large shallow punctures, each of these large punctures containing a small puncture from which arises a moderately long hair. Scutellum densely pubescent.

Elytra about three times as long as broad; sides nearly parallel to apical fourth, then broadly rounded; apices truncate; surface densely coarsely punctured, punctures becoming smaller toward apex; a moderately long hair arising from each depression.

Ventral surface lighter in color than above; punctures of abdomen small, not prominent.

Length 6.5 mm.; width 2 mm., paratypes varying to 8 mm. in length and 2.5 mm. in width.

The female differs from the male in length of antennae and by having a wider thorax.

Described from five specimens labeled Tucson, ARIZONA, June 4, G. Hofer collector. Male *type* and *paratypes* in writer's collection.

The species comes close to *A. cinerescens* Lec. and undoubtedly stands under that name in some collections.

A Summary of the Sucking Lice (Anoplura).

By G. F. FERRIS, Stanford University, California.

For several years the writer has been engaged upon a series of papers which have been intended—when and if completed—to constitute a systematic monograph of the Order Anoplura, the sucking lice. Thus far six parts¹ have been published, these completing the systematic review of all but a small number of genera and about twenty species. The remaining portions of the series are either entirely ready for publication or in condition to be rounded up rapidly but will probably not appear in print for some time to come owing to the existing financial situation. Because of the prospects of delay it seems justifiable to present a general summary of the results which appear from this study.

First as to the status of the Order. At one time the two

¹Stanford University Publications, University Series, Biological Sciences, Vol. 2. Six parts, 470 pages, 276 figs.

groups of the biting and the sucking lice were united into a single Order under the name Anoplura. They were later separated and for a time this name disappeared, the biting lice being recognized as the Order Mallophaga while the sucking lice were attached to the Hemiptera as a suborder, variously known as the Suctoria or Parasita. Once more they were restored to ordinal rank, various names, Pseudorhyncôta, Lipognatha, Ellipoptera, Siphunculata, being employed. And again the tendency to unite the two groups into a single Order has appeared, with resulting question as to the proper name to be employed.

Without entering into the arguments, the simple conclusion may be stated that in the writer's opinion the two groups may justifiably be recognized as distinct Orders and that for the sucking lice the name Anoplura may reasonably be retained. While without much doubt the two groups of lice are related, just as the Lepidoptera and Trichoptera are related, the differences between them are trenchant, extending much farther than the differences in mouthparts, and are not bridged by any known form. Whatever difficulty there may be in expressing this relationship properly may be ascribed to the defects of our traditional nomenclatorial system which attempts to make a very limited number of categories express a very large number of degrees of relationship. To place the Mallophaga and Anoplura under a single Order will very greatly complicate the difficulties encountered in formulating an expressive and balanced intra-ordinal classification.

This intra-ordinal classification presents problems concerning which the writer does not desire to express definite opinions until all the evidence to be derived from comparative morphological studies is in and has been carefully weighed. That the old classification of a single family, the Pediculidae, is unduly limited is evident. But the recognition of all the families that have been proposed, especially the Haematopinoididae and the Phthiridae, appears possible only by concentrating attention upon what are probably more or less superficial differences rather than upon fundamental resemblances. The consistent

use of criteria of the grade employed in establishing these two would result in the establishment of a considerable series of "families" based upon little more than generic or super-generic peculiarities of no deep-seated significance. The writer holds as a definite principle that it is the underlying thread of continuity, rather than the varying beads which are strung upon it, that should be followed if a balanced and logical classification is to be achieved.

One family which has been named in the Anoplura is valid enough but does not belong to this Order. This is the family Haematomyzidae, based upon the single species *Haematomyzus elephantis* Piaget. This has been discussed elsewhere by the writer and referred to a suborder, the Rhynchophthirina, of the Mallophaga.

One genus, *Acanthophthirius* Perkins, with a single species, *A. etheldredae* Perkins, is based upon an immature mite.

The total number of known species of Anoplura can not be stated precisely. Several named forms are still in doubt, owing to the inadequacy of original descriptions, but may possibly be recognizable at some time through circumstantial evidence or the rediscovery of the types, and some synonyms may prove to be involved. Furthermore, differences of opinion as to what constitutes a species are of considerable significance, especially in some genera, such as *Pediculus*, and considerably modify the total number. On the basis of the criteria of specific distinctness which are employed by the writer, the number of species is 200 plus or minus 2 or 3. Other authors might possibly recognize as many as 215.

The rate of growth in our knowledge of the group may be seen from the following figures. The Dalla Torre catalogue of 1909 recognized 65 species and the writer's catalogue of 1916 included 120. Both catalogues include a number of synonyms and there are some omissions in each, the synonyms, however, over-balancing the omissions so that the actual number of known species was in each case less than the number cited. Our knowledge of the species of Anoplura has therefore more than tripled since 1909.

It is interesting to speculate upon what percentage of the

existing species may now be known. Some rough idea may be formed by taking into consideration the known facts of distribution.

It may be taken as definitely established that certain large groups of mammals do not harbor sucking lice, these including the bats, the marsupials, the land carnivores (with the anomalous exception of certain Canidae), a considerable portion of the insectivores and certain families of rodents such as the Geomyidae and Erethizontidae. The groups upon which Anoplura may normally be expected to occur are the Primates, most of the rodents and the "ungulates." If we take, for example, the mammals of North America as they appear in a recent catalogue, we find that only 59% of the recognized species and subspecies are members of groups subject normally to infestation. This percentage will vary in different parts of the world, being exceedingly low in Australia with its marsupial fauna and possibly higher in Africa with its large numbers of rodents, Primates and "ungulates." Unfortunately for our purposes, no satisfactory estimate of the number of known living species of mammals in the whole world is available. The writers of two recent general zoological texts present estimates, the origins of which are not indicated, one of 7500 and the other of 15000! Trouessart in 1904 listed 9377 species, this, however, including fossil forms. There has been much activity among mammalogists since that date, particularly in the naming of subspecies and undoubtedly a great deal of synonymy is involved. Perhaps the number of known species is in the neighborhood of 10,000 and this will not be increased by many hundreds more in the future.

On this basis there are perhaps 6000 species of mammals on which Anoplura may be expected to occur. But the number of possible species of Anoplura can be no where near that figure. A single Anopluran species may range over a large number of closely related mammal species, as is the case, for example, with *Neohaematopinus sciurinus* Mjöberg, which has been recorded from about 25 host species and may be expected to occur on perhaps 100, or *Enderleinellus suturalis* (Osborn) which is recorded from 15 or more species of citelline squirrels

and probably occurs upon 50 or more. On the other hand, the situation is complicated by the fact that as many as three species of Anoplura may occur upon a single host species, as is the case with *Enderleinellus*, *Hoplopleura* and *Neohaematopinus* on *Sciurus* or *Haematopinus*, *Linognathus* and *Solenopotes* on domestic cattle, or the customary occurrence of species of both *Polyplax* and *Hoplopleura* upon many rodents.

But even so the number of Anopluran species relative to the number of possible hosts is small. The number of known possible hosts in North America is about 1300 species and subspecies. The number of Anoplura, from these hosts, including those now known and certain others not yet collected but the existence of which is almost certain, will scarcely exceed 50. On this basis the number of Anopluran species is about 4% of the number of possible hosts. Extending this to the world, we would have about 240 as the probable number of Anoplura. This is evidently too small a figure, but even so the writer would estimate that there are certainly not over 500 species of Anoplura in the world and in all probability the number is considerably less.

(To be continued)

Zur Systematik der Oribatiden (Acarina) nach Willmann (May, 1930).

By ARTHUR PAUL JACOT.

Willmann's remarks on my "Genera of Pterogasterine Oribatids" (1929) are in some instances based on misunderstanding which I hope to clear.

I believe in using the descriptions and figures of the old authors, but they must be applied to that species which most closely fits the description or figure, irrespective of earlier re-determinations. For instance *Hoplophora laevigata* Koch cannot be applied to a rough-sculptured species. Likewise one cannot apply the name *O. orbicularis* Koch to an elongate species.

Oudemans (1926), as I have already shown (1932), makes *Acarus geniculatus* Linné 1758 identical with a species