

**THE ANOPLURA AND  
MALLOPHAGA OF NORTH  
AMERICAN MAMMALS**

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The Anoplura and Mallophaga of North American Mammals by Vernon Lyman Kellogg & Gordon Floyd Ferris

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The  
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of  
North American Mammals

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## THE ANOPLURA AND MALLOPHAGA OF NORTH AMERICAN MAMMALS

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### I

#### INTRODUCTION

In the summer of 1913 the junior author, under an arrangement made by the Department of Entomology of Stanford University with Dr. Joseph Grinnell, director of the Museum of Vertebrate Zoology of the University of California, accompanied a collecting expedition of the Museum in Northern California with the privilege of examining for ectoparasites all specimens of birds and mammals taken by the expedition.

Most of the Anopluran material on which this paper is based was derived from this arrangement; but other material already in the hands of the senior author, obtained at various times from mammals taken in California and elsewhere, and certain specimens loaned by Professor Osborn of the Ohio State University and by Mr. Bruce Cummings of the British Museum (Natural History), are included in this paper.

The total Anopluran material on hand includes twenty-two species and two varieties, of which eight species and both varieties are new, and are described herewith. One of these varieties has up to now been considered and listed as a species originally described from European hosts. Only twenty-four species of Anoplura have been hitherto recorded from North American mammals, of which nine are peculiar to North American hosts (as so far known), and fifteen are species originally described from European hosts, or hosts common to both Europe and America. Our list of twenty-two includes fourteen of the twenty-four kinds heretofore listed from North America. The total number of Anopluran species now recorded (including the records in this paper) from North American mammals, is thirty-four species and two varieties.

The total Mallophagan material on hand includes eighteen species, of which one species is new. Twenty-seven species have so far been recorded from North America, of which nine occur on domesticated hosts.

The determination of the hosts of the Californian specimens of Anoplura taken by the junior author in 1913 were made by the wholly competent authorities of the Museum of Vertebrate Zoology of the University of California, and may be implicitly relied on. Great care was taken by the naturalists of the collecting expedition and by the junior author to prevent straggling of the parasites of the collected specimens, and the attributions of parasites to particular host can be confidently accepted.

We desire to express our obligations to Professor Herbert Osborn and to Mr. Bruce Cummings for permission to examine important material kindly sent to California at our request.

The types of all new species described herewith are in the collection of the Entomological Laboratory of Stanford University, California.



## II

## NORTH AMERICAN ANOPLURA

The systematic knowledge of the North American Anoplura—indeed, of the Anoplura of the world—is still very slight. Although probably most of the species infesting the domestic animals, and certainly all of those infesting man, are known, but few species have as yet been collected from wild animals. At the time of writing this paper only about a hundred species of Anoplura have been described, of which three occur on man and a dozen on domestic animals. The remaining four score have been taken from animals both of wide geographic and wide taxonomic distribution. Monkeys, wild cattle, sheep, goats, deer, elephants, the giraffe, rabbits, rats, mice, squirrels, gophers, shrews, wolves, foxes, wild cats, seals and walruses, of the Old and New Worlds, are represented in the host list, which, however, altogether includes hardly a hundred mammal species. There is no doubt, of course, that many other mammals are hosts of Anoplura; only a beginning in the recording of both parasite and host species has been made.

But this beginning, and the accompanying study of the general biology of the Anoplura and their particular relations to their hosts, both as regards the distribution, the adaptive structural modification, and the physiological fitting of the parasite species and the injury to the host species, have revealed such important problems that the collection and study of the Anoplura is certain to be pursued with an ever increasing interest and ardor.

The special problem of the host and geographic distribution of the Anoplura and Mallophaga of mammals has already been rather fully taken up by the senior author in a paper, "Ectoparasites of Mammals," published in the *American Naturalist*, vol. 48, pp. 257-279, May 1914, and a special brief discussion of certain significant aspects of the close physiological fitting of the parasites to the specific blood character of the hosts has been given by the senior author in a paper entitled "Ectoparasites of the Monkeys, Apes and Man," published in *Science*, N. S. vol. 38, pp. 601-602, October 1913.

The comparatively recent determination by the precipitins reactions and by a study of the crystallizable proteins (haemoglobin) of the spe-

cificity of the blood of different mammal kinds, and the physiological (chemico-physical) similarities of the blood of nearly related mammals as contrasted with the dissimilarities of the blood of widely related kinds, finds an interesting confirmation in the very precise host relations of the blood-sucking parasites of the mammals.

As a corollary of this precision of host-relation, there arises the possibility of the determination of the phyletic relationships of hosts on a basis of the identity or close relationship, or the non-identity or wide relationship, of their Anopluran parasites. For the proper following up of this interesting matter, however, a much wider knowledge of the Anopluran fauna is needed.

The importance from the economic and medical point of view of a knowledge of the blood-sucking parasites of mammals is, of course, apparent when we consider the new knowledge of the dissemination (and in some cases, incubation) of various germ-caused diseases. The Anoplura have already been tried and convicted of participation in this crime of aiding and abetting the germs of animal and human disease in their struggle for distribution. And they have been proved to be very suspicious characters, at least, if not yet known to be actual criminals, in relation to their possibility of serving as true alternate hosts of certain dangerous Sporozoa. At least some of these parasitic and disease-producing Sporozoa can enter, remain in, and pass from the bodies of the sucking lice with unimpaired life and virulence.

The Anoplura, then, call insistently for study; and the first need in that study is the collection of material from many hosts and the careful systematic determination of this material. We need to know how many and various are the living species of the group, and the exact facts of their geographic and, especially, host distribution. The present paper is a small contribution along this line.

## III

KEY TO THE FAMILIES, SUBFAMILIES AND GENERA OF  
THE ANOPLURA

1. Occurring exclusively on land mammals . . . . . 4
  - Occurring exclusively on marine mammals (seals, sea-lions and walruses) . Family ECHINOPHATHIRIIDAE . . . 2
2. Antennae five-segmented, thorax and abdomen bearing scales . . . . . Genus *Antarctophthirus*
  - Antennae four-segmented . . . . . 3
3. Thorax and abdomen bearing scales. Genus *Lepidophthirus*
  - Thorax and abdomen without scales . Genus *Echinophthirus*
4. Head much elongated, cylindrical in shape; tibiae without a thumb-like process opposing the claw . . . . . Family HAEMATOMYZIDAE  
(Containing but one genus, *Haematomyzus*, occurring on elephants.)
  - Head not elongated; tibiae with a thumb-like process opposing the claw . . . . . 5
5. Eyes extremely rudimentary or entirely lacking . . . . . Family HAEMATOPINIDAE . . . 9
  - Eyes present, well pigmented . Family PEDICULIDAE . . . 6
6. Antennae five-segmented (on apes and man) . . . . . Subfamily PEDICULINAE . . . 8
  - Antennae three-segmented (on monkeys) . . . . . Subfamily PEDICININAE . . . 7
7. Legs all of same size . . . . . Genus *Pedicinus*
  - Middle and posterior legs larger and stouter than anterior . . . . . Genus *Phthirpedicinus*
8. Legs all of same size . . . . . Genus *Pediculus*
  - Anterior legs smaller than the others . . . Genus *Phthirus*
9. Antennae five-segmented . . . . . 11
  - Antennae three-segmented Subfamily EUHAEMATOPININAE . . . 10
10. Posterior legs with stalked, disk-shaped appendages on femur and tibia . . . . . Genus *Euhaematopinus*
  - Posterior legs without appendages Genus *Haematopinoides*
11. Anterior legs smaller than posterior . . . . . Subfamily LINGNATHINAE . . . 12