# A STUDY OF THE MALLOPHAGA FOUND ON NORTH AMERICAN GALLINACEOUS BIRDS

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By

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## BIOGRAPHY

The writer was born near Sasakwa, Oklahoma, March 13, 1918, the son of Earle E. and Diva Elizabeth Emerson. He attended grade school in Ada, Beggs, and Cromwell, Oklahoma; and graduated in 1935 from the Cromwell High School. In the fall of 1935 he matriculated at Oklahoma Agricultural and Mechanical College from which he received the Bachelor of Science degree, with a major in Entomology, in 1939. In June, 1939, he entered the Graduate School of Oklahoma Agricultural and Mechanical College from which he received the Master of Science degree, with a major in Entomology, in 1940.

The writer entered the United States Army in 1940, and at the present time is a Major in the Infantry. Except for a period of internment in Japan, as a prisoner of war, the author since 1937 has been conducting taxonomic studies in North American Mallophaga, a part of which are described in this paper. During this period, collections were examined at the following institutions: Stanford University, California Academy of Science, Kansas State College, Bernice P. Bishop Museum, Philippine Bureau of Science, and the American Museum of Natural History.

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# PREFACE

A majority of the North American gallinaceous birds are classified as gamebirds. Much research has been conducted on their bionomics, but very little work has been done on the effect of such external parasites as the Mallophaga on the health and vigor of the birds.

Before such an ecological study can be made, it is important that the investigator know which lice species are normally found on the various birds under investigation. The identification of various species of Mallophaga normally found on North American gallinaceous bird hosts would, at present, involve the examination of more than thirty separate papers. The purpose of this study is to present in one paper keys and descriptions which the worker can use to identify all of the known species of Mallophaga found on North American gallinaceous birds. Eleven new species were encountered during the study.

Indebtedness is acknowledged to Drs. F. A. Fenton, Walter P. Taylor, Fred M. Baumgartner, and D. E. Howell for their valuable guidance, and for their assistance in the procurement of certain collections; and to the following for the loan of material used in this study: M. A. Carriker, Bucaramanga, Colombia; Oliver S. Cope, Stanford University; Theresa Clay, British Museum of Natural History; Richard B. Eads, Texas State Health Department; E. O. Essig, University of California; G. F. Ferris, Stanford University; Ephriam Hixson, University of Nebraska; Carlton M. Herman, California Fish and Game Division; G. H. E. Hopkins, Tring Museum; G. P. Holland, Ottawa, Canada; Maurice T. James, Washington State College; William L. Jellison and Robert Rausch of the U. S. Public Health Service; C. F. W. Muesebeck, Division of Insect Identification, Bureau of Entomology

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## INTRODUCTION AND LITERATURE

Many workers have included descriptions of Mallophagan species collected from North American gallinaceous birds in various papers presenting new genera and species; however, no study or publication devoted entirely to this subject has been published. A list of species, with their synonymy, described prior to, or during this study by other workers, is as follows:

| Original name | Present name |
|---|---|
| **Linnaeus 1758** | |
| *Pediculus caponis* | *Lipeurus caponis* (L.) |
| *Pediculus gallinae* | *Menopon gallinae* (L.) |
| *Pediculus lagopi* | *Goniodes lagopi* (L.) |
| *Pediculus meleagridis* | *Chelopistes meleagridis* (L.) |
| *Pediculus pavonis* | *Goniodes pavonis* (L.) |
| **DeGeer 1778** | |
| *Ricinus gallinae* | *Goniocotes gallinae* (DeG.) |
| **Olfers 1816** | |
| *Nirmus tetragonocephalus* | *Goniodes pavonis* (L.) |
| *Nirmus trigonocephalus* | *Menopon gallinae* (L.) |
| **Nitzsch 1818** | |
| *Goniodes falcicornis* | *Goniodes pavonis* (L.) |
| *Goniodes hologaster* | *Goniocotes gallinae* (DeG.) |
| *Goniodes microthorax* | *Goniocotes microthorax* (N.) |
| *Goniodes stylifer* | *Chelopistes meleagridis* (L.) |
| *Liotheum stramineum* | *Menacanthus stramineum* (N.) |
| **Children 1838** | |
| *Goniodes chelicornis* | *Goniodes lagopi* (L.) |
| *Nirmus affinis* | *Lagopoecus affinis* (Ch.) |
| **Burmeister 1838** | |
| *Goniodes dispar* | *Goniodes dispar* B. |
| *Lipeurus polytrapezius* | *Oxylipeurus polytrapezius* (B.) |
| *Lipeurus variabilis* | *Lipeurus caponis* (L.) |

Denny 1842

| | |
|---|---|
| Goniocotes hologaster | Goniodes gigas (T.) |
| Goniodes colchici | Goniodes colchici D. |
| Goniodes dissimilis | Goniodes dissimilis D. |
| Goniodes numidianus | Colinicola numidianus (D.) |
| Goniodes ortygis | Goniodes ortygis D. |
| Goniodes tetraonis | Goniodes lagopi (L.) |
| Menopon perdicis | Amyrsidea perdicis (D.) |

Grube 1851

| | |
|---|---|
| Menopon lagopi | Amyrsidea lagopi (Gr.) |

Nitzsch 1866

| | |
|---|---|
| Lipeurus heterogrammicus | Cuclotogaster heterogrammicus (N.) |
| Lipeurus heterographus | Cuclotogaster heterographus (N.) |

Rudow 1869

| | |
|---|---|
| Goniodes flaviceps | Goniodes dispar B. |

Rudow 1870

| | |
|---|---|
| Goniodes cupido | Goniodes cupido R. |
| Goniodes mamillatus | Goniodes mamillatus R. |

Packard 1870

| | |
|---|---|
| Goniocotes burnetti | Cuclotogaster heterographus (N.) |

Packard 1873

| | |
|---|---|
| Goniodes merriamanus | Goniodes merriamanus Pa. |

Giebel 1874

| | |
|---|---|
| Goniocotes chrysocephalus | Goniocotes chrysocephalus Gi. |
| Goniodes truncatus | Goniodes dispar B. |
| Menopon pallescens | Menopon pallens H. and Cl. |

Taschenberg 1879

| | |
|---|---|
| Goniocotes gigas | Goniodes gigas (T.) |

Piaget 1880

| | |
|---|---|
| Goniocotes abdominalis | Goniodes gigas (T.) |
| Goniodes dispar minor | Goniodes ortygis D. |
| Goniodes dissimilis bankiva | Goniodes dissimilis D. |
| Goniodes heteroceros | Goniodes lagopi (L.) |
| Lipeurus docophoroides | Colinicola docophoroides (Pi.) |
| Menopon biseriatum | Menacanthus stramineum (N.) |

Taschenberg 1882

| | |
|---|---|
| Rhopaloceras styliferum | Chelopistes meleagridis (L.) |

Piaget 1885

| | |
|---|---|
| Goniodes breviantennatus | Goniodes dispar B. |
| Lipeurus antennatus | Lipeurus caponis (L.) |

Theobald 1896

| | |
|---|---|
| Goniodes cynsfordii | Cuclotogaster heterographus (N.) |

Kellogg 1896

| | |
|---|---|
| Menopon longicephalum | Menopon gallinae (L.) |

Kellogg 1899

| | |
|---|---|
| Lipeurus perplexus | Lagopoecus perplexus (K.) |
| Lipeurus protervus | Lagopoecus affinis (C.) |
| Menopon striatum | Amyrsidea lagopi (G.) |

Kellogg and Chapman 1899

| | |
|---|---|
| Lipeurus docophoroides californicus | Lagopoecus californicus (K. and Ch.) |

Kellogg and Chapman 1902

| | |
|---|---|
| Lipeurus docophoroides minhaensis | Colinicola docophoroides (Pi.) |

Kellogg and Mann 1912

| | |
|---|---|
| Goniodes corpulentus | Goniodes corpulentus K. and M. |

Evans 1912

| | |
|---|---|
| Nirmus cameratus nigrescens | Lagopoecus affinis (Ch.) |

Neumann 1912

| | |
|---|---|
| Menopon pallidulum | Menacanthus pallidulum (Ne.) |

McGregor 1917

| | |
|---|---|
| Lipeurus aberrans | Colinicola numidianus (D.) |
| Lipeurus clavatus | Oxylipeurus clavatus (McG.) |

Sugimoto 1929

| | |
|---|---|
| Lipeurus variabilis formosanus | Lipeurus caponis (L.) |

Carriker 1936

| | |
|---|---|
| Cuclotogaster laticorpus | Cuclotogaster heterographus (N.) |

Simon 1938

| | |
|---|---|
| Goniodes centrocerci | Goniodes centrocerci S. |

Clay 1938

| | |
|---|---|
| Lipeurus maculosus | Lipeurus maculosus Cl. |
| Oxylipeurus colchicus | Oxylipeurus colchicus Cl. |
| Oxylipeurus corpulentus | Oxylipeurus polytrapezius (B.) |

Keler 1939

| | |
|---|---|
| Goniodes cypricus | Goniodes dispar B. |

Clay 1940

| | |
|---|---|
| Goniodes simoni | Goniodes merriamanus Pa. |

Carriker 1945

| | |
|---|---|
| Epicolinus callipeplus | Oxylipeurus callipeplus (Ca.) |

Carriker 1946

| | |
|---|---|
| Goniodes lagopi greenlandicus | Goniodes lagopi (L.) |
| Goniodes nebraskensis | Goniodes nebraskensis Ca. |

Hopkins 1947

| | |
|---|---|
| Lagopoecus gibsoni | Lagopoecus gibsoni H. |

Hopkins and Clay, In press

| | |
|---|---|
| Menopon pallens | Menopon pallens H. and Cl. |

## METHODS AND TECHNIQUES

Since it is difficult to capture birds alive, it is usually necessary to shoot them to obtain the lice. Many workers prefer to examine the birds immediately for parasites, however, the author prefers to examine them two or three hours later. Precaution must be taken to keep each bird separate, usually in a sealed paper bag, to prevent straggling by the parasites. Many of the lice start crawling off the host as soon as the body cools, which aids in collecting, but if care is not exercised, erroneous host data may result if lice are not confined to the host.

It is advisable to place the collected lice in one dram vials of seventy percent alcohol until they can be mounted. They can be dried for keeping, but there is always danger of damaging the specimens by losing the appendages which are very brittle and fragile when dry. It is best to keep a few adult and immature specimens in alcohol for future reference. The final collection should be mounted in balsam or clarite.

The mounting process employed by the author, is the one used by most workers. The lice are taken from seventy percent alcohol and washed in several changes of water. They are then transferred to a ten percent sodium or potassium hydroxide solution and heated, but not boiled, for about thirty minutes. If the crop or stomach of the louse contains feathers, these must now be removed by cutting the abdominal wall and gently forcing all of the dark material out of the abdomen. Usually the specimens require further clearing, which can be accomplished by leaving them in a cold ten percent solution of sodium or potassium hydroxide for twenty-four hours.

From this solution, the lice are placed in a five percent acetic acid solution for several hours. Then they are washed with several changes of water and placed in fifty percent alcohol. The specimens are kept about

twenty-four hours in each of the following: fifty percent alcohol, seventy percent alcohol, ninety-five percent alcohol and Beechwood creosote. From the Beechwood creosote, the specimens are placed in xylol or toluene for several hours. The agent used at this stage depends upon which is used as the solvent for the mounting medium. Balsam and clarite can be dissolved in either toluene or xylol, however, xylol is the more commonly used solvent for balsam, and toluene is recommended for clarite.

Specimens are taken from the xylol and mounted directly in a drop of rather thin balsam placed in the center of the microscope slide. Round cover glasses of 12 or 15 mm in diameter should be used. Labels should be placed on the slides as soon after mounting as possible. The data on the labels should be very complete and include the date and locality of collection, host, collector, and the mounting medium used.

The mounting technique just described has been used by the author for several years, and has proven to be satisfactory.

All drawing in this, and other papers by the author are from projected images. This technique is accomplished by placing the microscope in a horizontal position and using a strong light to project the image beyond the eye piece. The size of the image can be regulated by adjusting the distance between the eye piece and the drawing board.

## GENERAL CLASSIFICATION

The species of Mallophaga infesting gallinaceous birds which are included in this study belong to two suborders, Amblycera and Ischnocera. Each of these and other suborders have been divided into families; however, the status of these families is still undergoing change. It is believed that until a catalog of the Mallophaga now being prepared by Mr. G. H. E. Hopkins of the Tring Museum, and Miss Theresa Clay of the British Museum has been published, that a classification of genera into families should be omitted. Such a classification is dependent upon a study of all genera and species and cannot be satisfactorily determined from a study of species from a limited area or from a restricted number of host species. The genera of the suborder Amblycera listed in this paper are usually referred to the family Menoponidae, and those genera of the suborder Ischnocera are referred to the family Philopteridae.

A list of the families of Mallophaga, as currently accepted in American Literature, is as follows:

(1) Menoponidae—On birds.

(2) Boopidae—On Australian marsupials and domestic dogs.

(3) Trimenoponidae—On rodents and marsupials of Central and South America.

(4) Ricinidae—On humming birds and the Passerines.

(5) Laemobothriidae—On water birds and birds of prey.

(6) Gyropidae—On Central and South American rodents.

(7) Philopteridae—On birds (one species on a lemur of Madagascar).

(8) Trichodectidae—On mammals.

(9) Heptapsogastridae—On the Tinamous (birds) of Central and South America.

(10) Haematomyzidae—On elephants.

Some of the European workers are proposing a classification which would divide the order into thirty families. Any such revision of families is dependent upon a satisfactory classification of the various species into genera. Clay[1] has given the following commentary on the present generic classification:

> "It is usual for the systematics of any group to progress in three stages: the first, in which there are a few genera containing a number of heterogeneous species with little in common; the second, during which there is an excessive erection of new genera, many of which are monotypic; and the third, in which many of these genera are dropped, reducing the classification to a smaller number of larger genera."

It is believed by the writer that the systematics of the Mallophaga are now in the second stage, and probably will remain there for several more years. Therefore, any revision of families should be postponed.

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[1] Theresa Clay, "A Preliminary Key to the Genera of Menoponidae (Mallophaga)", Proc. Zool. Soc. Lond., CXVII, 1947, pp. 458-459.

## KEY TO THE GENERA

1. Maxillary palpi present; antennae swollen toward the free ends and when in repose largely concealed in fossae (Suborder Amblycera). 2

   Maxillary palpi wanting; antennae usually filiform, at least in the females, and always exposed. (Suborder Ischnocera) 4

2. Forehead provided ventrally with a pair of spinelike processes which arise behind the palpi. Menacanthus

   Ventral surface of the forehead without spinelike processes. 3

3. Pleural plates well developed with a row of posterior marginal setae; ventral abdominal chaetotaxy normal to heavy. Amyrsidea

   Pleural plates very narrow or non-apparent, never with posterior marginal setae; ventral abdominal chaetotaxy sparse. Menopon

4. Head wider than long. 5

   Head longer than wide. 7

5. Temples prolonged distally beyond the ocular margin. Chelopistes

   Temples not produced distally beyond the ocular margin. 6

6. Anterior margin of the pterothorax same width as the posterior margin of the prothorax. Goniodes

   Anterior margin of the pterothorax much wider than the posterior margin of the prothorax. Goniocotes

7. Antennae sexually dimorphic. 8

   Antennae filiform in both sexes. Lagopoecus

8. Males with intertergital abdominal plates, flattened endomeral plate, no penis, and sac present. Cuclotogaster

   Males without intertergital plates; genitalia of diverse form; without above combination of genitalia characters. 9

| | | |
|---|---|---|
| 9. | Head with pre-antennal chitin projections. | Oxylipeurus |
| | Head without such projections. | 10 |
| 10. | Slender form (4½ times as long as wide). | Lipeurus |
| | Robust form (2½ times as long as wide). | Colinicola |

## MORPHOLOGY AND GLOSSARY

Mallophaga, "biting lice", are very small insects, the smallest being about one millimeter in length, and the largest being more than ten millimeters in length. The insect is depressed or dorso-ventrally flattened, a morphological feature which aids very greatly in permitting these insects to escape death due to biting or scratching by the host.

The head is relatively large when compared in size with the rest of the body. In the suborder Amblycera there are lateral excavations called antennal fossae for the repose of the antennae. That part of the head in front of the antennae is referred to as the forehead. The anterior margin of the forehead is usually called the clypeal margin. The clypeal band is an anterior marginal pigmented band usually extending for the full length of the forehead and clypeal margin. If the clypeal margin is not separated from the remainder of the forehead by distinct clypeal sutures which traverse the lateral marginal bands, the head is described as circumfasciate. Just anterior to the bases of the antennae may be found short chitinous processes known as trabeculae. Just posterior to the bases of the antennae may be found the eyes. The swollen lateral margins posterior to the antennae are known as the temples. The region between the temples (or posterior margin of the head) is the occiput.

In the suborder Amblycera, the thorax is divided into three distinct parts as in most insects. In the suborder Ischnocera, however, the mesothorax and metathorax are completely fused into a single segment; the pterothorax.

The terminology used for certain abdominal structures does not entirely

conform to the latest interpretations as used by Snodgrass.[2] The term "pleurites" or "pleural plates" have been used for the plates along the lateral margin of the abdominal segments, rather than "paratergites" or "laterotergites" as used by Snodgrass. Tergites are those plates on the dorsal surface of the abdomen which lie between the pleurites. Sternites are the plates on the ventral surface of the abdomen which lie between the pleurites.

The chitinized plate to which are attached the movable parts of the male genital armature is known as the basal plate. The outer, longer pair of clasperlike structures which enclose the endomeral plate (or endomeres) and serve to open the genital aperture of the female during copulation are called parameres. The endomeres (or endomeral plate) are the thickened sclerites between and at the base of the parameres (junction with the basal plate) which support the penis and accessory parts. When the endomeres unite distally they may give rise to a structure known as the pseudopenis. The real penis, if present, is a tubular structure caudad to the position occupied by the pseudopenis.

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[2] Robert E. Snodgrass, Principles of Insect Morphology, pp. 69-82.

## GONIODES Nitzsch 1818

Germar's Mag. Ent., III, p. 293.

Genotype: Goniodes pavonis (Linnaeus 1758), by subsequent designation, Johnston and Harrison 1911. (Proc. Linn. Soc. N. S. Wales, XXXVI, p. 326).

Gonocephalus Nitzsch 1861. Z. Naturw., XVIII, p. 306. Genotype: Goniodes chelicornis Nitzsch 1818.

Astrocotes Kéler 1939. Nova Acta Leop., VIII, p. 109. Genotype: Goniodes asterocephalus (Nitzsch 1818).

Astrodes Kéler 1939. Ibid, p. 113. Genotype: Goniodes coronatus (Giebel 1874).

Gonotyles Kéler 1939. Ibid, p. 48. Genotype: Goniodes cervinicornis Giebel 1874.

Homocercus Kéler 1939. Ibid, p. 117. Genotype: Goniodes macrocephalus (Taschenberg 1882).

Margaritenes Kéler 1939. Ibid, p. 132. Genotype: Goniodes eurygaster Piaget 1885.

Oulocepis Kéler 1939. Ibid, p. 97. Genotype: Goniodes dissimilis Nitzsch 1818.

Solenodes Kéler 1939. Ibid, p. 101. Genotype: Goniodes dispar Burmeister 1838.

Stenocrotaphus Kéler 1939. Ibid, p. 124. Genotype: Goniodes gigas (Taschenberg 1879).

### Description of the genus

Head circumfasciate, clypeal margin broadly rounded. Temples angular, each lateroventral process bearing a seta or spine. Occipital margins produced posteriorly forming occipital angles, each armed with a seta.

Antennae filiform in the female; and with the first segments enlarged in a majority of the males.

Prothorax short and narrow. Pterothorax triangular in shape, without sternal plates. Meso- and metasternal setae absent on all but one species (G. pavonis (L.)).

Abdomen has large first segment with distinct or free lateral margins. Tergal plates on segments I to VII separated medianly by one-third the width of abdomen. Pleurites broad, thickened and irregular in shape. Male apparently with nine segments, the eighth of which is greatly reduced and appears only on the lateral margins. Female abdomen apparently with eight segments.

## Discussion of the genus

The genus as defined above, contains several species of diverse form, but which are related and cannot be separated into different genera if these forms are considered on a world-wide basis.

A key for the females is presented; however, it is believed that the illustrations of each species will serve as a better means of separation. The abdominal chaetotaxy, in tabular form, has been given for most of the species. Although the addition or loss of two or three setae in a group is not of specific importance, the presence or absence of certain setae is in many cases a diagnostic character. In the discussion of species which follows, the first and third number of tergal setae listed refer to the lateral post-spiracular setae, and the middle number to the median-lateral tergal setae.

## Key to the females

| | | |
|---|---|---|
| 1. | Meso and metasternal setae present. | *pavonis* |
| | Without meso and metasternal setae. | 2 |
| 2. | Sternal plates on abdominal segments II-VI divided into two parts on each side. | *gigas* |
| | Sternal plates on abdominal segments undivided. | 3 |
| 3. | Posterior margin of the vulva with five lobes | *dissimilis* |
| | Posterior margin of the vulva with not more than three lobes. | 4 |
| 4. | Concentration of setae at the posterolateral angles of the vulva. | 8 |
| | No concentration of setae at the posterolateral angles of the vulva. | 5 |
| 5. | Spinous processes near the posterolateral angles of the vulva. | 6 |
| | No spinous processes near the vulva. | 7 |
| 6. | Vulva with two long setae. | *ortygis* |
| | Vulva with four long setae. | *mamillatus* |
| 7. | Second antennal segment as long as the combined length of the third, fourth and fifth. | *submamillatus* |
| | Second antennal segment only slightly longer than the third or fourth or fifth. | *squamatus* |
| 8. | Spinous processes near the posterolateral angles of the vulva. | *picta* |
| | No spinous processes near the vulva. | 9 |
| 9. | Setae on the posterior margin of the vulva. | *cupido* |
| | Posterior margin of the vulva without setae. | 10 |
| 10. | Spinous processes near the vulva, straight and extremely small. | *centrocerci* |
| | Spinous processes near the vulva, large or normal sized and curved. | 11 |
| 11. | Dorsal chaetotaxy of the first abdominal segment, 2-6-2. | 12 |

Dorsal chaetotaxy of the first abdominal segment, 2-8-2. 15

Dorsal chaetotaxy of the first abdominal segment, 1-6-1. bonasus

12. Lateral margins of the vulva long, straight and parallel to the sides of the abdomen. merriamianus

Lateral margins of the vulva short and irregular in shape. 13

13. Dorsal chaetotaxy of second and third abdominal segments, 2-8-2. 14

Dorsal chaetotaxy of second and third abdominal segments, 2-6-2. nebraskensis

14. Lateral margin of the vulva without setae or spines. corpulentus

Lateral margin of the vulva with numerous short setae or spines. dispar

15. Seven to ten setae in the concentration at each posterolateral angle of the vulva. lagopi

Twelve to fifteen setae in the concentration at each posterolateral angle of the vulva. colchicus

## GONIODES BONASUS Emerson 1948
## (Plate IV, figures 1-4)

J. Kans. Ent. Soc., XXI, p. 92, f. 1-4.

Type host: Bonasa umbellus (probably) umbelloides (Douglas), Gray Ruffed Grouse.

Antennae sexually dimorphic. Temples exhibiting sexual dimorphism in shape, being expanded in the female to a width greater than in the preantennal region; temples not expanded in the male. Females about 2.6 mm and males about 2.0 mm in length. Male genitalia, plate IV, figure 3; female genital region, plate IV, figure 4.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 6-2-6 | 1-6-1 | 0 | 0 | 2 | 3 |
| II | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-8-2 | 2 | 2 | 4 | 3 |
| V | 2-2-2 | 3-6-3 | 2 | 2 | 4 | 4 |
| VI | 2-2-2 | 3-4-3 | 2 | 2 | 4 | 4 |
| VII | 4-2-4 | 5-2-5 | 2 | 2 | 3 | 4 |

Material was examined from the following hosts: Bonasa umbellus umbelloides (Douglas), Gray Ruffed Grouse--Ravalli County, Montana; and Bonasa umbellus umbellus (Linnaeus), Eastern Ruffed Grouse--Delmar, New York.

GONIODES CENTROCERCI Simon 1938
(Plate II, figure 2; Plate III, figure 5)

J. Kans. Ent. Soc., XI, p. 104, f. 1-4.

Type host: Centrocercus urophasianus (Bonaparte), Sage Grouse.

Antennae sexually dimorphic. Temples expanded in both sexes to a width greater than in the preantennal region. The ventral processes on the female genital region are unusually small. Females about 2.8 mm and males about 2.0 mm in length. Male genitalia, plate III, figure 5; and female genital region, plate II, figure 2.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 3-2-3 | 2-4-2 | 0 | 0 | 2 | 3 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| II | 3-2-3 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 3-2-3 | 2-6-2 | 2 | 2 | 3 | 3 |
| IV | 3-2-3 | 3-8-3 | 2 | 2 | 3 | 3 |
| V | 3-2-3 | 3-6-3 | 2 | 2 | 3 | 4 |
| VI | 3-2-3 | 3-6-3 | 4 | 2 | 3 | 4 |
| VII | 4-2-4 | 3-2-3 | 2 | 2 | 4 | 3 |

Material was examined which had been collected from the Sage Grouse collected from the following localities: Burns, and Lake County, Oregon; Fergus County, Montana; Dixon, Wyoming; and Mayfield, Idaho.

Published records of collections from the Sage Grouse are from Wyoming and Nebraska.

## GONIODES COLCHICI Denny 1842
## (Plate II, figure 3; and Plate III, figure 1)

Monog. Anoplur. Brit., p. 56 and 158, Pl. XII, f. 4.

Type host: Phasianus colchicus.

Antennae sexually dimorphic. Temples exhibiting sexual dimorphism in shape, being expanded in the female to a width greater than in the preantennal region; and not expanded in the male. Females about 2.8 mm and males about 2.2 mm in length. Male genitalia; plate III, figure 1 and female genital region; plate II, figure 3.

### Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 2-2-2 | 2-8-2 | 0 | 0 | 2 | 2 |
| II | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| III | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-8-2 | 2 | 2 | 4 | 3 |
| V | 3-2-3 | 2-8-2 | 2 | 2 | 4 | 4 |
| VI | 3-2-3 | 2-6-2 | 4 | 2 | 4 | 4 |
| VII | 3—3 | 3-4-3 | 2 | 2 | 4 | 4 |

Material collected from Ring-necked Pheasant, Phasianus colchicus torquatus Gmelin, taken from the following localities was examined: Ames, Iowa; Berkeley, California; Corvallis, Oregon; Hamilton and Woodside, Montana; and Toronto, Ontario.

This species has been recorded as G. mamillatus from the Ring-necked Pheasant collected in Ohio.

GONIODES CORPULENTUS Kellogg and Mann 1912
(Plate II, figure 7; and Plate III, figure 9)

Ent. News, XXIII, p. 14, f. 1-2.

Type host: Canachites canadensis canadensis (Linnaeus), Hudsonian Spruce Partridge.

Antennae sexually dimorphic. Temples exhibiting sexual dimorphism in shape, being expanded in the female to a width greater than in the preantennal region; and only slightly expanded in the male. Females about 2.5 mm and males about 2.0 mm in length. Male genitalia; plate III, figure 9 and female genital region; plate II, figure 7.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 2-2-2 | 2-6-2 | 0 | 0 | 2 | 2 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| II | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-4-2 | 2 | 2 | 3 | 3 |
| V | 2-2-2 | 2-4-2 | 2 | 2 | 4 | 4 |
| VI | 2-2-2 | 2-2-2 | 4 | 4 | 4 | 4 |
| VII | 2-2-2 | 3---3 | 2 | 2 | 3 | 4 |

Material from the following hosts was examined: Canachites canadensis canadensis (Linnaeus), Hudsonian Spruce Partridge--Churchill, Manitoba; and Cook's Inlet, Alaska. Canachites canadensis canace (Linnaeus), Canadian Spruce Partridge--Armstrong, and Nakina, Ontario. Canachites franklinii (Douglas), Franklin's Grouse--Beaverhead County, Montana.

Published records include only the original collection from which the species was described; the specimens were collected at Norton Sound, Alaska.

## GONIODES CUPIDO Rudow 1870
## (Plate II, figure 9 and Plate III, figure 4)

Z. Naturw., XXXV, p. 482.

Type host: Tympanuchus cupido pinnatus (Brewster), Greater Prairie Hen.

Antennae and temples exhibiting sexual dimorphism. Ventrally, last abdominal segment with a pair of patches of long setae; in the male. Females about 2.6 mm and males about 2.2 mm in length. Male genitalia; plate III, figure 4 and female genital region; plate II, figure 9.

### Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 4-2-4 | 1-6-1 | 2 | 0 | 2 | 3 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| II | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-6-2 | 4 | 2 | 3 | 3 |
| V | 2-2-2 | 2-6-2 | 4 | 2 | 4 | 4 |
| VI | 3-2-3 | 2-4-2 | 2 | 2 | 4 | 4 |
| VII | 4——4 | 4-2-4 | | | 4 | 4 |

Material was examined from the following hosts: Tympanuchus cupido pinnatus (Brewster), Greater Prairie Hen—Osage County, Oklahoma; Nebraska; and Lac des Roches, Canada. Tympanuchus pallidicinctus (Ridgway), Lesser Prairie Hen—Arnett and Ellis County, Oklahoma.

Published records are from Tympanuchus cupido pinnatus (Brewster), Greater Prairie Hen, collected in Texas.

## GONIODES DISPAR Burmeister 1838
## (Plate II, figure 11 and Plate III, figure 2)

Handb. Ent., II, p. 432.

Goniodes flaviceps Rudow 1869. Beitr. zür Kenn. Mall., p. 28.

Goniodes truncatus Giebel 1874. Insecta Epizoa, p. 194.

Goniodes breviantennatus Piaget 1885. Les Pediculines, Suppl., p. 50, Pl. V, f. 8.

Solenodes cypricus Kéler 1939. Nova Acta Leop., VIII, p. 107, f. 56.

Type host: Perdix perdix perdix (Linnaeus), Hungarian Partridge.

Antennae exhibiting sexual dimorphism. Temples expanded and similar in both sexes. The distal post-axial angle of the third antennal segment of the male prolonged parallel to the fourth. Females about 3.3 mm and males about 2.6 mm in length. Male genitalia; plate III, figure 2 and female genital region; plate II, figure 11.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 4-2-4 | 2-6-2 | 2 | 2 | 2 | 2 |
| II | 3-2-3 | 2-8-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| V | 2-2-2 | 2-4-2 | 2 | 2 | 4 | 4 |
| VI | 3-2-3 | 2-4-2 | 2 | 2 | 4 | 4 |
| VII | 3---3 | 2-2-2 | 2 | 2 | 4 | 4 |

Material examined from the Hungarian Partridge was collected as follows: Richmond, Virginia; Ravalli County, Montana; Pilot Rock, Ohio; Pullman, Washington; Regina, Saskatchewan; Ellerstie, Prince Edwards Island; and Berkeley, California.

This species has been recorded from the Hungarian Partridge collected in Quebec, P. Q.

## GONIODES LAGOPI (Linnaeus 1758)
(Plate II, figure 1 and Plate III, figure 6)

Systema Naturae, 10th Ed., p. 614.

Goniodes chelicornis Children 1836. App. Bach's Arctic Land Exp., p. 539.

Goniodes tetraonis Denny 1842. Monog. Anoplur. Brit., p. 57 and 161 (partim).

Goniodes heteroceros Piaget 1880. Les Pediculines, p. 251 (partim).

Goniodes lagopi greenlandicus Carriker 1945. Rev. Acad. Colomb. Sci., VI, p. 359, f. 9.

Type host: Lagopus lagopus.

Antennae exhibiting sexual dimorphism. Temples expanded and similar in both sexes. Clypeal band narrow. Females about 2.5 mm and males about 2.2 mm in length. Male genitalia; plate III, figure 6 and female genital region; plate II, figure 1.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 4-2-4 | 2-8-2 | 0 | 0 | 2 | 2 |
| II | 3-2-3 | 2-8-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-8-2 | 2 | 2 | 3 | 3 |
| V | 2-2-2 | 3-8-3 | 2 | 2 | 4 | 4 |
| VI | 3-2-3 | 3-8-3 | 4 | 2 | 4 | 4 |
| VII | 3---3 | 4---4 | 2 | 2 | 4 | 4 |

Material was examined from the following hosts: Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan—Quebec, P. Q.; Craig Harbour and Pangnirtung, N. W. T.; Les Pas, Manitoba; and Kapuskesing and Smoky Falls, Ontario. Lagopus lagopus alexandrae J. Grinnell, Alexander's Ptarmigan—Pitmatalik and Kodiak Island, Alaska. Lagopus lagopus leucopterus Taverner, Baffin Island Ptarmigan—Lake Harbour, Baffin Island. Lagopus lagopus alascensis Swarth, Alaska Willow Ptarmigan—Point Barrow and Golovin, Alaska. Lagopus mutus rupestris (Gmelin), Rock Ptarmigan—Southhampton Island, Canada.

Published records are as follows: Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan—Churchill, Canada. As G. tetraonis (L.), from Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan—Wolstenholine, P. Q. As G. l. greenlandicus C., from Lagopus mutus rupestris (Gmelin), Rock

Ptarmigan—Jensen Island, Greenland. As G. mamillatus R., from Lagopus lagopus alexandrae J. Grinnell, Alexander's Ptarmigan—Kodiak Island, Alaska; from Lagopus mutus rupestris (Gmelin), Rock Ptarmigan—Alaska and Northwest Territories; and from Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan—Alaska and Northwest Territories.

GONIODES MAMILLATUS Rudow 1870
(Plate II, figure 8 and Plate III, figure 3)

Z. Naturw., XXXV, p. 483.

Type host: Lophortyx californica californica (Shaw), Valley Quail.

Antennae exhibiting sexual dimorphism. Temples exhibiting sexual dimorphism in shape, being expanded in the female to a width greater than in the preantennal region; and not expanded in the male. No concentration of setae at the lateral corners of the vulva. Females about 2.2 mm and males about 1.8 mm in length. Male genitalia; plate III, figure 3 and female genital region; plate II, figure 8.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 3-4-3 | 1-4-1 | 2 | 2 | 2 | 2 |
| II | 2-4-2 | 1-4-1 | 2 | 2 | 3 | 3 |
| III | 2-4-2 | 2-4-2 | 2 | 2 | 3 | 3 |
| IV | 2-4-2 | 2-4-2 | 2 | 2 | 4 | 3 |
| V | 2-2-2 | 2-4-2 | 2 | 2 | 4 | 4 |
| VI | 2-2-2 | 2-4-2 | 2 | 2 | 4 | 4 |
| VII | 3—3 | 2-2-2 | 2 | 2 | 4 | 4 |

Material was examined from the following hosts: Lophortyx californica

brunnescens Ridgway, California Quail—Tehama County and Woodland, California. Lophortyx californica californica (Shaw), Valley Quail—Hastings Natural History Reservation and Chino, California.

Published records are as follows: Lophortyx californica californica (Shaw), Valley Quail—Mountain View, California; and Lophortyx gambelii gambelii Gambel, Gambel's Quail, collected in California.

## GONIODES MERRIAMANUS Packard 1873
## (Plate II, figure 5 and Plate III, figure 7)

Sixth Ann. Rept. U. S. Geol. Surv., p. 731, f. 2.

Goniodes simoni Clay 1940. Proc. Zool. Soc. Lond., Ser. B, CX, p. 44, t. f. 28.

Type host: Dendragapus obscurus richardsonii (Douglas), Richardson's Grouse.

Antennae sexually dimorphic. Temples expanded in both sexes to a width greater than in the preantennal region. Females about 2. 5 mm and males about 2.0 mm in length. Male genitalia; plate III, figure 7 and female genital region; plate II, figure 5.

### Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 3-2-3 | 2-6-2 | 0 | 0 | 2 | 2 |
| II | 3-2-3 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 3-2-3 | 2-6-2 | 2 | 2 | 3 | 3 |
| IV | 3-2-3 | 3-6-3 | 2 | 2 | 3 | 3 |
| V | 3-2-3 | 3-6-3 | 2 | 2 | 4 | 4 |
| VI | 3-2-3 | 3-6-3 | 2 | 2 | 4 | 4 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| VII | 4-2-4 | 3-4-3 | 4 | 4 | 4 | 3 |

Material was examined from the following hosts: Dendragapus obscurus obscurus (Say), Dusky Grouse—Wyoming. Dendragapus obscurus richardsonii (Douglas), Richardson's Grouse—Tin Cup District, and Ravalli County, Montana.

This species has been recorded as G. simoni Cl. from Dendragapus o. obscurus (Say), Dusky Grouse, from Utah and Colorado.

## GONIODES NEBRASKENSIS Carriker 1946
## (Plate II, figure 10 and Plate III, figure 8)

Rev. Acad. Colomb. Sci., VI, p. 357, f. 6-9.

Type host: Pedioecetes phasianellus campestris Ridgway, Prairie Sharp-tailed Grouse.

Antennae sexually dimorphic. Temples expanded to a width greater than in the preantennal region only in the female. Females about 2.8 mm and males about 2.2 mm in length. Male genitalia; plate III, figure 8 and female genital region; plate II, figure 10.

### Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 4-4-4 | 2-6-2 | 0 | 0 | 2 | 2 |
| II | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| V | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| VI | 2-2-2 | 3-4-3 | 4 | 4 | 4 | 4 |
| VII | 4-2-4 | 4-2-4 | 2 | 2 | 3 | 3 |

Material was examined from the following hosts: Pedioecetes phasianellus jamesi Lincoln, Great Plains Sharp-tailed Grouse—Grafton, North Dakota. Pedioecetes phasianellus columbianus (Ord), Columbian Sharp-tailed Grouse—Ravalli County, Montana. Pedioecetes phasianellus phasianellus (Linnaeus), Northern Sharp-tailed Grouse—Vivian, Manitoba; Port Arthur, Nakina, and Smoky Falls, Ontario; and Timmins, Ontario.

Published records are: Pedioecetes phasianellus campestris Ridgway, Prairie Sharp-tailed Grouse collected in Sioux County, Nebraska. As G. mamillatus R., from Pedioecetes phasianellus columbianus (Ord), Columbian Sharp-tailed Grouse collected in Pullman, Washington.

## GONIODES ORTYGIS Denny 1842
(Plate II, figure 6 and Plate III, figure 10)

Monog. Anoplur. Brit., p. 56 and 158, Pl. XIII, f. 6.

Goniodes dispar minor Piaget, 1880. Les Pediculines, p. 248.

Type host: Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite.

Antennae sexually dimorphic. Temples expanded to a width greater than in the preantennal region in both sexes. The distal post-axial angles of the male third antennal segments prolonged at right angles to the fourth. Females about 2.3 mm and males about 1.6 mm in length. Male genitalia; plate III, figure 10 and female genital region; plate II, figure 6.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 25 | 0-4-0 | 2 | 2 | 2 | 2 |
| II | 25 | 2-6-2 | 2 | 2 | 3 | 3 |
| III | 25 | 3-8-3 | 2 | 2 | 3 | 3 |
| IV | 4-12-4 | 2-8-2 | 2 | 2 | 3 | 3 |
| V | 2-10-2 | 3-6-3 | 2 | 2 | 4 | 4 |
| VI | 2——2 | 2-4-2 | 2 | 2 | 4 | 4 |
| VII | 2——2 | 2-4-2 | 2 | 2 | 4 | 4 |

Material was examined from the following hosts: Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite—Halifax, North Carolina; Ames, Iowa; Valdosta, and Beachton, Georgia; Somerset, and Laurel, Maryland; Columbus, Ohio; Foley, Alabama; Georgetown, South Carolina; and Stillwater, and Cromwell, Oklahoma. Colinus virginianus texanus (Lawrence), Texas Bobwhite—Uvalde, Texas; Woodside, Montana; Whitman County, Washington; and Sayries Island, Oregon. Colinus virginianus floridanus (Coues), Florida Bobwhite—Jefferson County, Florida.

This species has been recorded from the following collections: Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite—Washington, D. C.; Colinus virginianus floridanus (Coues), Florida Bobwhite—Florida; and Colinus virginianus texanus (Lawrence), Texas Bobwhite—Texas.

GONIODES PICTA N. SP.
(Plate V, figures 1-3)

Female. Head circumfasciate; clypeal margin broadly rounded with prominent angles. Temples angular with lateroventral processes, each bearing one long seta and one short seta. Head wider than long, greatest

width at the slightly expanded temples. Prothorax short and narrow. Pterothorax short and wide, without lateral indications of meso-metathoracic junctions. Dorsal chaetotaxy of the head and thorax as shown in plate V, figure 1a. Legs characteristic of the genus. Abdomen large and elongate. Genital region as shown in plate V, figure 3a. Vulva with short marginal setae and with concentrations of setae at each posterolateral angle. Spinous processes absent.

Male. Head and thorax as shown in plate V, figure 1b. Abdomen shorter and more rounded than in female. Genitalia (plate V, figure 2) distinctive and prominent. Chaetotaxy of terminal abdominal segments as shown in plate V, figure 3b.

Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 5-2-5 | 2-4-2 | 2 | 0 | 2 | 2 |
| II | 2-2-2 | 2-4-2 | 2 | 3 | 2 | 2 |
| III | 2-4-2 | 2-4-2 | 2 | 3 | 3 | 2 |
| IV | 2-2-2 | 2-6-2 | 2 | 3 | 3 | 3 |
| V | 2-2-2 | 2-4-2 | 2 | 3 | 4 | 4 |
| VI | 3-2-3 | 1-2-1 | 2 | 2 | 4 | 4 |
| VII | 3-2-3 | 1-2-1 | 2 | 2 | 3 | 3 |

Holotype male, allotype female and paratypes from Oreortyx picta picta (Douglas), Plumed Mountain Quail, collected on the Hastings Natural History Reservation, California; by Dr. Oliver B. Cope.

## GONIODES SUMAMILLATUS N. SP.
(Plate V, figures 4-6)

Female. Head circumfasciate; clypeal margin broadly rounded with prominent angles. Head almost as long as wide. Temples slightly wider than preantennal region of head. Prothorax short and narrow. Pterothorax short and wide, without lateral indications of meso-metathoracic junctions. Dorsal chaetotaxy of head and thorax shown in figure 4a. Legs characteristic of the genus. Abdomen large and elongate. Genital region shown in plate V, figure 6a. Vulva with marginal setae but without concentrations of setae at the posterolateral angles. Spinous processes absent.

Male. Head and thorax shown in plate V, figure 4b. Abdomen shorter and more rounded than in female. Genitalia (plate V, figure 5) easily distinguishes this form from all other known species. Chaetotaxy of terminal abdominal segments, shown in plate V, figure 6b.

### Abdominal chaetotaxy

| Segment | Tergites | | Sternites | | Pleurites | |
|---|---|---|---|---|---|---|
| | M | F | M | F | M | F |
| I | 2-2-2 | 1-4-1 | 2 | 2 | 3 | 1 |
| II | 2-2-2 | 2-2-2 | 2 | 2 | 3 | 3 |
| III | 2-2-2 | 2-6-2 | 2 | 2 | 3 | 3 |
| IV | 2-2-2 | 2-4-2 | 2 | 2 | 3 | 4 |
| V | 2-2-2 | 2-4-2 | 2 | 2 | 3 | 4 |
| VI | 2-2-2 | 2-4-2 | 2 | 2 | 3 | 4 |
| VII | 2-2-2 | 2-2-2 | 2 | 2 | 3 | 4 |

Holotype male, allotype female and paratypes from Cyrtonyx montezumae mearnsi Nelson, Mearns's Quail; collected by Dr. D. M. Gorsuch in Florida Canyon of the Santa Rita Mountains, Arizona.

## GONIODES SQUAMATUS N. SP.
(Plate VI, figures 7-9)

Female. Head circumfasciate; clypeal margin broadly rounded with prominent angles. Clypeal band narrow. Head wider than long, greatest width at the slightly expanded temples. Antennae filiform. Prothorax short and narrow with one long seta in each posterolateral angel. Pterothorax short and wide, almost triangular in shape. Legs normal for the genus. Abdomen large and oval-shaped. Vulva with marginal setae and without concantrations of setae at the posterolateral angles. Spinous processes absent. Dorsal and ventral chaetotaxy as shown in plate VI, figure 7.

Male. Head as wide as long; greatest width in the preantennal region. Clypeal margin broadly rounded with prominent angles. First three antennal segments enlarged. Prothorax and pterothorax as in the female. Abdomen shorter and more rounded than in the female. Genital opening with a marginal row of setae. Dorsal and ventral chaetotaxy as shown in plate VI, figure 8. Genitalia shown in plate VI, figure 9.

Holotype male, allotype female and paratypes from Callipepla squamata pallida Brewster, Arizona Scaled Partridge; collected by J. L. Greenwald at Albuquerque, New Mexico. Paratypes also from the same host collected at Sheffield, and Fort Stockton, Texas.

## GONIODES GIGAS (Taschenberg 1879)
(Plate I, figures 4-6)

Goniocotes hologaster Denny 1842. Monog. Anoplur. Brit., p. 56 and 153, Pl. XIII, f. 4.

Goniocotes gigas Taschenberg 1879. Z. Naturw., LII, p. 104, Pl. I, f. 10. (Nom. nov. for hologaster Denny.)

Goniocotes abdominalis Piaget 1880. Les Pediculines, p. 238, Pl. XX, f. 9.

Type host: Guinea Fowl.

Antennae similar in both sexes. Temples similar in both sexes, being only slightly expanded and not produced to a width greater than in the preantennal region. Female, plate I, figure 4; and male, plate I, figure 5. Male genitalia; plate I, figure 6. Abdominal chaetotaxy as shown in plate I, figures 4 and 5.

Numerous specimens were examined which had been collected from domestic poultry from many regions of North America.

## GONIODES DISSIMILIS Denny 1842
(Plate I, figures 1-3)

Goniodes dissimilis Nitzsch 1818. Germar's Mag. Ent., III, p. 294.

Goniodes dissimilis Denny 1842. Monog. Anoplur. Brit., p. 57 and 162, Pl. XII, f. 6.

Goniodes dissimilis var. bankiva Piaget 1880. Les Pediculines, p. 269, Pl. XXII, f. 3a.

Type host: Domestic Chicken.

Antennae sexually dimorphic. Temples exhibiting sexual dimorphism in shape, being greatly expanded in the female and not expanded in the male. Female; plate I, figure 1 and male; plate I, figure 2. Male genitalia; plate I, figure 3. Abdominal chaetotaxy as shown in plate I, figures 1 and 2.

Numerous specimens were examined which had been collected from domestic poultry from many regions of North America.

## GONIODES PAVONIS (Linnaeus 1758)
## (Plate II, figure 4 and Plate III, figure 11)

Systema Naturae, 10th Ed., p. 613.

Nirmus tetragonocephalus Olfers 1816. De Veg. et Anim. Corp. in Corp. Anim. Ref. Comm., p. 90.

Goniodes falcicornis Nitzsch 1818. Germar's Mag. Ent. III, p. 293.

Type host: Domestic Peafowl.

Antennae sexually dimorphic, first segments of the male antennae with thickened processes. Temples similar in the two sexes, not expanded beyond the preantennal region. Females about 4.5 mm and males about 3.7 mm in length. This species is characterized by the very large male genitalia (Plate III, figure 11) which occupies a large portion of the abdomen.

Material was examined which had been collected from domestic peafowls in Oklahoma and California.

## CHELOPISTES Kéler 1939

Nova Acta Leop., VIII, p. 180.

Virgula Clay 1941. Parasit., XXXIII, p. 120.

Trichodomedea Carriker 1945. Rev. Acad. Colomb. Sci., VI, p. 365.

Genotype: Chelopistes meleagridis (Linnaeus 1758).

### Description of the genus

Head circumfasciate; temples prolonged distally. Antennae sexually dimorphic. In the male antennae, the distal pre-axial angles of the third segments are produced. Antennae filiform in the female.

Prothorax short and narrow, with one setae in each posterolateral angle. Pterothorax large; almost triangular in shape. A large sternal plate located centrally, bearing numerous setae. Legs normal.

Abdomen somewhat elongated and pointed posteriorly. First segment small in both sexes. In the male, segments VIII and IX are fused and elongated. In the female, segment X is comparatively large and has well-marked tergal plates separated medianly. The female genital region is without particular distinguishing marks. Male genitalia is distinctive.

### Discussion of the genus

This genus is found on members of the families Cracidae, Meleagrididae, and certain genera (Dendrortyx and Odontophorus) of the family Phasianidae. Of these hosts, only certain turkeys are included in this study; resulting in only one species being included.

## CHELOPISTES MELEAGRIDIS (Linnaeus 1758)
## (Plate VII, figures 1-3)

Systema Naturae, 10th Ed., p. 613.

Goniodes stylifer Nitzsch 1818. Germar's Mag. Ent., III, p. 294.

Rhopaloceras styliferum Taschenberg 1882. Nova Acta Leop., XLIV, p. 47.

Type host: Domestic Turkey.

The male (plate VII, figure 2); the female (plate VII, figure 1); and the male genitalia (plate VII, figure 3) are illustrated completely.

Material was examined from the following hosts: Meleagris gallopavo silvestris Vieillot, Eastern Turkey—Virginia; Lawton, Oklahoma; and Huntingdon County, Pennsylvania. Meleagris gallopavo merriami Nelson, Merriam's Turkey—Apache National Forest, Arizona. Domestic Turkey—Oklahoma and Los Angeles, California.

This species has been recorded from the domestic turkey and from Merriam's Turkey collected in Texas.

## COLINICOLA Carriker 1945

Rev. Acad. Colomb. Sci., VI, p. 360.

Genotype: Colinicola numidianus (Denny 1842).

### Description of the genus

Head circumfasciate, clypeal margin rounded or pointed. Temples rounded; no wider than preantennal region. Antennae sexually dimorphic. The first segments of the male antennae enlarged, but without appendages. The first segments of the female antennae somewhat thickened, but short. Trabeculae prominent in both sexes.

Prothorax well developed, with rounded sides. Pterothorax triangular in shape, without sternal plates. Legs normal in appearance.

Abdomen apparently with nine segments. Pleural plates normal; tergal plates well developed and separated medianly. Male genitalia massive and prominent.

### Discussion of the genus

The members of this genus are as large as those of Goniodes. The appearance and structure of the head and thoracic segments are very similar to those found in Cuclotogaster; however, the male genitalia are probably closer to those of the genus Lagopoecus.

Four species of this genus are now known from the United States; and none have been collected from Canada or Alaska. In C. mearnsi Emerson and C. numidianus (Denny), the clypeal margin is broad and evenly rounded; while, C. docophoroides (Piaget) and C. pallida Emerson, each have a narrow clypeal margin which is very pointed.

## COLINICOLA DOCOPHOROIDES (Piaget 1880)
(Plate VIII, figure 1)

Les Pediculines, p. 357, Pl. XXVIII, f. 9.

Lipeurus docophoroides var. minhaensis Kellogg and Chapman 1902. N. Y. Ent. Soc., X, p. 159.

Type host: Lophortyx californica californica (Shaw), Valley Quail.

Clypeal margin very pointed. Prothorax and pterothorax approximately the same length. Abdominal tergal plates of the male armed on the posterior margins as follows: I-12, II-16, III-20, IV-20, V-18, VI-12 and VII-8. Females about 2.0 mm and males about 1.6 mm in length. Male genitalia; (plate VIII, figure 1) extends internally almost the full length of the abdomen.

Material was examined from the following hosts: Lophortyx californica californica (Shaw), Valley Quail--Hastings Natural History Reservation, and Chino, California. Lophortyx californica brunnescens Ridgway, California Quail--Tehama and San Mateo Counties, California.

This species has previously been recorded from Lophortyx californica californica (Shaw), Valley Quail; without locality data.

## COLINICOLA MEARNSI Emerson 1948
(Plate IX, figures 4-6)

J. Kans. Ent. Soc., XXI, p. 137, Pl. II, f. 4-6.

Type host: Cyrtonyx montezumae mearnsi Nelson, Mearns's Quail.

Clypeal margin rounded. Prothorax shorter than pterothorax. Abdominal tergal plates of the male armed on the posterior margins as follows: I-10, II-18, III-18, IV-18, V-16, VI-16 and VII-12. Females about 2.5 mm and males about 2.0 mm in length. Male genitalia; plate IX, figure 6.

The only material examined was the type series collected at Nogales, Arizona.

## COLINICOLA NUMIDIANUS (Denny 1842)
(Plate IX, figure 7)

Monog. Anoplur. Brit., p. 57 and 163, Pl. XIII, f. 7.

Lipeurus aberrans McGregor 1917. Psyche, XXIV, p. 112, Pl. VII, f. 1.

Type host: Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite.

Clypeal margin rounded. Prothorax longer than pterothorax. Abdominal tergal plates of the male armed on the posterior margins as follows: I-14, II-28, III-28, IV-32, V-30, VI-22, and VII-10. Females about 2.6 mm and males about 2.1 mm in length. Male genitalia; plate IX, figure 7.

Material examined was collected from Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite, from Stillwater, and Cromwell, Oklahoma; St. Cloud, Florida; Valdosta, Georgia; and Columbus, Ohio.

Published records are as follows: As L. aberrans McG., from Colinus virginianus texanus (Lawrence), Texas Bobwhite--Columbus, Ohio; Maryland; and South Carolina. From Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite--Guntersville, Alabama. As L. numidianus (D.), from Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite--Washington, D. C.; and from Colinus virginianus floridanus (Coues), Florida Bobwhite--Florida.

## COLINICOLA PALLIDA Emerson 1949
(Plate VIII, figure 2)

In press, Ent. News.

Type host: Callipepla squamata pallida Brewster, Arizona Scaled

Partridge.

Clypeal margin pointed. Prothorax slightly shorter than pterothorax. Abdominal tergal plates of the male, each armed on the posterior margin as follows: I-8, II-16, III-16, IV-16, V-12, VI-8, and VII-6. Females about 2.0 mm and males about 1.6 mm in length. Male genitalia; plate VIII, figure 2.

The only material examined was the type series collected in Pecos County, Texas.

## CUCLOTOGASTER Carriker 1936

Proc. Acad. Nat. Sci. Philad., LXXXVIII, p. 67.

Genotype: Cuclotogaster heterographus (Nitzsch 1866).

Gallipeurus Clay 1938. Proc. Zool. Soc. Lond., Ser. B, CVIII, p. 135.

### Description of the genus

Head circumfasciate; temples swollen. Antennae sexually dimorphic; in the male, the first segments enlarged without appendages, and the third segments produced distally into a thickened point. Occipital bands and signature present.

Prothorax short and without lateral setae, but with long posterolateral setae. Pterothorax with visible meso-metathoracic division on the lateral margins. Legs, normal-sized.

Abdomen elongately oval. Wide tergal plates separated medianly. Pleurites broad, and irregular in shape. Sternal plates median and semi-circular in shape. Male genitalia with flattened endomeral plate; sac present.

### Discussion of the genus

This genus is normally found on gallinaceous hosts of the Old World; and has not been collected from any of the native North American birds. One species, C. heterographus, normally found on domestic chickens, may prove to be of economic importance on game birds. In collections of Mallophaga from hatchery-reared Ring-necked Pheasants, from Ontario, Canada, Ithaca, N. Y., and from the California Game Farm, this species comprised about one-half of the parasites collected.

Two species of this genus are included in this study. The parameres

and endomeral plate of C. heterographus are short and bluntly rounded; while in C. heterogrammicus, these structures are slender and pointed.

CUCLOTOGASTER HETEROGRAMMICUS (Nitzsch 1866)
(Plate VIII, figure 3)

Z. Naturw., XXVIII, p. 379.

Type host: Perdix perdix perdix (Linnaeus), Hungarian Partridge.

In the male, the dorsal posterior pterothoracic setae are arranged: 2, 3, 1 -- 1, 3, 2. In the female, the tergal plate of the seventh abdominal segment is interrupted medianly and there is no connecting plate between the two halves of the eighth plate. Males and females about 2.5 mm in length. Male genitalia; plate X, figure 4.

Material examined from the Hungarian Partridge was collected as follows: Ravalli County, Montana; Pullman, Washington; and Berkeley, California.

CUCLOTOGASTER HETEROGRAPHUS (Nitzsch 1866)
(Plate X, figures 1-3)

Z. Naturw., XXVIII, p. 381.

Goniocotes burnetti Packard 1870. Amer. Natur., IV, p. 94, f. 26.

Goniodes eynsfordii Theobald 1896. Parasitic Diseases of Poultry. London, p. 26, f. 8.

Cuclotogaster laticorpus Carriker 1936. Proc. Acad. Nat. Sci. Phila., LXXXVIII, p. 67, Pl. 1, f. 2.

Type host: Domestic Chicken.

The male (plate X, figure 2), the female (plate X, figure 1), and the male genitalia (plate X, figure 3) are illustrated completely.

Material was examined from the following hosts: Domestic chickens—from many regions of North America; and Ring-necked Pheasant—from Ontario,

Canada; Ithaca, New York; and the California Game Farm.

## OXYLIPEURUS Mjöberg 1910

Arkiv Zoologi, VI, p. 91.

Genotype: Oxylipeurus inaequalis (Piaget 1880).

### Description of the genus

Head circumfasciate; trabeculae variable in size and shape, and sometimes absent in the female. Antennae sexually dimorphic; in the male, its first segments enlarged and the third segments produced beyond the point of articulation with the fourth. The chitin of the anterior portion of the preantennal region is modified either into a number of projections or into a raised transverse line across the head.

Prothorax short and narrow. Pterothorax without visible meso-metathoracic division on the lateral margins. Legs long and slender.

Abdomen slender. Pleurites with re-entrant heads and usually complicated. In the male, the posterior sternal plate is prolonged into a narrow thickened modified process; usually on each side of this process is a clump of setae. The male genitalia consists of a flattened endomeral plate, free penis, and without a sac.

### Discussion of the genus

Clay, in 1939, enlarged this genus to include six groups, all of which apparently are related. Carriker, in 1945, erected genera for two of these groups; however, it is the opinion of this author, that one of his genera, Epicolinus, can be nothing more than a subgenus.

### Key to the species

1. Patches of setae on each side of the tubular process arising from the eighth abdominal segment of the male. 2.

No patches of setae on each side of the tubular process arising from the eighth abdominal segment of the male (subgenus Epicolinus). 4.

2. The patches, mentioned above, each with two rows of setae. montezumae

The patches, mentioned above, each with only a posterior row of setae. 3.

3. Total length of 2.3 to 2.7 mm. colchicus

Total length of 3.3 to 3.6 mm. polytrapezius

4. Width of head at the antennae less than preantennal width. clavatus

Width of head at the antennae greater than preantennal width. callipeplus

## OXYLIPEURUS COLCHICUS Clay 1938
## (Plate XI, figure 1)

Proc. Zool. Soc. Lond., Ser. B, CVIII, p. 177, Pl. 11, f. 3.

Type host: Phasianus colchicus.

First antennal segments of the male each with a small triangular appendage. Posterior dorsal pterothoracic setae of the male, arranged in two patches of four setae each. The paramera (plate XI, figure 1) of the male genitalia almost straight sided. Males about 2.3 mm and females about 2.6 mm in length.

Material examined was taken from a Ring-necked Pheasant collected in Illinois.

## OXYLIPEURUS POLYTRAPEZIUS (Burmeister 1838)
## (Plate XI, figure 2)

Handb. Ent., III, p. 434.

Oxylipeurus corpulentus Clay 1938. Proc. Zool. Soc. Lond., Ser. B., CVIII, p. 183, Pl. XII, f. 1; t. f. 37b, 38 and 39a.

Type host: Domestic Turkey.

First antennal segment of the male with a transparent rounded appendage. Posterior dorsal pterothoracic setae of the male arranged: 3, 2, 2 -- 2, 2, 3. The parameres (plate XI, figure 2) of the male genitalia curved evenly inward. Males about 3.4 mm and females about 3.5 mm in length.

Material examined was from the following hosts: Domestic Turkey--Dallas, Texas. Meleagris gallopavo osceola Scott, Florida Turkey--Chokoloshee, Florida. Meleagris gallopavo silvestris Vieillot, Eastern Turkey--Cache, Oklahoma; Forsythe, Missouri; Asheville, North Carolina; and Mason, Texas. Meleagris gallopavo merriami Nelson, Merriam's Turkey--Apache National Forest, Arizona.

## OXYLIPEURUS MONTEZUMAE Emerson 1949
## (Plate XII, figures 1-2)

J. Kans. Ent. Soc, XXII, p. 75, f. 1-2.

Type host: Cyrtonyx montezumae mearnsi Nelson, Mearns's Quail.

The male and male genitalia are illustrated completely. The female is unknown.

The type male collected on the Apache Indian Reservation, Arizona was the only specimen studied.

## Subgenus EPICOLINUS Carriker 1945

Rev. Brasil Biol., V, p. 104.

Genotype: Oxylipeurus clavatus (McGregor 1917).

This subgenus differs from Oxylipeurus sen. str. as follows; there are no transverse clypeal or postantennal sutures. The patches of setae usually on each side of the tubular process arising from segment VIIIof the

male abdomen are absent. The male genitalia is simpler, with the minute parameres folded across the tip.

OXYLIPEURUS (EPICOLINUS) CLAVATUS (McGregor 1917)
(Plate XI, figure 3)

Psyche, XXIV, p. 115, Pl. VII, f. 3.

Type host: Colinus virginianus texanus (Lawrence), Texas Bobwhite.

The sides of the head of the male are concaved in the antennal region. In the female, the "claspers" at the tip of the abdomen are slender and curved inward; and apparently without a connective membrane. Males about 1.7 mm and females about 1.9 mm in length.

Material examined was collected from Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite; from Hugesville, Maryland; Ravalli County, Montana; and Stillwater, Oklahoma.

The type series was recorded from Hamburg, Mississippi. The species has been recorded as follows: from Colinus virginianus floridanus (Coues), Florida Bobwhite—Florida; and from Colinus virginianus virginianus (Linnaeus), Eastern Bobwhite—Washington, D. C.; Maryland; Georgia; Florida; and Guntersville, Alabama.

OXYLIPEURUS (EPICOLINUS) CALLIPEPLUS (Carriker 1945)
(Plate XI, figure 4)

Rev. Brasil Biol., V, p. 106, f. 35-38.

Type host: Callipepla squamata squamata (Vigors), Scaled Partridge.

The sides of the head of the male are almost parallel. In the female, the "claspers" at the tip of the abdomen are straight and pointed; and have the space between them partially filled by a membrane which extends inward but is divided medianly. Males about 1.8 mm and females about 2.0 mm in

length.

A large series collected from Callipepla squamata pallida Brewster, Arizona Scaled Partridge, from Sheffield, Texas was studied.

The type series was recorded from Arizona.

## LIPEURUS Nitzsch 1818

Germar's Mag. Ent., III, p. 292

Genotype: Lipeurus caponis (Linnaeus 1758), by subsequent designation, Johnston and Harrison 1911. (Proc. Linn. Soc. N. S. Wales, XXXVI, p. 326).

### Description of the genus

Head circumfasciate; lateral margins parallel, and in the male, the temples with a width less than in the preantennal region. Antennae sexually dimorphic. In the male, the first segments are enlarged, each with a short thickened appendage; third segments with free thickened distal ends. Preantennal region without sutures or modification of the chitin.

Prothorax without lateral setae. Pterothorax with visible meso-metathoracic division on the lateral margins. Legs extremely long and slender.

Abdomen long and slender. Tergites and pleurites simple. Sternal plates simple and wide. Male genitalia with complicated elongated sac; parameres unusual.

### Discussion of the genus

This genus is normally found on gallinaceous hosts of the Old World; and has not been collected from any of the native North American Game Birds.

### LIPEURUS CAPONIS (Linnaeus 1758)
### (Plate XIII, figures 1-3)

Systema Naturae, 10th Ed., p. 614.

Lipeurus variabilis Burmeister 1838. Handb. Ent., II, p. 434.

Lipeurus antennatus Piaget 1885. Les Pediculines, Suppl., p. 75,

Pl. VIII, f. 3.

Lipeurus variabilis var. formosanus Sugimoto 1929. Rept. Dept. Agri. Formosa, XLIII, p. 179.

Type host: Domestic Chicken.

The male (plate XIII, figure 2), the female (plate XIII, figure 1), and the male genitalia (plate XIII, figure 3) are illustrated completely.

Material collected from domestic chickens from many regions of North America was examined.

## LIPEURUS MACULOSUS Clay 1938

Proc. Zool. Soc. Lond., Ser. B, CVIII, p. 116, Pl. I, f. 2, t. f. 52, 6a.

Type host: Phasianus colchicus.

This species resembles L. caponis very much, but can be distinguished from it by the presence of an emargination of the tip of the last abdominal segment. The chaetotaxy is the same as L. caponis, except that in the male, there are four not six median ventral setae on the last abdominal segment.

Material examined was collected from the Ring-necked Pheasant as follows: Corvallis, Oregon; Moorestown, New Jersey; Cambridge, Wisconsin; and Amston, Connecticut.

## LAGOPOECUS Waterston 1922

Ent. Mon. Mag., LVIII, p. 159

Genotype: Lagopoecus lyrurus Clay 1938. Proc. Zool. Soc. Lond., Ser. B, CVIII, p. 187. (Nom. nov. for Lagopoecus cameratus (Burmeister, 1839), preoccupied).

### Description of the genus

Head circumfasciate. Antennae filiform in both sexes. Eye prominent, with a long seta arising from the dorsal surface. Temples convexly rounded, each with two long setae; cephalic margin without setae.

Prothorax short, wide, and armed dorsally with one long seta on each posterolateral angle. Pterothorax short, wide, and with dorsal posterior pterothoracic setae. Legs short.

Abdomen short and wide. Tergal plates with median setae; long setae in the posterolateral angles; and post spiracular setae. Sternal plates with a pair of median setae.

Male genitalia simple.

Plate XIV illustrates all characters of the genus, except the clypeal margin is sometimes pointed.

### Discussion of the genus

Within the genus, the North American species fall roughly into two groups. The members of one group, L. gambelii and californicus, have a pointed clypeal margin; and except for the filiform antennae might be placed in the genus Colinicola. The other species resemble each other very much and form a very compact group. The chaetotaxy, male genitalia, and size can only be illustrated to show differences between the species. These

differences cannot be adequately described, therefore no attempt has been made to separate the species in a key. It is believed that plates XVI and XVII will illustrate adequate differences for separation. All figures on plate XVI are drawn to the same scale; hence, differences in size, shape, and chaetotaxy are very readily noticed. These figures are the dorsal view; of the head in outline, the thorax, and the first four abdominal segments. The dorsal chaetotaxy of the remaining abdominal segments is the same as that found on the third or fourth segments. The ventral abdominal chaetotaxy is similar for all species and has not been used in this study. All figures of the male genitalia on plate XVII are drawn to the same scale.

LAGOPOECUS GAMBELII Emerson 1949
(Plate XIV, figures 3-5; Plate XVI, figure 4; Plate XVII, figure 5)

J. Kans. Ent. Soc., XXII, p. 75, f. 3-5.

Type host: Lophortyx gambelii gambelii Gambel, Gambel's Quail.

The type series collected in Tucson, and the Santa Rita Reservation, Arizona; was studied.

LAGOPOECUS CALIFORNICUS (Kellogg and Chapman 1899)
(Plate XVI, figure 2; Plate XVII, figure 4)

Occ. Papers Calif. Acad. Sci., VI, p. 103.

Type host: Oreortyx picta picta (Douglas), Plumed Mountain Quail.

Material examined was collected from the type host collected in California.

The species has been recorded from: Oreortyx picta picta (Douglas), Plumed Mountain Quail, collected in Nevada; and Oreortyx picta palmeri Oberholser, Northwestern Mountain Quail, collected in California.

## LAGOPOECUS AFFINIS (Children 1836)
## (Plate XVI, figure 1; Plate XVII, figure 1)

App. Bach's Arctic Land Exp., p. 537.

Nirmus cameratus var. nigrescens Evans 1912. Scott. Nat., p. 280.

Nirmus protervus Kellogg 1899. Occ. Papers Calif. Acad. Sci., VI, p. 31, Pl. III, f. 4.

Type host: Lagopus lagopus lagopus (Linnaeus).

The material examined was from the following collections: Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan--Craig Harbour and Pangnirtung, N. W. T.; Les Pas, Manitoba; and Kapuskasing, Smoky Falls and Cape Henrietta Maria, Ontario. Lagopus lagopus alexandrae J. Grinnell, Alexander's Ptarmigan--Kodiak Island, Alaska. Lagopus lagopus leucopterus Taverner, Baffin Island Ptarmigan--Lake Harbour, Baffin Island. Lagopus lagopus alascensis Swarth, Alaska Willow Ptarmigan--Point Barrow, Alaska.

## LAGOPOECUS COLCHICUS Emerson 1949
## (Plate XIV, figure 6; Plate XVI, figure 3; Plate XVII, figure 3)

J. Kans. Ent. Soc., XXII, p. 78, f. 6.

Type host: Phasianus colchicus torquatus Gmelin, Ring-necked Pheasant.

Material was studied which had been collected from the type host in Logan, Utah; Williamston, Michigan; Homer, and Urbana, Illinois; and Hamilton, and Lake County, Montana.

## LAGOPOECUS GIBSONI Hopkins 1947
## (Plate XVI, figure 5; Plate XVII, figure 7)

Ann. Mag. Nat. Hist., ser. 11, XIII, p. 172, f. 1-3.

Type host: Centrocercus urophasianus (Bonaparte), Sage Grouse.

Material was studied which had been collected from the type host in

Fergus and Ravalli Counties, Montana; Burns, and Lake County, Oregon; Dixon, Wyoming; and Mayfield, Idaho.

LAGOPOECUS OBSCURUS Emerson 1948
(Plate XV, figures 1-3; Plate XVI, figure 6; Plate XVII, figure 2)

J. Kans. Ent. Soc., XXI, p. 137, Pl. I, f. 1-3.

Type host: Dendragapus obscurus richardsonii (Douglas), Richardson's Grouse.

Material was examined from the following: Dendragapus obscurus fuliginosus (Ridgway), Sooty Grouse—Nicola, and Trangville, British Columbia; Conlitz and Okanogan Counties, Washington; and Kings River Canyon, California. Dendragapus obscurus richardsonii (Douglas), Richardson's Grouse—Ravalli County, and Florence, Montana.

LAGOPOECUS PERPLEXUS (Kellogg and Chapman 1899)
(Plate XVI, figure 7)

Occ. Papers Calif. Acad. Sci., VI, p. 103, Pl. VII, f. 5.

Type host: Pedioecetes phasianellus columbianus (Ord), Columbian Sharp-tailed Grouse.

The male of this species was not encountered in this study.

Material was examined from the following: Pedioecetes phasianellus columbianus (Ord), Columbian Sharp-tailed Grouse—Pullman, Washington. Pedioecetes phasianellus phasianellus (Linnaeus), Northern Sharp-tailed Grouse—Kirkland, Ontario.

LAGOPOECUS UMBELLUS N. SP.
(Plate XVI, figure 8; Plate XVII, figure 6)

Female. Head circumfasciate; clypeal margin evenly rounded, and with scattered small setae. Eyes prominent, each with a long seta arising from

the dorsal surface. Temples convexly rounded, each with two long setae; caudal margin without setae. Prothorax short, wide, and armed dorsally with one long seta on each posterolateral angle. Pterothorax more than twice as wide as long. Dorsal chaetotaxy of thorax and first four abdominal segments as shown in plate XVI, figure 8. Abdominal segments with tergal plates as shown in plate XVI, figure 8. One pair of sternal setae on each abdominal segment. Vulva with a posterior marginal row of short setae.

Male. Head approximately the same size as in the female. Thorax and abdomen essentially the same shape as in the female, but smaller. Chaetotaxy, except for the posterior abdominal segments, same as in the female. Genitalia as shown in plate XVII, figure 6.

Type host: Bonasa umbellus (probably) phaia Aldrich and Friedmann, Idaho Ruffed Grouse.

Type material. Holotype male and allotype female and paratypes, collected by S. D. Beak, from the Moscow Mountains, Latak County, Idaho.

Other material has been examined from the following hosts: Bonasa umbellus umbellus (Linnaeus), Eastern Ruffed Grouse--Mifflin County, Pennsylvania; and New York State. Bonasa umbellus togata (Linnaeus), St. Lawrence Ruffed Grouse--Brule Lake, Frank's Bay, Buckshot Lake, and the Denora District, Ontario.

## GONIOCOTES Burmeister 1838

Handb. Ent., II, p. 431.

Genotype: Goniocotes gallinae (DeGeer 1778), by subsequent designation, Johnston and Harrison 1911. (Proc. Linn. Soc. N. S. Wales, XXXVI, p. 326).

Dictyocotes Kéler 1939. Nova Acta Leop., VIII, p. 152.

Genotype: Goniocotes halogonus (Burmeister 1838).

### Description of the genus

Head circumfasciate, wider than long. Clypeal margin broadly rounded. Sides of the head parallel or diverging at the temples. Temples rounded and without lateroventral processes. Occipital margin concave. Antennae filiform in both sexes.

Prothorax short and wide. Pterothorax triangular, twice as wide as long. Legs short and stout.

Abdomen elongately oval. Tergal plates separated medianly by one-third the width of abdomen. Pleurites narrow and curved inward. Sutures separating the segments, faint or invisible. Dorsal and ventral chaetotaxy very sparce. Vulva with only a few short marginal setae. Male genitalia simple.

### Discussion of the genus

The members of this genus resemble species of the genus Goniodes; except they are much smaller and are only slightly pigmented. They are often mistaken for immature specimens of the genus Goniodes. The simple male genitalia, rounded temples, and small size easily distinguish the members of this genus from all others. Only three of the North American species are included in the scope of this study.

Key to the species

1. Eight short stout spines on the posterior margin of the vulva. chrysocephalus

   Six short stout spines on the posterior margin of the vulva. 2

2. Post spiracular setae on the third abdominal segments. microthorax

   No post spiracular setae on the third abdominal segments. gallinae

GONIOCOTES CHRYSOCEPHALUS Giebel 1874

Insecta Epizoa, p. 189.

Type host: Phasianus colchicus.

Long setae on the posterior margin of the pterothorax arranged: 2, 2, —2, 2. One pair of median setae on the dorsal surface of each abdominal segment; and postspiracular setae on abdominal segments IV, V, and VI. Four short stout spines on the posterior margin of the vulva.

Material was examined which had been collected from Phasianus colchicus torquatus Gmelin, Ring-necked Pheasant, in Ravalli County, Montana. These specimens were damaged to the extent that adequate illustrations could not be made.

GONIOCOTES GALLINAE (DeGeer 1778)
(Plate VIII, figure 4)

Mémoires pour servir a l'histoire des Insectes, VII, p. 79, Pl. IV, f. 15.

Goniodes hologaster Nitzsch 1818. Germar's Mag. Ent., III, p. 294.

Type host: Domestic chicken.

Long setae on the posterior margin of the pterothorax arranged: 2,

2, --2, 2. Two pairs of median setae on the dorsal surface of the first abdominal segment; and one pair of median setae on the other abdominal segments. Postspiracular setae on abdominal segments IV, V, and VI. Three short stout spines on the posterior margin of the vulva.

Material was examined from many regions of North America, which had been collected from domestic chickens.

## GONIOCOTES MICROTHORAX (Nitzsch 1818)
## (Plate XVIII, figures 1-3)

Germar's Mag. Ent., III, p. 294.

Type host: Perdix perdix perdix (Linnaeus), Hungarian Partridge.

The male (plate XVIII, figure 2), the female (plate XVIII, figure 1), and the male genitalia (plate XVIII, figure 3) are illustrated completely.

Material collected from the Hungarian Partridge from Ravalli County, Montana, was examined.

## MENOPON Nitzsch 1818

Germar's Mag. Ent., III, p. 299.

Genotype: Menopon gallinae (Linnaeus, 1758), by subsequent designation, Johnston and Harrison 1911. (Proc. Linn. Soc. N. S. Wales, XXXVI, p. 327).

### Description of the genus

Head triangular, widest at the posterior margin. Lateral margins of the head, slightly excavated with a deep narrow slit in front of the eye. Antennal fossae deep, open ventrally; the ventral margin surpassed by the dorsal margin. The posterior margin of the head slightly concave.

Prothorax triangular; twice as wide as long; with a row of setae on the posterior margin. Mesothorax much reduced in size. Metathorax narrow, with straight divergent sides. The femora of the third pair of legs with a distinct patch of setae on the ventral surface.

Abdomen elongately tapering. Tergal and sternal plates weakly chitinized. Tergal plates with a row of posterior marginal setae. Chaetotaxy on the abdominal sternal plates sparce and scattered except for a pair of patches of short setae on the fourth segment. Tip of the abdomen tapering. Male genitalia very small and indistinct.

### Discussion of the genus

This genus as now defined, includes only a few species found on gallinaceous birds of the Old World. Only two of the species have been included in this study; neither have been collected from native North American birds.

## MENOPON GALLINAE (Linnaeus 1758)
(Plate XIX, figure 1)

Systema Naturae, 10th Ed., p. 613.

Nirmus trigonocephalus Olfers 1816, De Veg. et Anim. Corp. in Corp. Anim. Ref. Comm., p. 90

Menopon longicephalum Kellogg 1896. Proc. Calif. Acad. Sci., VI, p. 535, Pl. 13, f. 4.

Type host: Domestic chicken.

Female as shown in plate XIX, figure 1. Male practically identical with the female except the abdomen is less tapering and terminates in a rounded plate which has four long setae.

Numerous specimens were examined which had been collected from domestic chickens.

## MENOPON PALLENS Hopkins and Clay
(Plate XX, figures 1-3)

In press (Personal correspondence).

Menopon pallescens Nitzsch (In Giebel) 1874. Insecta Epizoa, p. 293. (preoccupied).

Type host: Perdix perdix perdix (Linnaeus), Hungarian Partridge.

The male (plate XX, figure 2), the female (plate XX, figure 1), and the male genitalia (plate XX, figure 3) are illustrated completely.

Material was examined which had been collected from the type host in Ellerstie, Prince Edward Island.

## AMYRSIDEA Ewing 1927

Proc. Acad. Sci. Wash., XVII, p. 90.

Genotype: Amyrsidea ventralis (Nitzsch 1866).

Argimenopon Eichler 1947. Arkiv Zool., XXXIX, p. 5.

Genotype: Amyrsidea polytrichum (Eichler 1947).

### Description of the genus

Head triangular; widest at the posterior margin. Lateral margins of the head slightly excavated with a slit in front of the eye. Antennal fossae deep, open ventrally. The posterior margin of the head is slightly concaved and armed dorsally with a row of long setae.

Prothorax triangular, twice as wide as long, with a row of setae on the posterior margin. Mesothorax reduced in size. Metathorax longer and wider than prothorax; and with straight divergent sides. The femora of the third pair of legs with a somewhat indistinct patch of short setae.

Abdomen elongately oval. Tergal and sternal plates weakly chitinized. Tergal plates with a posterior row of marginal setae. Chaetotaxy of the sternal plates, normal to heavy. Sternites III to IV with definite patches of small or normal sized setae in each posterolateral angle. Tip of abdomen broadly rounded. Male genitalia medium sized.

### Discussion of the genus

The chaetotaxy found on species of this genus is heavier and more dense than that found on species of the genus Menopon. Likewise, they are more robust and more heavily chitinized. A comparison of plates XX and XXI will illustrate many differences between the two genera.

Very few collections of this genus were studied, because the forms are

small, active, and hard to collect. It is believed that many species of native gallinaceous birds harbor specimens of this genus. It is regrettable that the collections are inadequate.

AMYRSIDEA LAGOPI (Grube 1851)
(Plate XXI, figures 1-3)

Middendorff's Sibirischer Reise, II, p. 491, Pl. 31, f. 7.

Menopon striatum Kellogg 1899. Occ. Papers Calif. Acad. Sci., VI, p. 44, Pl. IV, f. 6.

Type host: Lagopus mutus rupestris (Gmelin), Rock Ptarmigan.

The male (plate XXI, figure 2), the female (plate XXI, figure 1), and the male genitalia (plate XXI, figure 3) are illustrated completely.

Material was examined from the following hosts: Lagopus mutus dixoni J. Grinnell, Dixon's Ptarmigan--Glacier Bay, Alaska. Lagopus lagopus alexandrae J. Grinnell, Alexander's Ptarmigan--Kodiak Island, Alaska. Lagopus lagopus albus (Gmelin), Keewatin Willow Ptarmigan--Button Island, P. Q., S. W. Keewatin, Canada and Arctic Red River, N. W. T. Lagopus lagopus alascensis Swarth, Alaska Willow Ptarmigan--Point Barrow, Alaska.

AMYRSIDEA PERDICIS (Denny 1842)

Monog. Anoplur. Brit., p. 225, Pl. 21, f. 9.

Type host: Perdix perdix perdix (Linnaeus), Hungarian Partridge.

This species is fairly common on the Hungarian Partridge in its native habitat, but was not encountered during this study.

## MENACANTHUS Neumann 1912

Arch. Parasit., XV, p. 353.

Genotype: Menacanthus robustum (Kellogg 1896).

Eomenacanthus Uchida 1926. J. Col. Agri., Imp. Univ. Tokyo, IX, p. 30. Genotype: Menacanthus stramineum (Nitzsch 1818).

Neumannia Uchida 1926. Ibid, p. 27. Genotype: Menacanthus okadai (Uchida 1926).

Uchida Ewing 1930. Proc. Biol. Soc. Wash., XLIII, p. 125. (Nom. nov. for Neumannia, preoccupied).

### Description of the genus

Head triangular; twice as wide as long; widest at the temples. Lateral margins slightly excavated and with a slit in front of each eye. Antennal fossae deep. Just behind and slightly lateral to the base of each palpus arises a prominent stout, backward pointing, process.

Prothorax triangular, twice as wide as long, with a row of setae on the posterior margin. Mesothorax much reduced in size. Metathorax larger than prothorax; with the lateral margins strongly divergent. The posterior femora with only a few scattered setae on the venter.

Abdomen elongately oval. The tergal plates strongly chitinized and with a single row of posterior marginal setae. Chaetotaxy of the sternal plates normal, with indistinct patches in each posterolateral angle. Tip of abdomen broadly rounded. Male genitalia medium sized and very similar to the forms found in the genus Amyrsidea.

### Discussion of the genus

This genus contains a large number of heterogeneous species from several

orders of birds. It apparently once was found on all Aves, but now is extinct on many orders. In general appearance, many species resemble those of the genus Amyrsidea; but with the ventral spine-like processes on the head.

Specimens of this genus have been reported several times from native gallinaceous birds. All of this material examined apparently was immature forms of the species normally found on chickens, as positive identification could not be made. It is very probable that with better collecting, new species of the genus can be found on the smaller North American gallinaceous birds.

## MENACANTHUS STRAMINEUM (Nitzsch 1818)
## (Plate XXII and XXIII)

Germar's Mag. Ent., III, p. 300.

Menopon biseriatum Piaget 1880. Les Pediculines, p. 469, Pl. 37, f. 2.

Type host: Domestic Turkey.

This species is the largest species found on gallinaceous birds and is often called "the large body louse". It was collected from Meleagris gallopavo silvestris Vieillot, Eastern Turkey, from Virginia and Lawton, Oklahoma; and from domestic turkeys and chickens.

The male (plate XXII) and the female (plate XXIII) are illustrated.

## MENACANTHUS PALLIDULUM (Neumann 1912)
## (Plate XXII, figures 3 and 4)

Arch. Parasit., XV, p. 361, f. 7-8.

Type host: Domestic chicken.

This species is similar to Menacanthus stramineum (N.), but only about one-half as large. It was collected from domestic chickens, but was not found in abundance.

The male (plate XXIV) and the female (plate XXV) are illustrated.

## SUMMARY

One paper is presented whereby a worker can readily identify, by the use of keys and illustrations, all of the known species of Mallophaga found on North American gallinaceous birds. The synonymy is presented in the discussion of each species; and the present status of all previously used names is presented in the introduction.

Eleven new species were encountered in this study. Five names previously used were placed in synonymy; and one genus was reduced to a subgeneric status.

A summary of the parasites encountered on each host is as follows:

| Host | Parasite |
|---|---|
| Bonasa umbellus umbellus (L.), Eastern Ruffed Grouse | Goniodes bonasus E.<br>Lagopoecus umbellus n. sp. |
| Bonasa umbellus togata (L.), St. Lawrence Ruffed Grouse | Lagopoecus umbellus n. sp. |
| Bonasa umbellus umbelloides (D.), Gray Ruffed Grouse | Goniodes bonasus E. |
| Callipepla squamata pallida B., Arizona Scaled Partridge | Colinicola pallida E.<br>Goniodes squamatus n. sp.<br>Oxylipeurus callipeplus (Ca.) |
| Canachites canadensis canadensis (L.), Hudsonian Spruce Partidge | Goniodes corpulentus K. and M. |
| Canachites canadensis canae (L.), Canadian Spruce Partridge | Goniodes corpulentus K. and M. |
| Canachites franklinii (D.), Franklin's Grouse | Goniodes corpulentus K. and M. |
| Centrocercus urophasianus (B.), Sage Grouse | Goniodes centrocerci S.<br>Lagopoecus gibsoni H. |
| Colinus virginianus virginianus (L.), Eastern Bobwhite | Colinicola numidianus (D.)<br>Goniodes ortygis D.<br>Oxylipeurus clavatus (McG.) |
| Colinus virginianus floridanus (C.), Florida Bobwhite | Colinicola numidianus (D.)<br>Goniodes ortygis D. |

| Host | Parasite |
|---|---|
| Colinus virginianus texanus (La.), Texas Bobwhite | Colinicola numidianus (D.)<br>Goniodes ortygis D.<br>Oxylipeurus clavatus (McG.) |
| Cyrtonyx montezumae mearnsi M., Mearns's Quail | Colinicola mearnsi E.<br>Goniodes submamillatus n. sp.<br>Oxylipeurus montezumae E. |
| Dendragapus obscurus obscurus (S.), Dusky Grouse | Goniodes merriamanus Pa. |
| Dendragapus obscurus fuliginosus (R.), Sooty Grouse | Lagopoecus obscurus E. |
| Dendragapus obscurus richardsonii (D.), Richardson's Grouse | Goniodes merriamanus Pa.<br>Lagopoecus obscurus E. |
| Lagopus lagopus alascensis S., Alaska Willow Ptarmigan | Amyrsidea lagopi (Gr.)<br>Goniodes lagopi (L.)<br>Lagopoecus affinis (Ch.) |
| Lagopus lagopus albus (G.), Keewatin Willow Ptarmigan | Amyrsidea lagopi (Gr.)<br>Goniodes lagopi (L.)<br>Lagopoecus affinis (Ch.) |
| Lagopus lagopus alexandrae J. G., Alexander's Ptarmigan | Amyrsidea lagopi (Gr.)<br>Goniodes lagopi (L.)<br>Lagopoecus affinis (Ch.) |
| Lagopus lagopus leucopterus T., Baffin Island Ptarmigan | Goniodes lagopi (L.)<br>Lagopoecus affinis (Ch.) |
| Lagopus mutus dixoni J. G., Dixon's Ptarmigan | Amyrsidea lagopi (Gr.) |
| Lagopus mutus rupestris (G.), Rock Ptarmigan | Goniodes lagopi (L.) |
| Lophortyx californica californica (S.), Valley Quail | Colinicola docophoroides (Pi.)<br>Goniodes mamillatus R. |
| Lophortyx californica brunnescens R., California Quail | Colinicola docophoroides (Pi.)<br>Goniodes mamillatus R. |
| Lophortyx gambelii gambelii G., Gambel's Quail | Lagopoecus gambelii E. |
| Meleagris gallopavo silvestris V., Eastern Turkey | Chelopistes meleagridis (L.)<br>Menacanthus stramineum (N.)<br>Oxylipeurus polytrapezius (B.) |

| Host | Parasite |
|---|---|
| Meleagris gallopavo osceola S., Florida Turkey | Oxylipeurus polytrapezius (B.) |
| Meleagris gallopavo merriami N., Merriam's Turkey | Chelopistes meleagridis (L.)<br>Oxylipeurus polytrapezius (B.) |
| Oreortyx picta picta (D.), Plumed Mountain Quail | Goniodes picta n. sp.<br>Lagopoecus californicus (K. and Ch.) |
| Pedioecetes phasianellus phasianellus (L.), Northern Sharp-tailed Grouse | Goniodes nebraskensis Ca.<br>Lagopoecus perplexus (K. and Ch.) |
| Pedioecetes phasianellus campestris R., Prairie Sharp-tailed Grouse | Goniodes nebraskensis Ca. |
| Pedioecetes phasianellus columbianus (O.), Columbian Sharp-tailed Grouse | Goniodes nebraskensis Ca.<br>Lagopoecus perplexus (K. and Ch.) |
| Pedioecetes phasianellus jamesi L., Great Plains Sharp-tailed Grouse | Goniodes nebraskensis Ca. |
| Perdix perdix perdix (L.), Hungarian Partridge | Cuclotogaster heterogrammicus (N.)<br>Goniocotes microthorax (N.)<br>Goniodes dispar B.<br>Menopon pallens H. and Cl. |
| Phasianus colchicus torquatus G., Ring-necked Pheasant | Cuclotogaster heterographus (N.)<br>Goniocotes chrysocephalus G.<br>Goniodes colchici D.<br>Lagopoecus colchicus E.<br>Lipeurus maculosus Cl.<br>Oxylipeurus colchicus Cl. |
| Tympanuchus cupido pinnatus (B.), Greater Prairie Hen | Goniodes cupido R. |
| Tympanuchus pallidicinctus (R.), Lesser Prairie Hen | Goniodes cupido R. |
| Domestic chicken | Cuclotogaster heterographus (N.)<br>Goniocotes gallinae (DeG.)<br>Goniodes dissimilis D.<br>Goniodes gigas (T.)<br>Lipeurus caponis (L.)<br>Menacanthus pallidulum (N.)<br>Menacanthus stramineum (N.)<br>Menopon gallinae (L.) |
| Peafowl | Goniodes pavonis (L.) |

## Explanation of Plate I

Figures 1-3. Goniodes dissimilis Denny.

1. Dorsal-ventral view of the female.
2. Dorsal-ventral view of the male.
3. Male genitalia.

Figures 4-6. Goniodes gigas (Taschenberg).

4. Dorsal-ventral view of the female.
5. Dorsal-ventral view of the male.
6. Male genitalia.

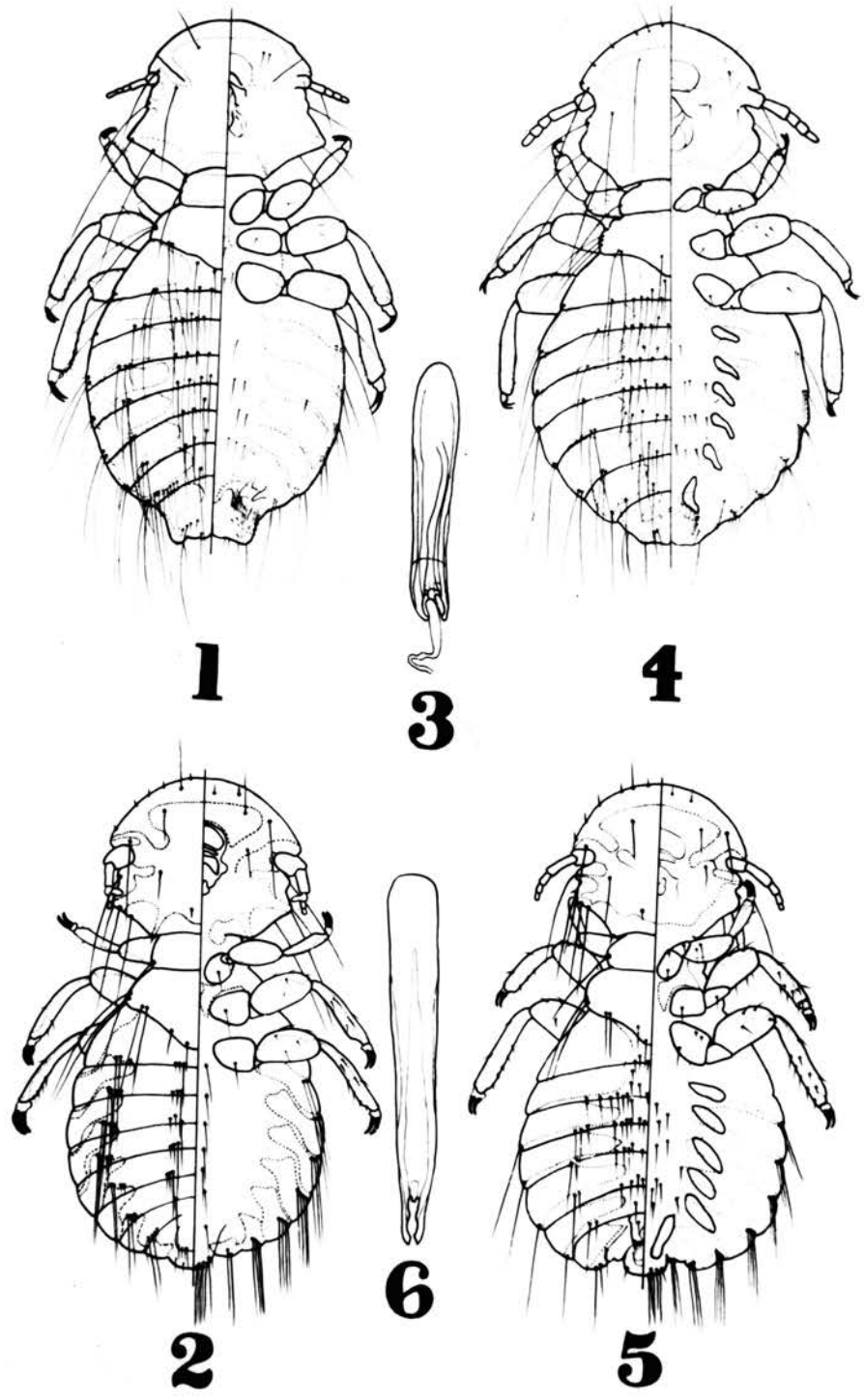



Plate I

## Explanation of Plate II

Figures 1-11. Female genital regions of *Goniodes* spp.

1. *G. lagopi* (Linnaeus).
2. *G. centrocerci* Simon.
3. *G. colchici* Denny.
4. *G. pavonis* (Linnaeus).
5. *G. merriamanus* Packard.
6. *G. ortygis* Denny.
7. *G. corpulentus* Kellogg and Mann.
8. *G. mamillatus* Rudow.
9. *G. cupido* Rudow.
10. *G. nebraskensis* Carriker.
11. *G. dispar* Burmeister.

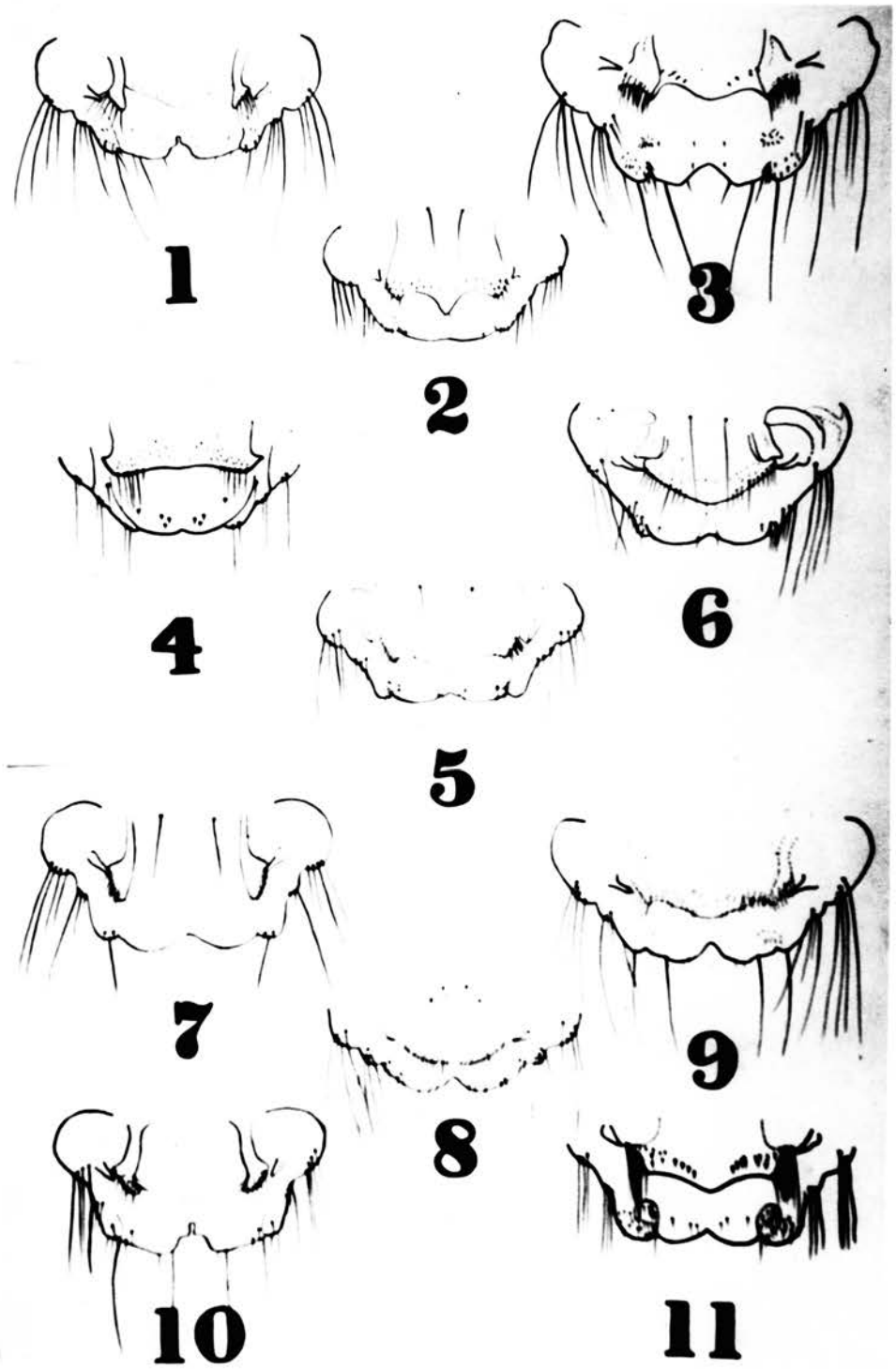



Plate II

## Explanation of Plate III

Figures 1-11. Male genitalia of *Goniodes* spp.

1. *G. colchici* Denny.
2. *G. dispar* Burmeister.
3. *G. mamillatus* Rudow.
4. *G. cupido* Rudow.
5. *G. centrocerci* Simon.
6. *G. lagopi* (Linnaeus).
7. *G. merriamanus* Packard.
8. *G. nebraskensis* Carriker.
9. *G. corpulentus* Kellogg and Mann.
10. *G. ortygis* Denny.
11. *G. pavonis* (Linnaeus).

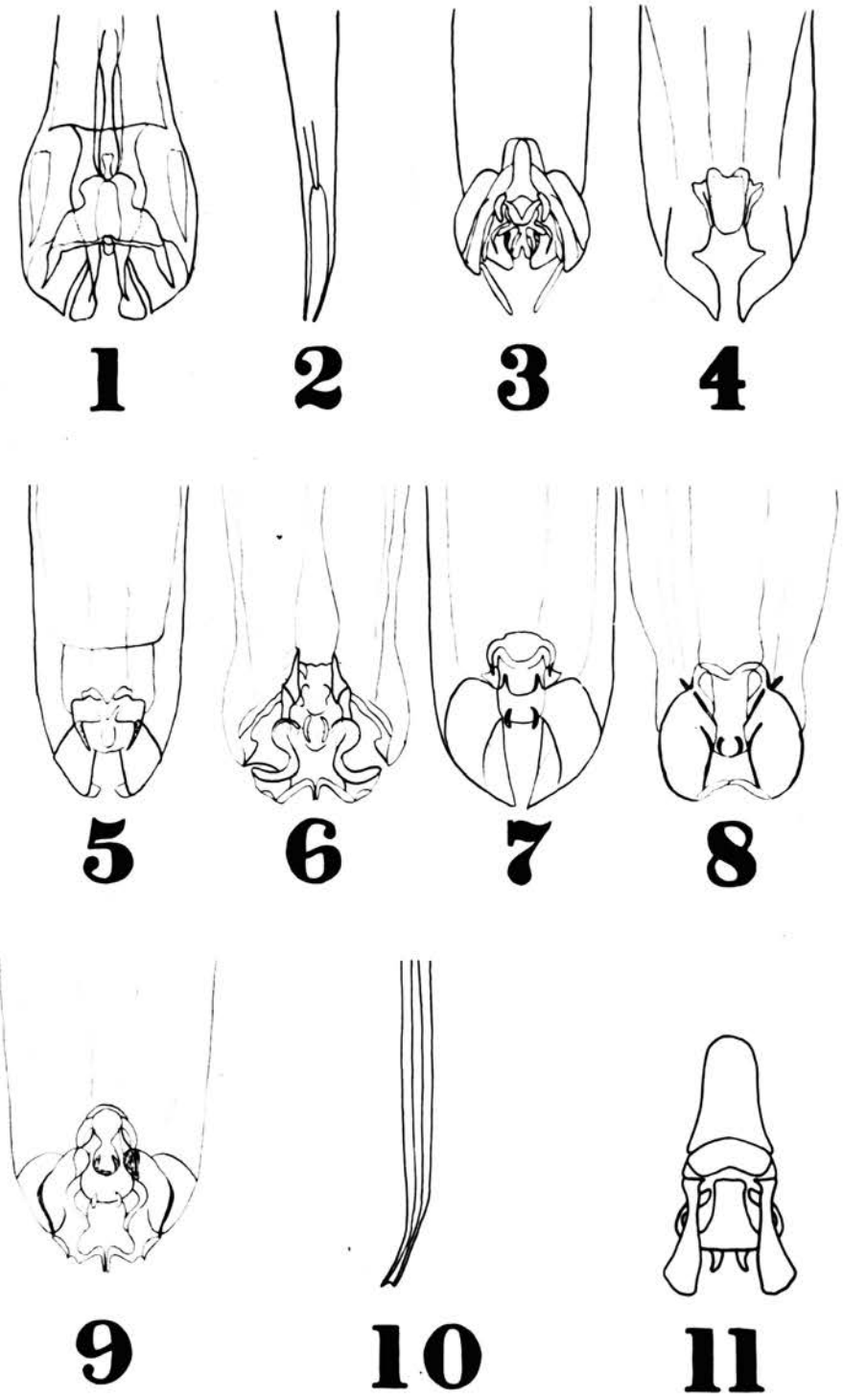



Plate III

Explanantion of Plate IV

Figures 1-4. Goniodes bonasus Emerson.

1. Dorsal-ventral view of the female.
2. Dorsal-ventral view of the male.
3. Male genitalia.
4. Ventral view of the genital region of the female.

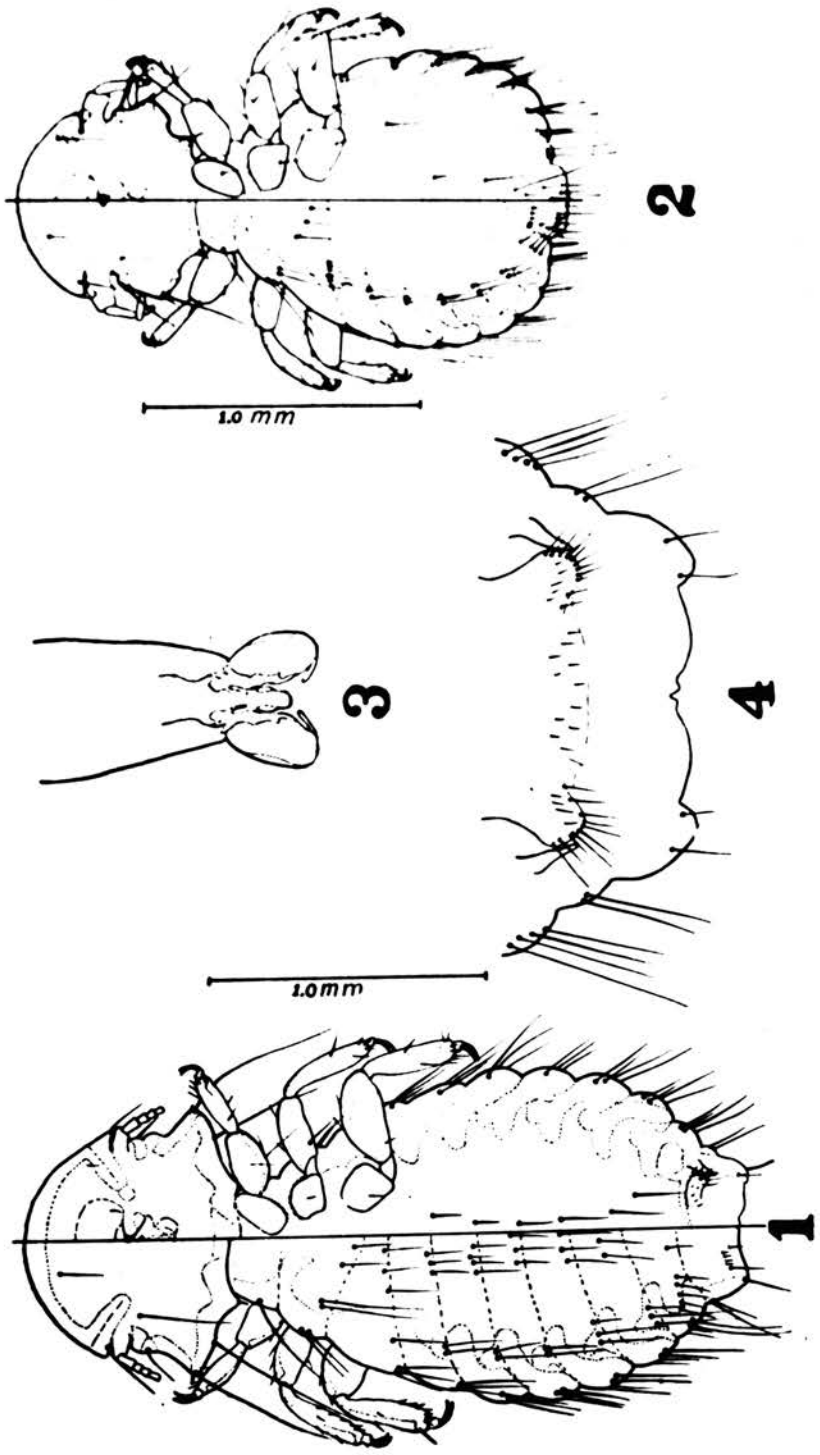



Plate IV

Explanation of Plate V

Figures 1-3 refer to *Goniodes picta* n. sp.

1a. Dorsal view of the female head and thorax.

1b. Dorsal view of the male head and thorax.

2. Male genitalia.

3a. Ventral view of the female genital region.

3b. Dorsal view of the male genital region.

Figures 4-6 refer to *Goniodes submamillatus* n. sp.

4a. Dorsal view of the female head and thorax.

4b. Dorsal view of the male head and thorax.

5. Male genitalia.

6a. Ventral view of the female genital region.

6b. Ventral view of the male genital region.

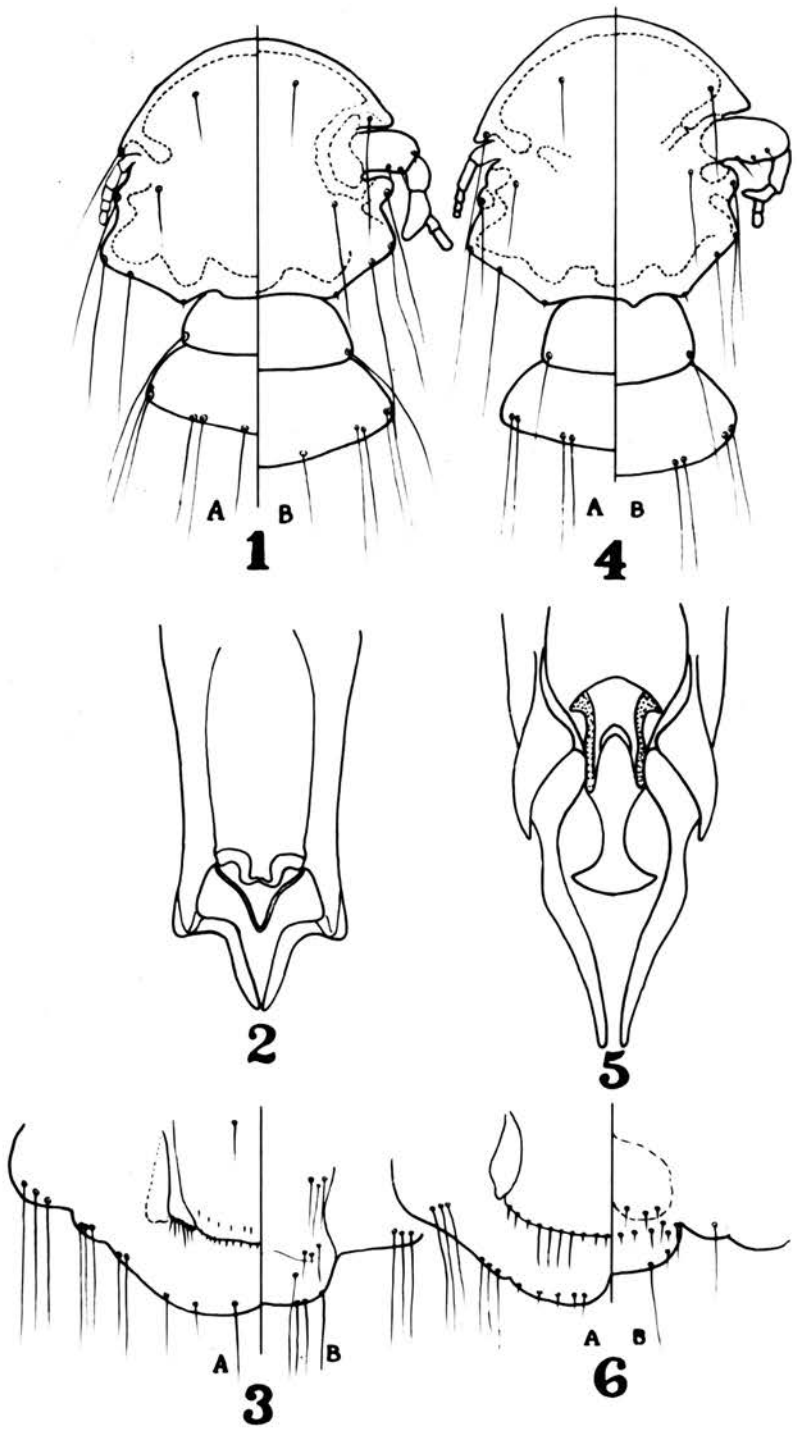



Plate V

Explanation of Plate VI

Figures 7-9. Goniodes squamatus n. sp.

7. Dorsal-ventral view of the female.

8. Dorsal-ventral view of the male.

9. Male genitalia.

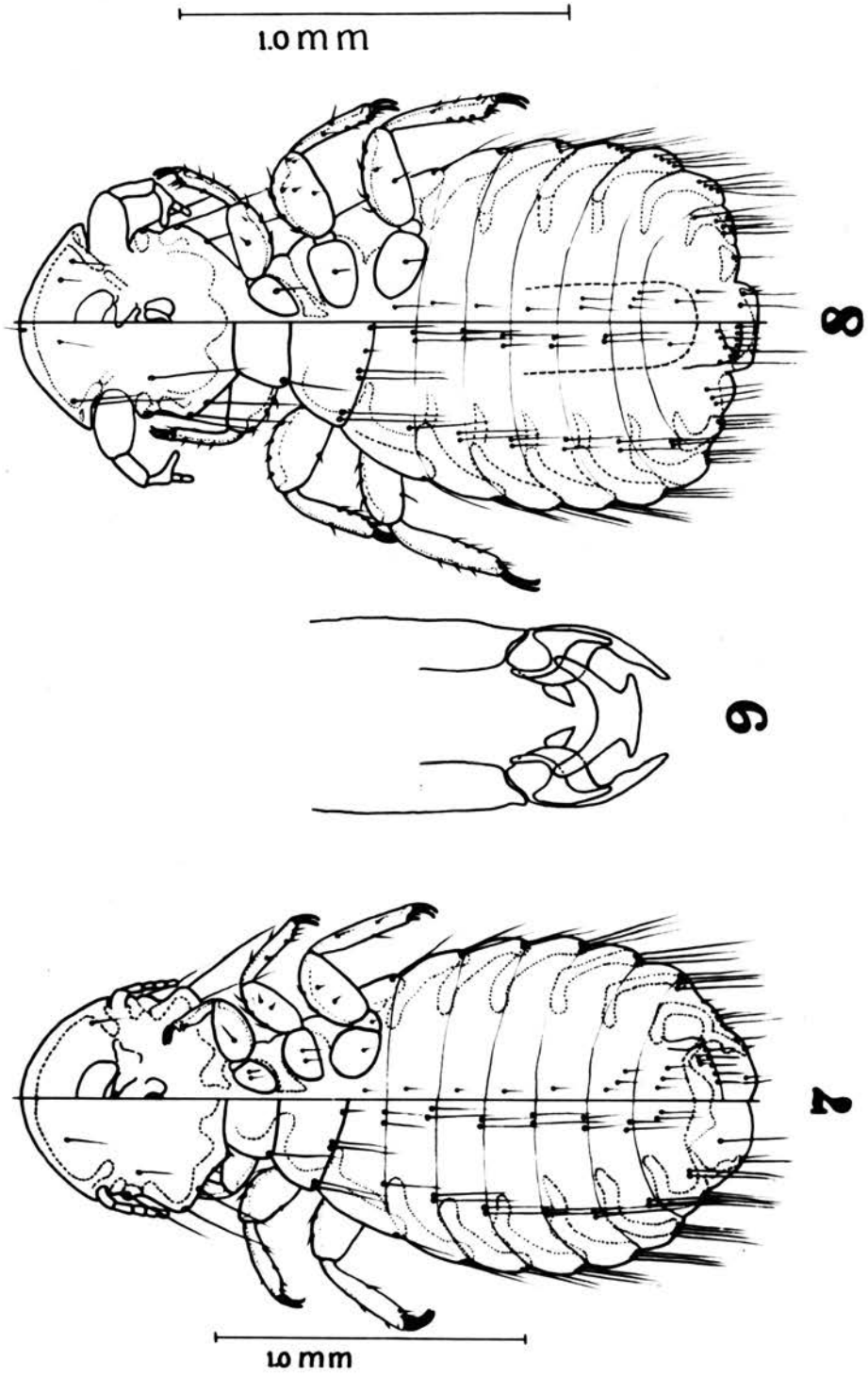



Plate VI

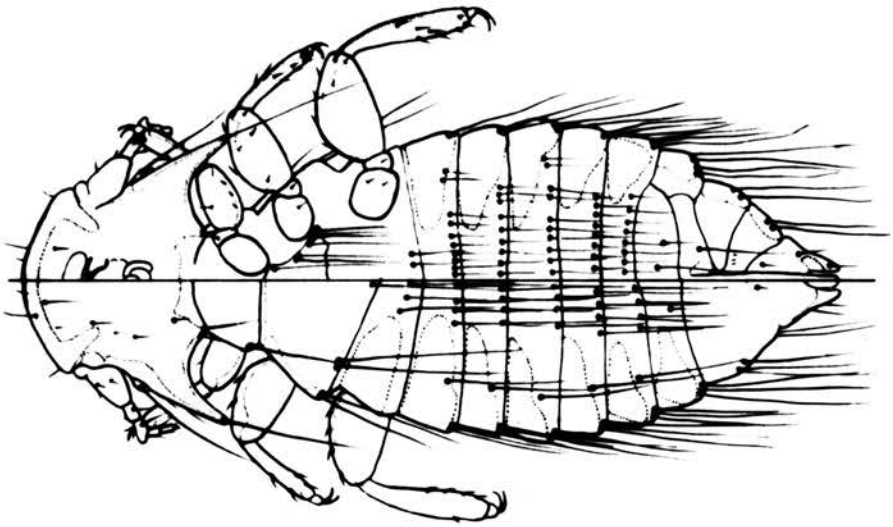
Explanation of Plate VII

Figures 1-3. Chelopistes meleagridis (Linnaeus).

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.



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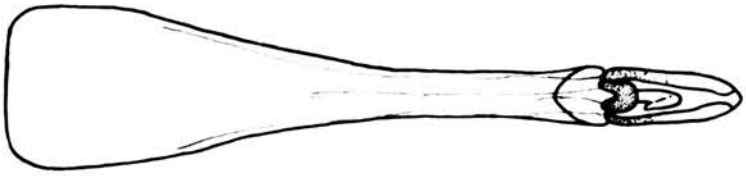

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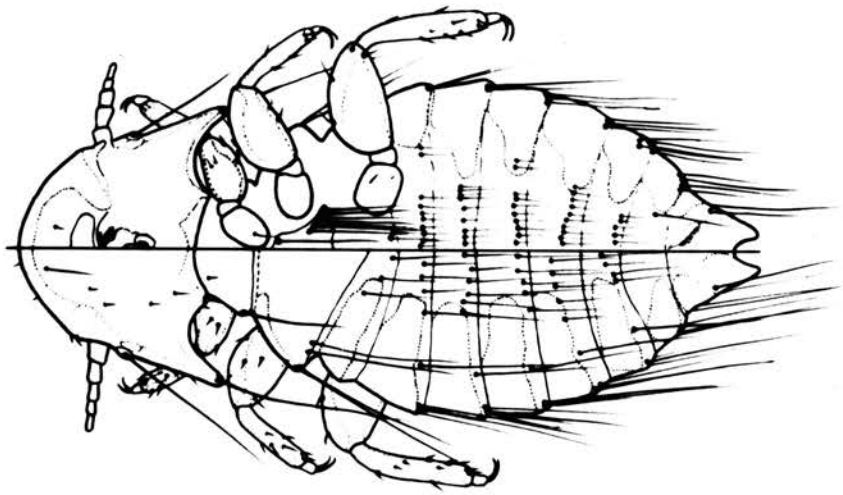

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Plate VII

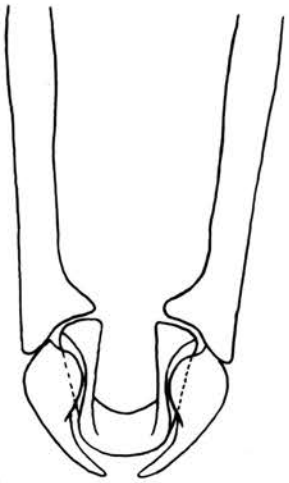
Explanation of Plate VIII

Figure 1. Male genitalia of Colinicola docophoroides (Piaget).

2. Male genitalia of Colinicola pallida Emerson.

3. Male genitalia of Cuclotogaster heterogrammicus (Nitzsch).

4. Male genitalia of Goniocotes gallinae (DeGeer).



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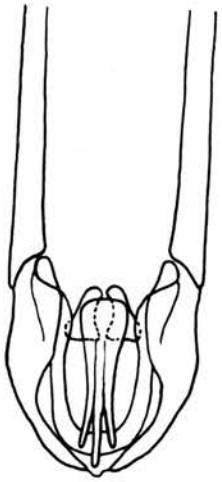

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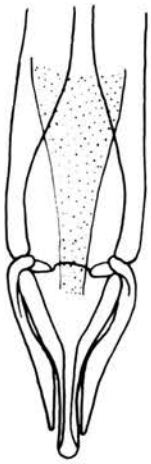

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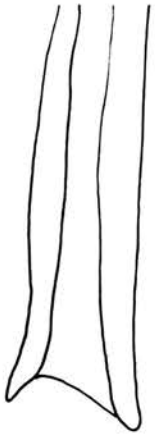

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Plate VIII

Explanation of Plate IX

Figure 4. Dorsal-ventral view of the female of Colinicola mearnsi Emerson.

5. Dorsal-ventral view of the male of Colinicola mearnsi Emerson.

6. Male genitalia of Colinicola mearnsi Emerson.

7. Male genitalia of Colinicola numidianus (Denny).

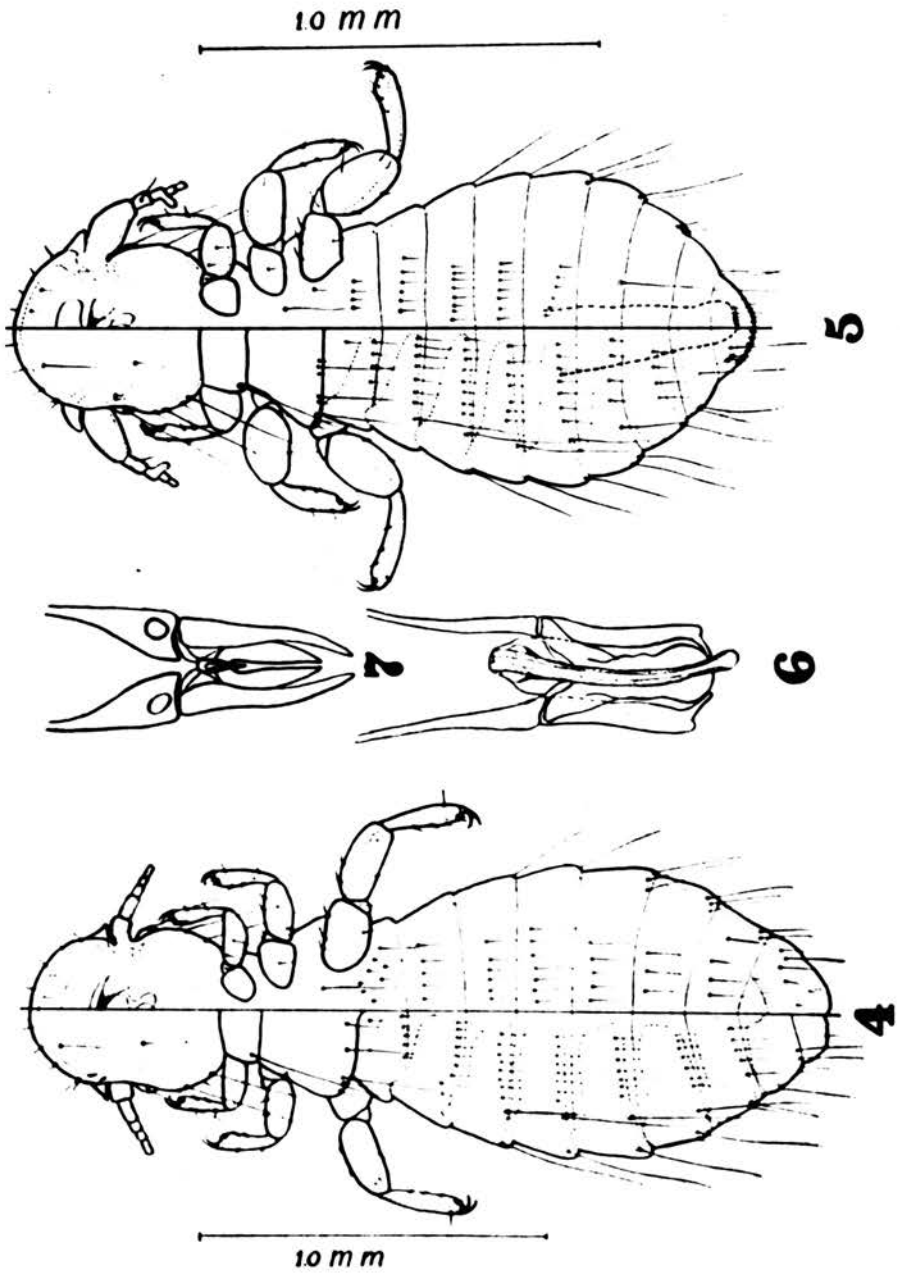



Plate IX

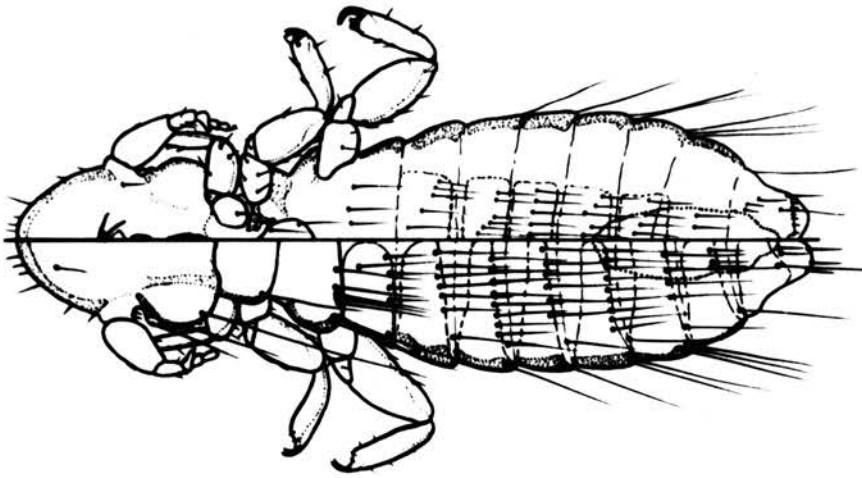
Explanation of Plate X

Figures 1-3. Cuclotogaster heterographus (Nitzsch).

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.



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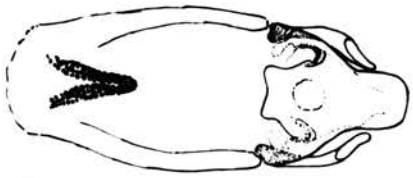

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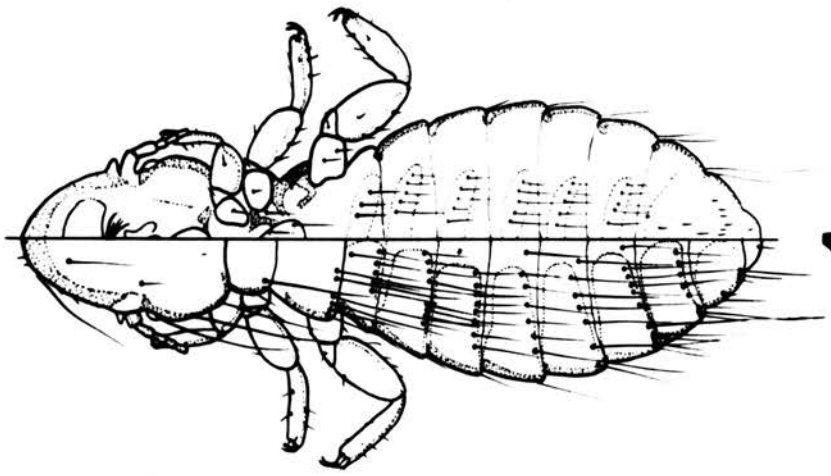

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Plate X

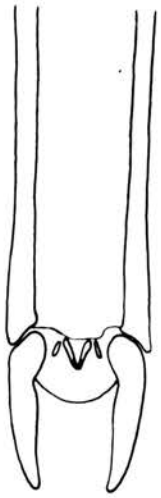
Explanation of Plate XI

Figure 1. Male genitalia of Oxylipeurus colchicus Clay.

2. Male genitalia of Oxylipeurus polytrapezius (Burmeister).

3. Ventral tip of female abdomen of Oxylipeurus (Epicolinus) clavatus (McGregor).

4. Ventral tip of female abdomen of Oxylipeurus (Epicolinus) callipeplus (Carriker).



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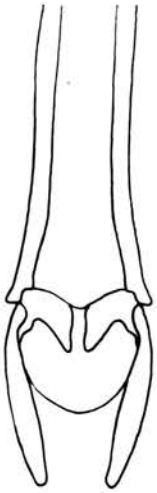

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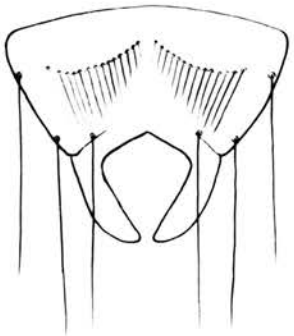

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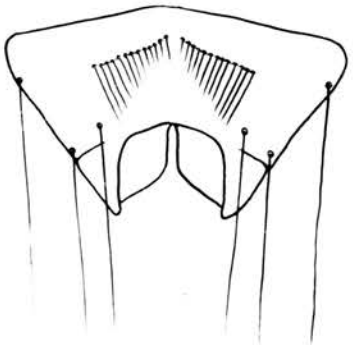

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Plate XI

Explanation of Plate XII

Figures 1-2. Oxylipeurus montezumus Emerson.

1. Dorsal-ventral view of the male.

2. Male genitalia.

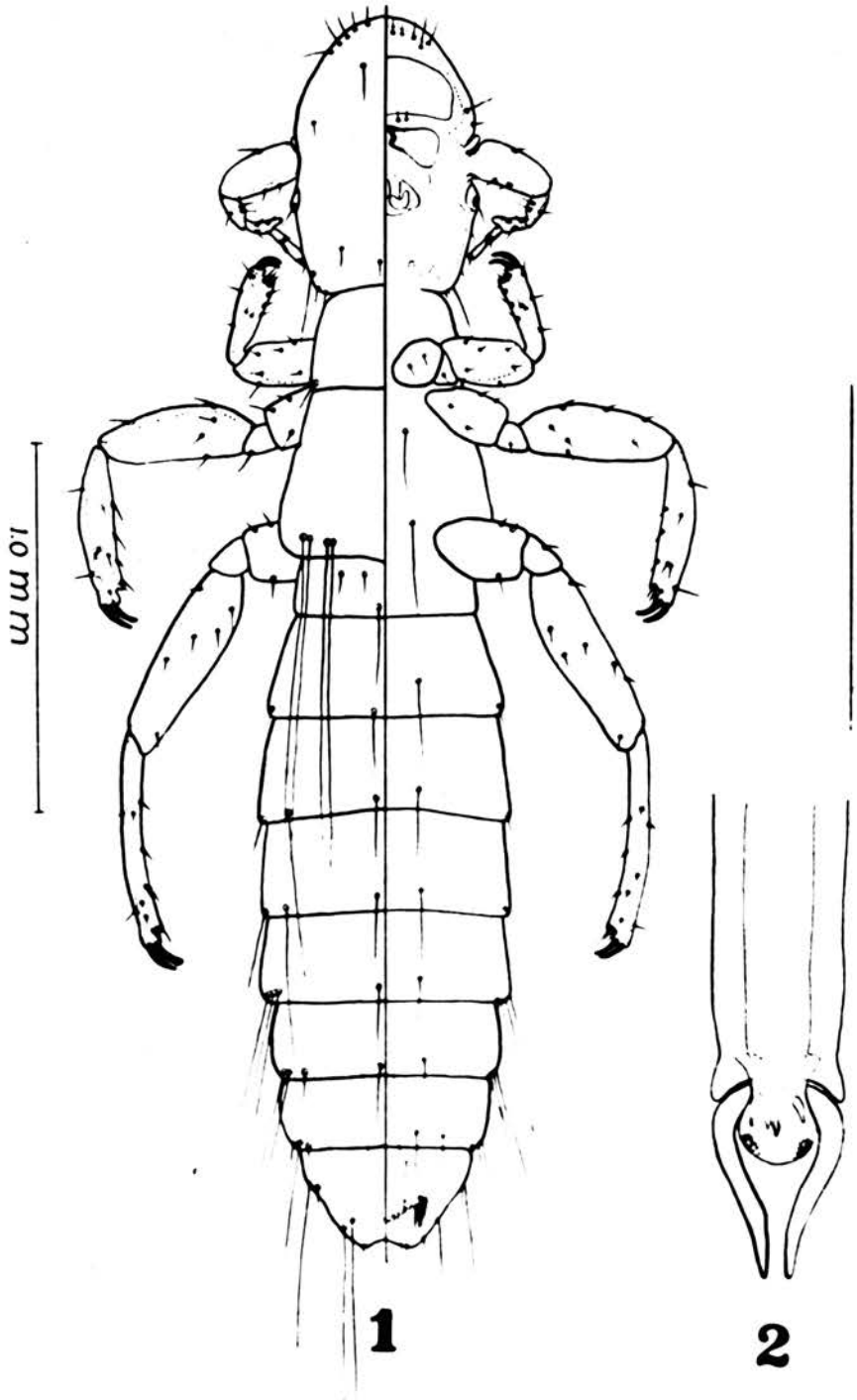



Plate XII

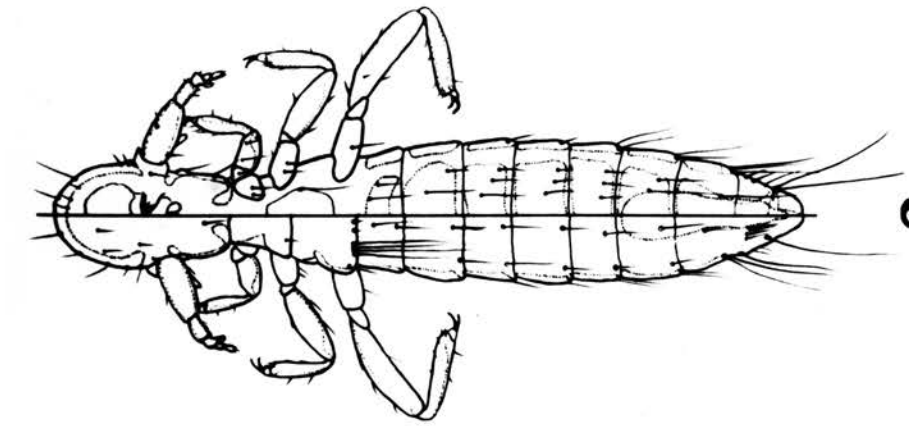
Explanation of Plate XIII

Figures 1-3. Lipeurus caponis (Linnaeus).

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.



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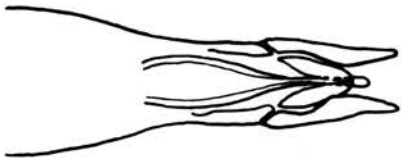

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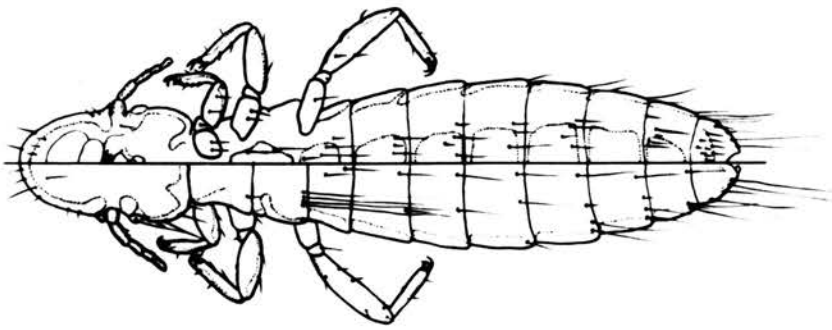

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Plate XIII

Explanation of Plate XIV

Figure 3. Dorsal-ventral view of the female of Lagopoecus gambelii Emerson.

Figure 4. Dorsal-ventral view of the male of Lagopoecus gambelii Emerson.

Figure 5. Male genitalia of Lagopoecus gambelii Emerson.

Figure 6. Male genitalia of Lagopoecus colchicus Emerson.

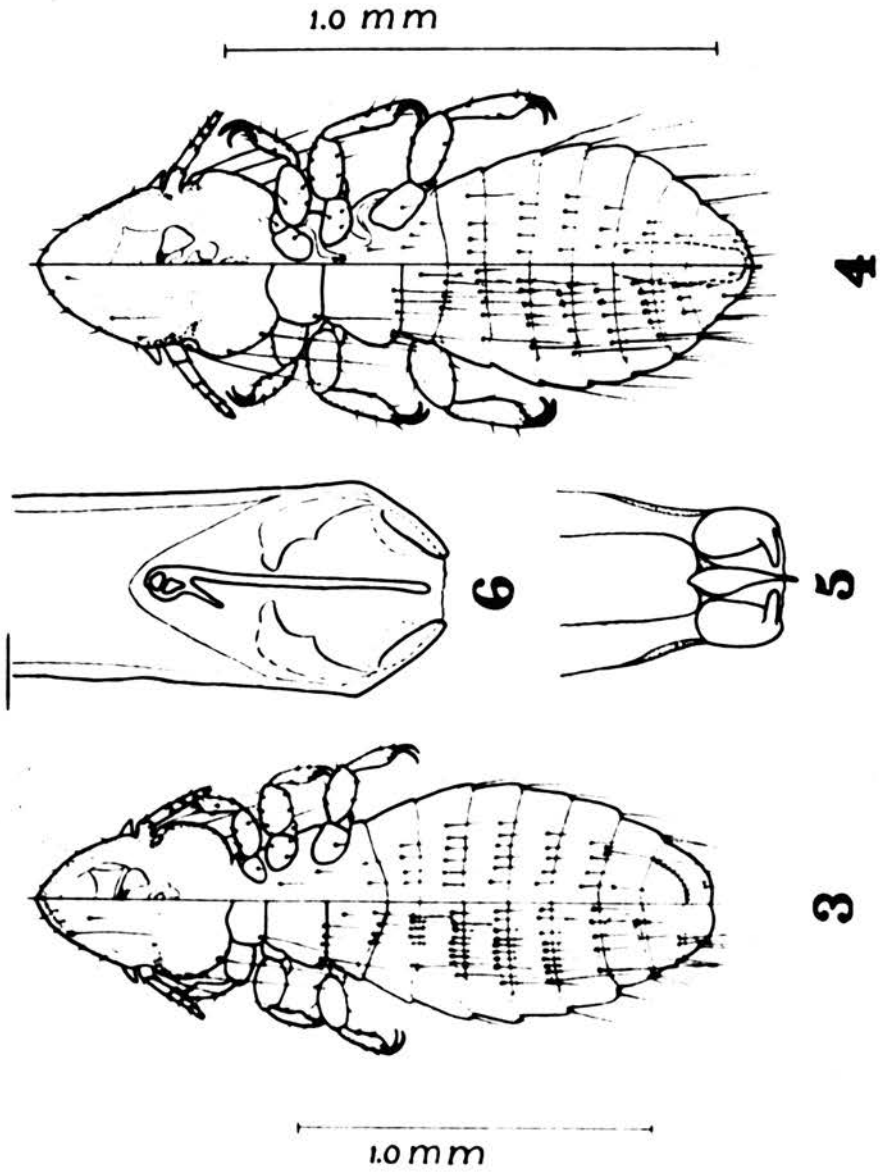



Plate XIV

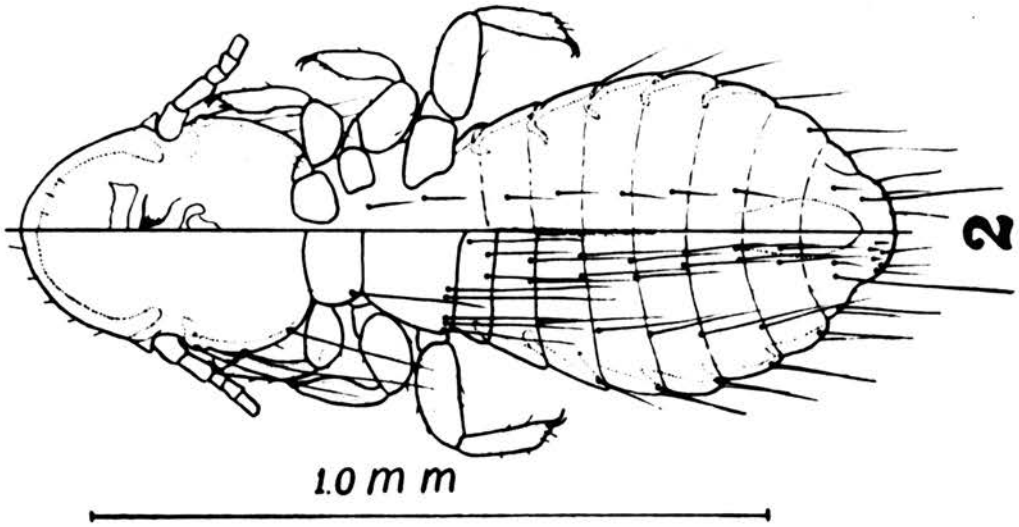
Explanation of Plate XV

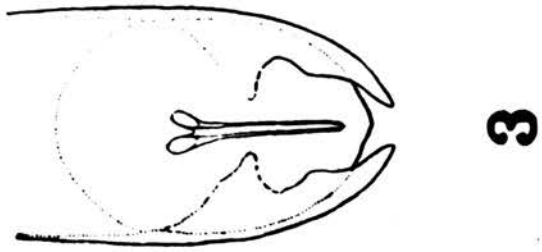
Figures 1-3. Lagopoecus obscurus Emerson.

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.



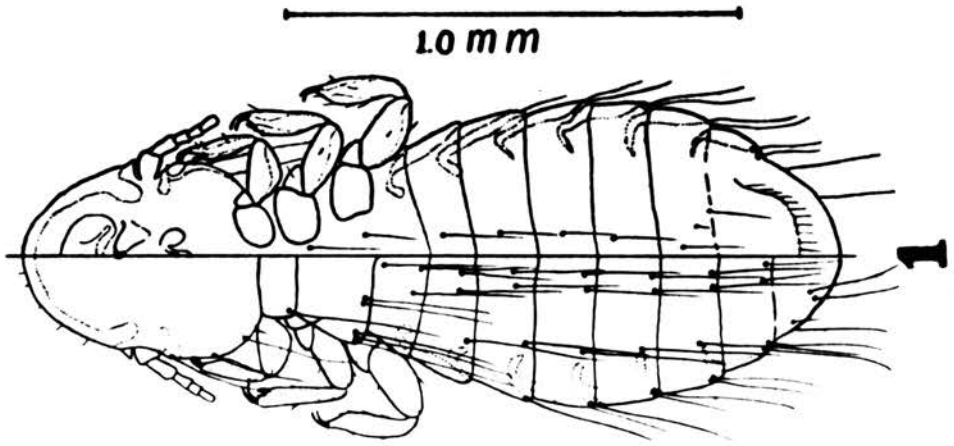




Plate XV

Explanation of Plate XVI

Figures 1–8. Dorsal view in outline of the female head, thorax and first four abdominal segments of *Lagopoecus* spp.

1. *affinis* (Children).
2. *californica* (Kellogg and Chapman).
3. *colchicus* Emerson.
4. *gambelii* Emerson.
5. *gibsoni* Hopkins.
6. *obscurus* Emerson.
7. *perplexus* (Kellogg and Chapman).
8. *umbellus* n. sp.

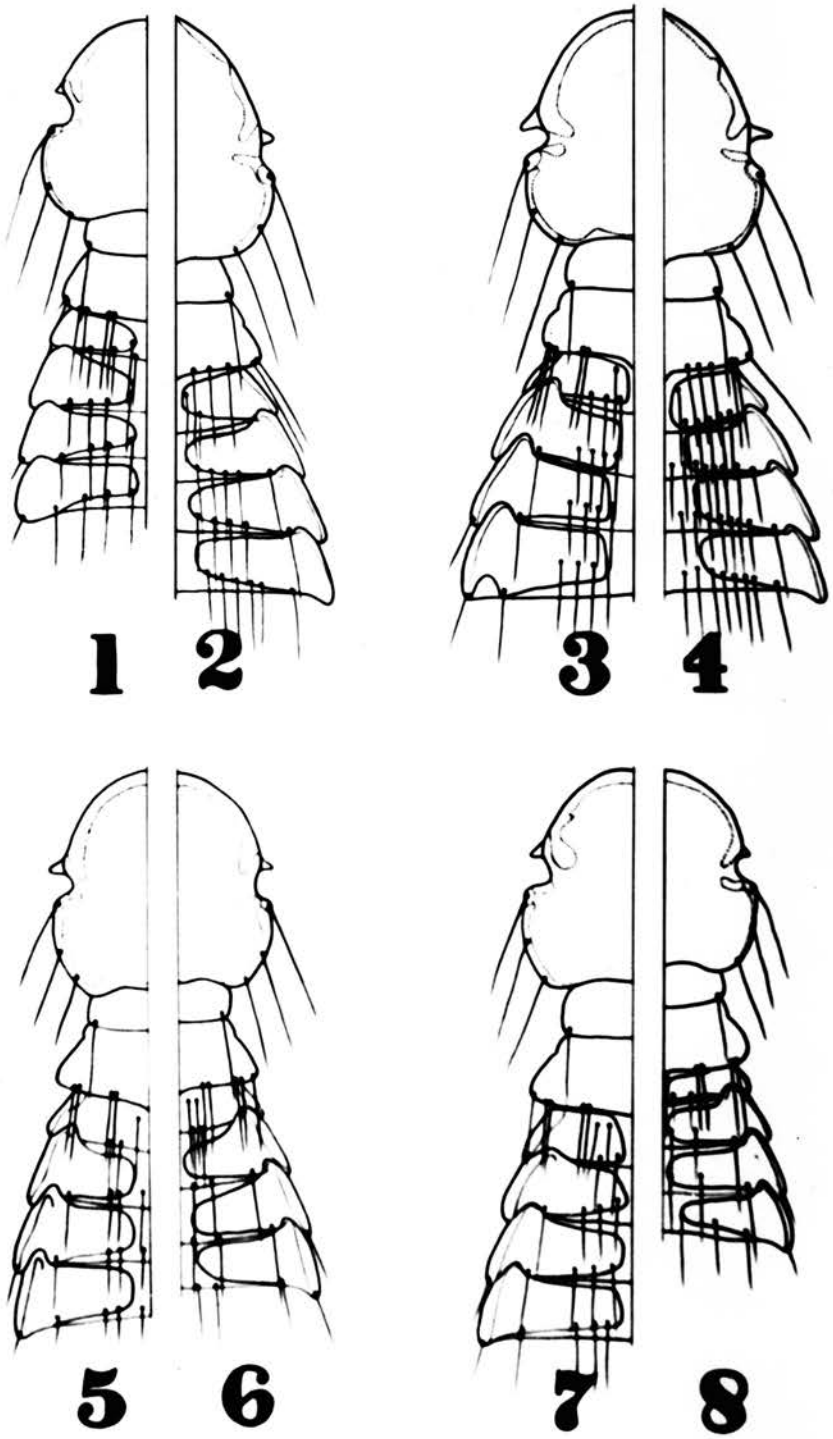
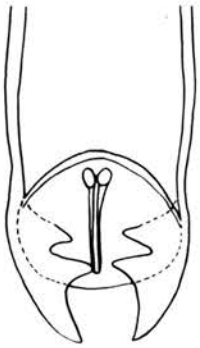



Plate XVI

Explanation of Plate XVII

Figures 1-7. Male genitalia of *Lagopoecus* spp.

1. *affinis* (Children).
2. *obscurus* Emerson.
3. *colchicus* Emerson.
4. *californicus* (Kellogg and Chapman).
5. *gambelii* Emerson.
6. *umbellus* n. sp.
7. *gibsoni* Hopkins.



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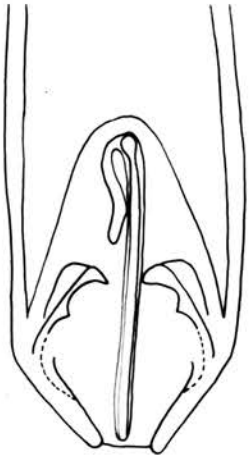

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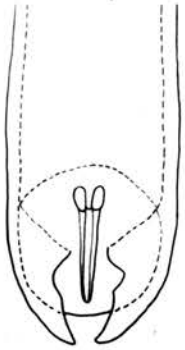

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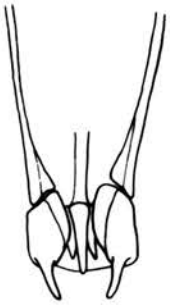

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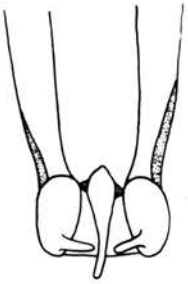

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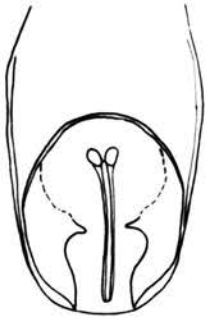

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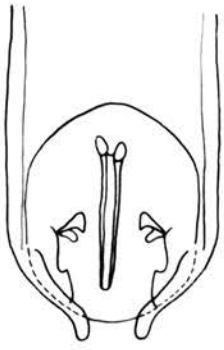


7

Plate XVII

Explanation of Plate XVIII

Figures 1-3. Goniocotes microthorax (Nitzsch).

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.

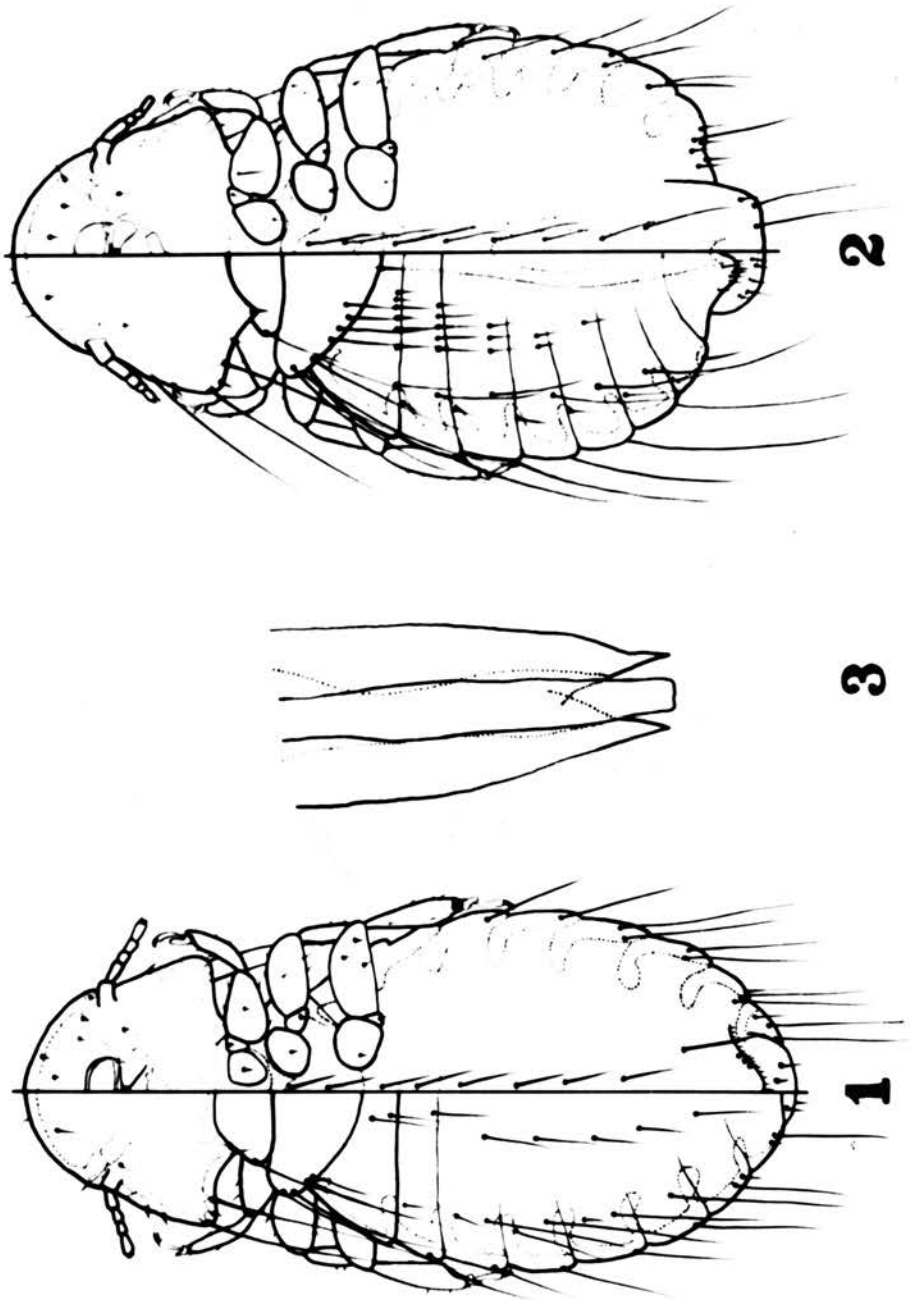



Plate XVIII

Explanation of Plate XIX

Figure 1. Dorsal-ventral view of the female of *Menopon gallinae* (Linnaeus).

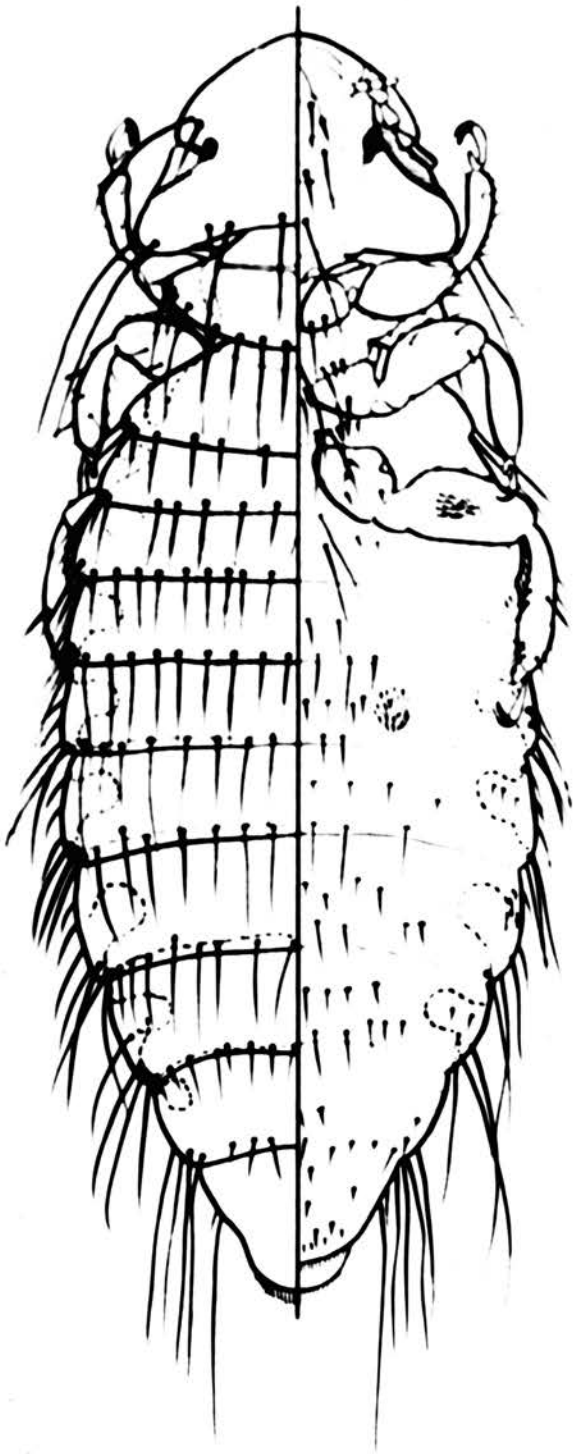


Plate XIX

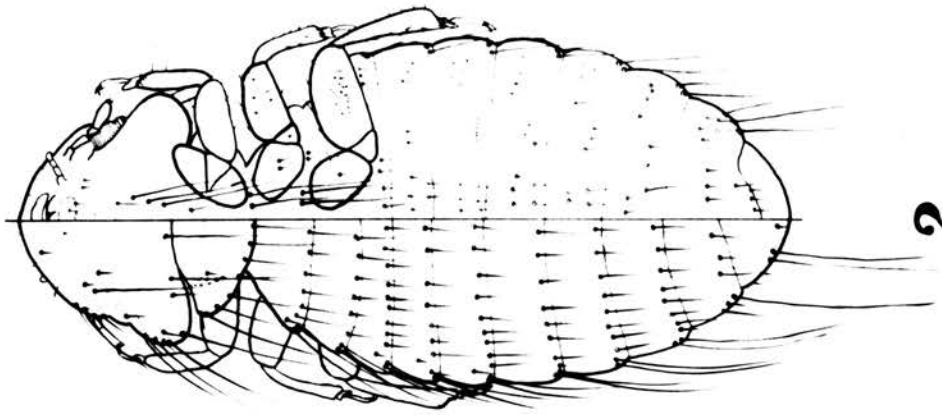
Explanation of Plate XX

Figures 1-3. Menopon pallens Hopkins and Clay.

1. Dorsal-ventral view of the female.

2. Dorsal-ventral view of the male.

3. Male genitalia.



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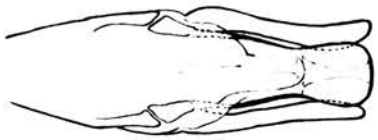

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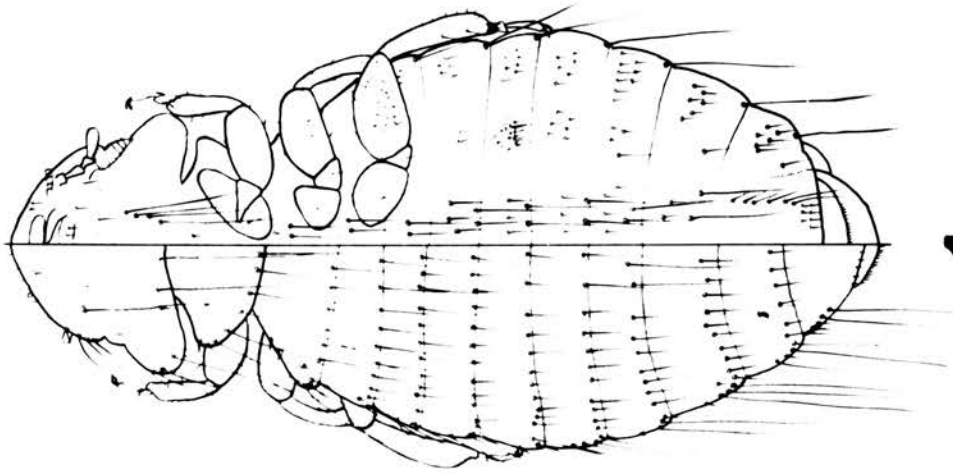

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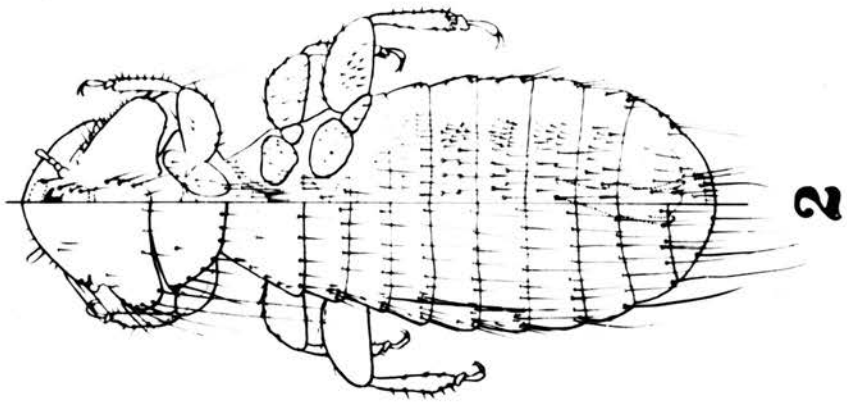
Plate XX

## Explanation of Plate XXI

Figures 1-3. *Amyrsidea lagopi* (Grube).

1. Dorsal-ventral view of the female.
2. Dorsal-ventral view of the male.
3. Male genitalia.



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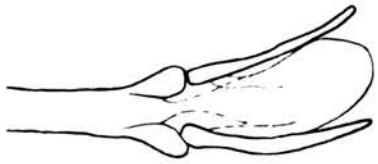

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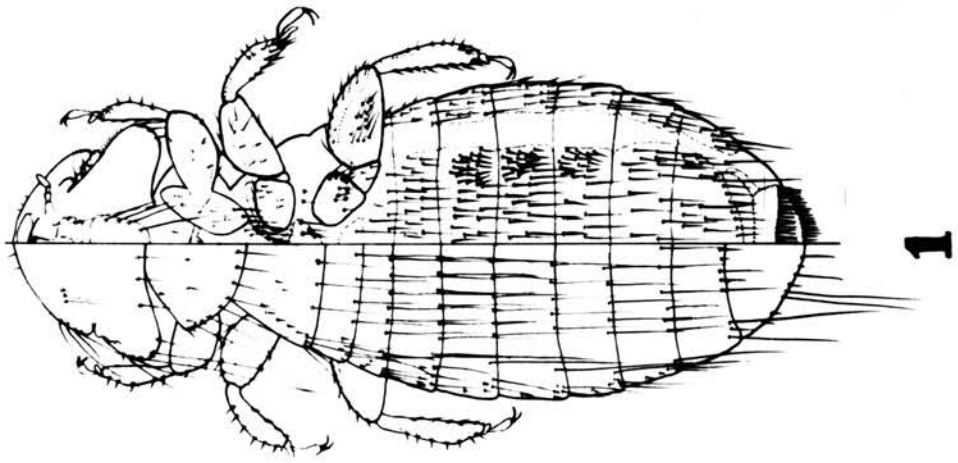

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Plate XXI

Explanation of Plate XXII

*Menacanthus stramineum* (Nitzsch), male.

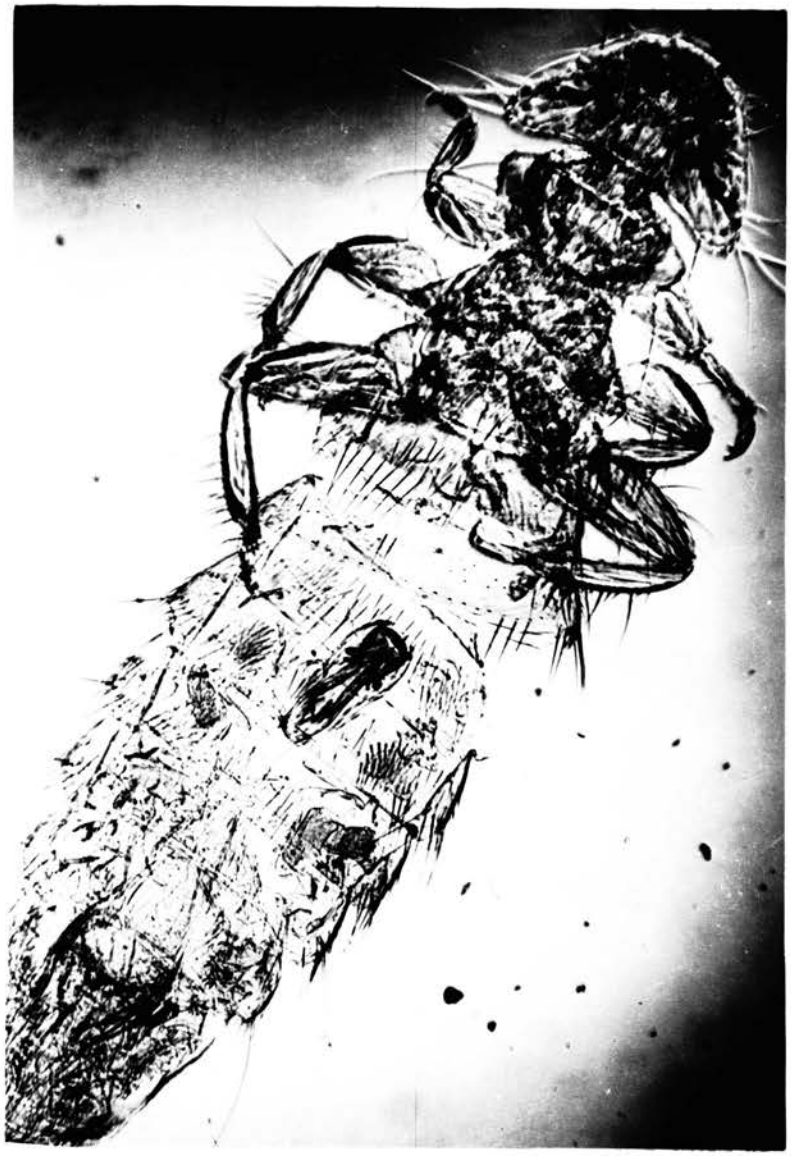

Plate XXII

Explanation of Plate XXIII

*Menacanthus stramineum* (Nitzsch), female.

Plate XXIII

Explanation of Plate XXIV

*Menacanthus pallidulum* (Neumann), male.

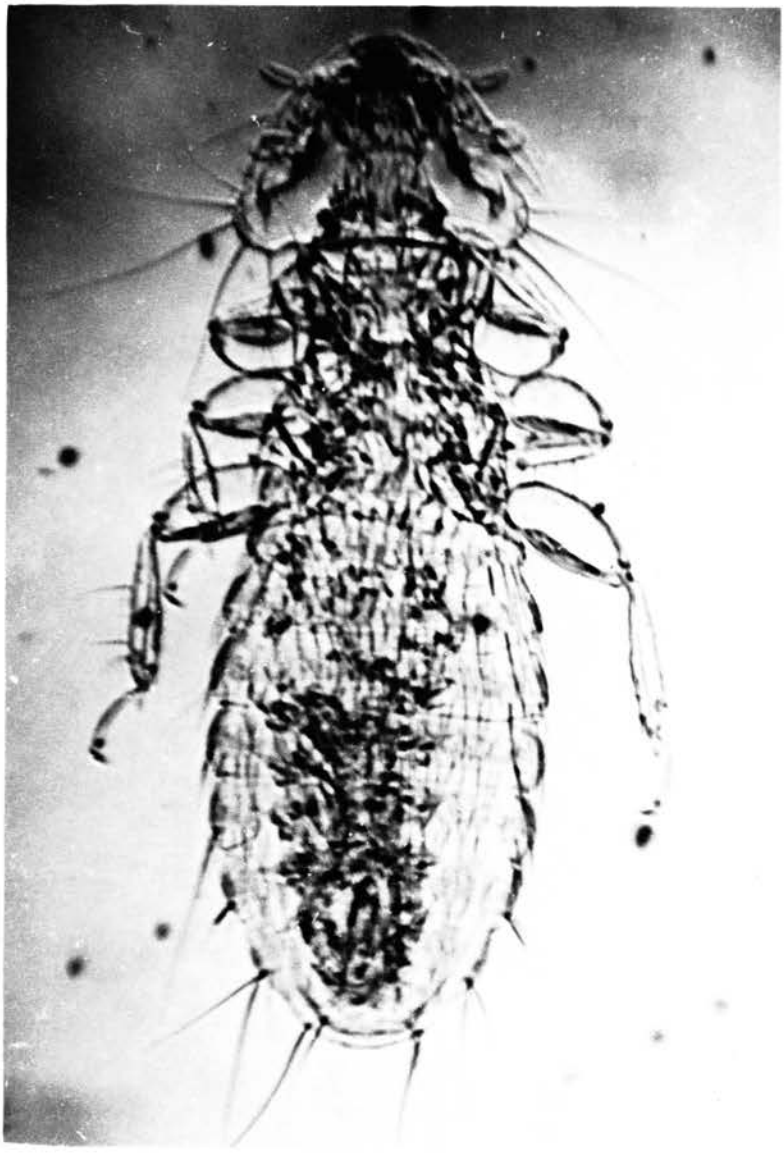

Plate XXIV

Explanation of Plate XXV

Menacanthus pallidulum (Neumann), female.

Plate XXV

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Typist -- Gaynelle B. Latimer