BULLETIN

OF THE

ILLINOIS STATE LABORATORY

OF

NATURAL HISTORY

URBANA, ILLINOIS, U. S. A.

VOL. VII. SEPTEMBER, 1909 ARTICLE X.

THE ORIBATOIDEA OF ILLINOIS.

BY

HENRY E. EWING, A.M.

ERRATA AND ADDENDA.

Page 55, line 15, for *1854* read *1855*.

Page 55, line 16, for *Horticultural* read *State Agricultural*.

Page 60, in second table, Illinois, for *240* read *241*.

Page 65, first line above foot-note, for *ventricosa* read *ligamentina*.

Page 72, line 9, for *imbecilis* read *imbecillis*.

Page 79, line 19, for *asperimus* read *asperrimus*.

Page 80, above *Quadrula rubiginosa* insert Section *Fusconaia* Simpson.

Page 76. The record of Calkins for *Margaritana margaritifera* is without doubt erroneous and should be eliminated. This species is not found in Illinois.

Page 95. *Pomatiopsis sheldonii* Pilsbry should read *Amnicola sheldonii* and should be transferred to the genus *Amnicola* on page 93.

Page 100. *Physa gyrina oleacea* Tryon is the immature stage of *Physa gyrina*.

Page 103. *Lymnæa tazewelliana* is a synonym of *Lymnæa parva*.

Page 105. *Lymnæa palustris michiganensis* is the immature form of *Lymnæa reflexa*.

Page 106. *Lymnæa reflexa iowensis* and *Lymnæa reflexa crystalensis* are synonyms of *Lymnæa reflexa*.

Page 112, line 6 from bottom, for *gouldi* read *gouldii*.

Page 114, line 5 from bottom, for *juxtigens* read *juxtidens*.

Page 115, line 21, for *Witter* read *Walker*; line 23, *Polygyra sayii* Binney should be changed to *Polygyra sayana* Pilsbry.

Page 116, line 1. *Polygyra exoleta* Binney (1885) should be changed to *Polygyra zaleta* Binney (1837).

Page 117, line 11 from bottom, for *leai* read *leaii*; line 3 from bottom, *Polygyra monodon fraterna* is a good species and should read *Polygyra fraterna*.

Page 119, foot-note. A specimen of *alliarius* in the collection of Mr. Aldrich, received from Calkins, proves to be *draparnaldi*.

Page 121, line 3 from bottom, for *Champaign* read *Piatt*.

Page 122, line 12 from bottom, for *Pyramidula striatella* Anthony read *Pyramidula cronkkitei anthonyi* Pilsbry; line 4, for *Held* read *Hald*.

Page 123, for *Helicodiscus lineatus* Say read *Helicodiscus parallelus* Say.

Page 162, line 7, for *glandulosa* read *linearis*.

Page 171, line 17, for *riparia* read *vulpina*.

Page 176, line 8 from bottom, for *canadense* read *majus*.

Page 180, line 9, for *virginica* read *virginiana*.

Page 221, line 6 from bottom, for *rectangulus* read *rectangularis*.

Page 226, line 3, for *fasciatus* read *fasciata*.

Page 239, line 11, strike out Lake Co. entry.

Page 246, lines 6 and 7, and page 248, lines 1, 14, 20, and 23, for *Œnothera* read *Onagra*.

Page 248, line 4, for *candida* Horn substitute n. sp.

Page 249, line 8 from bottom, for *Olethreutes dimidiana* Sodoff? read *Olethreutes separatana* Kearfott, and strike out parenthetical matter.

Page 251, line 7, for *grossa* read *thoracica*; line 21, for words preceding H. 6, read *Asilus rufipennis* Hine; line 18 from bottom, for words preceding H. 2, substitute *Asilus cacopilogus* Hine.

Page 253, line 8, for *Linn.* read *Emory.*

Page 257, line 15, for *pennsylvanicus* DeG. read *auricomus* Rob.

Page 261, Note 6. *Melanoplus macneilli* is very probably *M. fluviatilis* Brun.

Page 262, Note 9. Dr. Bergroth writes that *Nabis elongatus* is preoccupied. The original is *elogantus* in the check list. Comparison with long-winged *vicarius* is desirable before re-naming it.

Page 309, in table, for *59* read *57*, and for *743* read *741.*

Page 310, in table, for *59* read *57.*

Page 314, line 5, for *1587* read *481*; line 16, after *stubble* insert *meadows*; line 17, after *pastures* strike out *and meadows*, and after *1500* strike out *each.*

Page 315, last line, for *553* read *481.*

Page 362, line 7 from bottom, for *longa* read *parvilamellata.*

Page 373. As a second entry in synonymy insert as follows:

1854. *Nothrus bistriatus*, Nicolet, Acariens des Environs de Paris, p. 397, Pl. VII., Fig. 7.

Page 376, line 13 from bottom, for *Oribata* read *Oribates.*

Page 378, line 1, for *XXV.* read *XXXV.*

Page 384, after line 5 insert as follows:

N. bipilis Hermann. Mem. Apt., p. 95.
In moss, Arcola and Parker, Ill.

Page 384, line 5 from bottom, for *pyrostigma* read *pyrostigmata.*

Page 386, after line 11 from bottom insert as follows:

H. bistriata Nicolet. Acariens des Environs de Paris, p. 397, Pl. VII., Fig. 7.
Under logs and in moss, Urbana and Arcola, Ill.

Page 388, line 12, for *sphærulum* read *sphærula.*

ARTICLE X.—*The Oribatoidea of Illinois.* BY HENRY E. EWING.

INTRODUCTION.

The mites of the group *Oribatoidea*, though abundant in this country, have received but little study. About a hundred species have been recorded from America. Out of this number over 90 per cent. are new species, yet with this very large per cent. of new species only two new genera (*Gymnobates* Banks and *Tumidalvus* Ewing) are peculiar to our country. Our fauna is especially rich in the abdominal-winged forms (*Pterogasterea*). The number of the *Pterogasterea* described from this country, up to the present, is over 40. Nearly all of these winged forms have a shiny integument, which fact may have caused their more ready discovery and the apparently much greater percentage of winged forms here than in Europe.

The *Oribatoidea* are appropriately called beetle-mites because of their hard, chitinized integument. They are quite distinct however from the mites of those groups which are parasites or pseudoparasites of beetles, and which for this reason have been called beetle-mites by some persons. The internal anatomy and life history of this group have been studied very carefully by A. D. Michael, of England, to whom the writer is indebted for a large collection of named European species. The physiology and embryology of the group are almost entirely unknown. Economically the beetle-mites have no great importance.

The writer is very much indebted to Dr. J. W. Folsom, of the department of zoology of the University of Illinois, for assistance in many ways. Mr. J. D. Hood, a specialist in the study of the *Thysanoptera*, has not only collected material for the author from many parts of the state, but has in most cases furnished mounted specimens and also added notes upon their

habits, etc. The following persons have aided very materially in collecting specimens: Mr. C. A. Hart, systematic entomologist of the State Laboratory of Natural History; Mr. J. J. Davis, assistant to the State Entomologist; Mr. J. L. Pricer, A. M., graduate student in entomology; and Messrs. J. Zetek, R. D. Glasgow, and H. Glasgow, all students of the University of Illinois.

Dr. S. A. Forbes has kindly permitted the author to work up the oribatid collections of the State Laboratory of Natural History, in which type specimens of the species described in this paper have been deposited.

Methods.

In making collections of oribatids several methods may be employed. It is very desirable that these mites be collected alive, in order that they may be studied before being placed in a preserving fluid. All notes on color and the position of the bristles and pseudostigmatic organs should be made from living specimens. Individual mites can be very readily transferred on a camel's hair brush to a collecting vial, to be taken to the laboratory and killed.

Specimens are best killed in hot water or hot alcohol, when they die in an extended position, most favorable for study. While the specimens are still in the alcohol, notes should be made on the shape of the pteromorphæ, the pseudostigmata, and the pseudostigmatic organs, since it is hard to study the form of these parts in the dorsal or ventral view of permanently mounted specimens. Mr. Michael suggests the use of dilute acetic acid instead of alcohol as a preservative.

In order to collect oribatids in large numbers, I use with great success a modification of the Berlese method described by Howard in "Entomological News", Vol. XVII., 1906, pages 49–54. If vegetable debris is passed through a sieve before being treated by the Berlese method, the number and variety of small arthropods that may thus be obtained is surprisingly large. A simple but satisfactory method consists in placing

the siftings on a flat dish suspended over a large funnel, and placing the funnel and all in the sunlight. The sunlight drives the mites out of the siftings, and they fall through the funnel into a vial below.

The most convenient and satisfactory mounting media for oribatids are Canada balsam and dammar balsam. Dissections of the mouth-parts are frequently necessary. Material must often be rendered partially transparent by means of potassic hydrate or eau de Labrraque.

In making the drawings I used an Abbé camera lucida. The measurements were made with an ocular micrometer.

External Anatomy.

The body in the *Oribatoidea* (Fig. 1) consists of an anterior narrower region termed the cephalothorax, and a posterior, much larger, portion termed the abdomen. The union of these two regions is more intimate in some genera than in others. There is usually an evident division between the cephalothorax and the abdomen except in the genera *Scutovertex* and *Amerus*. In two genera, *Hoploderma* and *Phthiracarus*, the cephalothorax is hinged to the abdomen in such a way that the former can be folded down against the ventral surface of the latter.

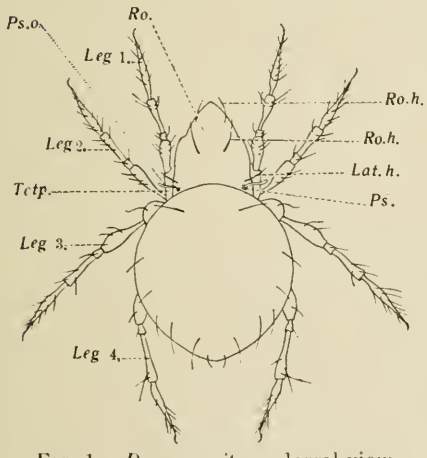


Fig. 1. *Damæus niteus*, dorsal view.

The cephalothorax may be divided into two parts; the rostrum (Fig. 1, *Ro.*) and the posterior portion. The rostrum is the anterior hood-like portion which protects the mouth-parts. Upon the rostrum is found a pair of stout hairs termed rostral hairs (Fig. 1, *Ro. h.*); sometimes the

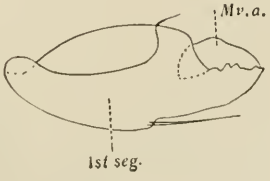


Fig. 2. *Oribata banksi*, mandible.

rostrum bears an additional pair of hairs. Underneath the rostrum may be seen the mouth-parts, which consist of mandibles (Fig. 2), palpi (Fig. 3, *Pa.*), maxillæ (Fig. 3, *Max.*), and the maxillary lip (Fig. 3, *Max. l.*). From the maxillary lip project the maxillæ and the palpi. The maxillæ are curved and blade-like, and are large and highly developed in the genus *Hoploderma*. The palpi consist usually of five segments, and as a rule are very small; in the genera *Phthiracarus* and *Hoploderma*, however, they are large. On the posterior part of the cephalothorax are found the following organs: pseudostigmata, pseudostigmatic organs, lamellæ, lamellar hairs, interlamellar hairs and sometimes a translamella, and often one or more pairs of tectopedia. The pseudostigmata (Fig. 4, *Ps.*), formerly supposed to be the true stigmata, are situated near the abdominal margin and usually close to the lateral margin of the cephalothorax. They are of various forms, though usually cylindrical or funnel shaped. From each pseudostigma projects the pseudostigmatic organ (Fig. 4, *Ps. org.*). This may be filiform, fungiform, setiform, clavate, or subglobose, and is often pectinate or dentate. The lamellæ consist of either blade-like chitinous projections, or of mere ridges. They vary greatly in size and shape, and are situated on the dorso-lateral part of the cephalothorax. Sometimes the lamellæ project in a free end which may extend to the apex of the rostrum or even beyond it. From the tip of the lamellæ project a pair of prominent bristles, termed the lamellar hairs. The tectopedia, of which there may be as many as three pairs, are generally blade-like, are situated on the sides of the cephalothorax, and have either a tactile function or serve to protect the coxæ.

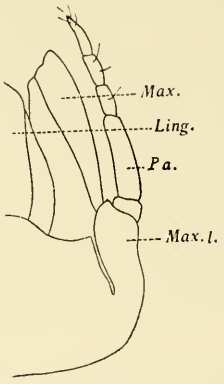


FIG. 3. *Oribata banksi*, mouth-parts.

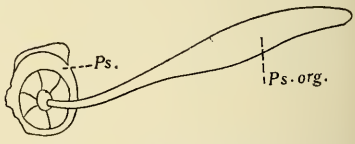


FIG. 4. *Oribata setosa*, pseudostigma and pseudostigmatic organ.

The abdomen has the following structures: dorsum, ventral plate, anal covers, genital covers, often pteromorphæ, and sometimes large bristles. The dorsum of the abdomen consists of a single large chitinous plate. The ventral plate varies much in size; is sometimes confluent with the dorsum, and contains the genital and anal apertures. The genital aperture is anterior to the anal aperture, and is closed by two chitinous "folding doors", known as the genital covers. The anal aperture is similarly closed, its "folding doors" being termed the anal covers. Sometimes on the dorsum, rarely on the ventral plate, long bristles may be found, though frequently the abdomen is hairless. In some genera, as *Pelops* and *Oribata*, there are chitinous wing-like expansions of the abdomen termed pteromorphæ (Pl. XXXIII., Fig. 4, *pter.*).

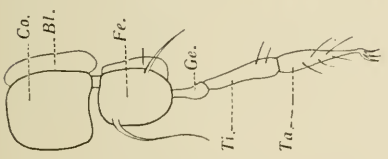


Fig. 5. *Oribata mollicoma*, leg 4.

The legs (Fig. 5) consist of five segments, namely, coxa, femur, genual, tibia, and tarsus. The coxa (*Co.*), or basal segment, is usually the shortest and stoutest of the segments, and sometimes has a blade-like expansion (*Bl.*) on one side. The femur (*Fe.*) is usually the largest and sometimes the longest segment. The genual (*Ge.*) is very small and inconspicuous. The tibia (*Ti.*) is usually subequal to the tarsus (*Ta.*), and often bears, especially on the front pair of legs, a long tactile hair at its distal end. The tarsus ends in either one (monodactyle) claw or three (tridactyle) claws, and never in two except in the species *Nothrus anauniensis*.

The parts most used for systematic purposes are the pseudostigmatic organs, lamellæ, translamella, pteromorphæ, and ungues.

Internal Anatomy.

Most of the internal organs of the oribatids may be divided into three systems: the digestive, tracheal, and reproductive systems. The digestive and reproductive organs occupy most of the body cavity.

The digestive system includes the mouth, pharynx, œsophagus, ventriculus or stomach, intestine, and rectum. The mouth leads into a not well marked off region, called the pharynx, which is sometimes broader than the œsophagus. The posterior end of the œsophagus is generally enlarged, forming the ingluves just in front of the stomach. The ventriculus, or stomach, is very large, and its outline can often be seen through the integument of light-colored species or in specimens which have recently emerged from the nymphal skin. I have found that treatment with acetic acid and mounting in glycerine will frequently show the internal organs very plainly. The stomach is almost like a spherical bag in most cases, with its anterior wall lying at the division between the cephalothorax and abdomen, while its posterior wall extends to a point almost above the anal opening. Extending out from the stomach on each side at the posterior part is a blind pouch or cœcum. The cœca vary somewhat in size, shape, and situation with the species. The intestine and rectum are very short and often resemble a C-shaped tube, leading from the posterior wall of the stomach to the anus. In connection with the digestive process is a small pair of glands situated on the front wall of the ventriculus or stomach.

The tracheal system exists only in the adult forms and is absent in the *Hoplodermidæ*. The tracheæ usually consist of from eight to twelve main trunks, which start from the acetabula of the legs, most of them extending backwards in a wavy course to the posterior end of the abdomen, where they become slightly enlarged at their termination to form air-sacs. The tracheæ are always unbranched.

The nervous system has not been well worked out in the case of the *Oribatoidea* but consists of a sub- and a supra-œsophageal ganglion, which have nerves running to the important organs.

Situated on the sides of the abdominal cavity in the case of some species, is a small sac which opens to the exterior through the integument. This apparatus is supposed to have an excretory function. The region of the cephalothorax is largely occupied by muscles controlling the legs and the mouth-

parts. No circulatory system has been demonstrated in the beetle-mites although some *Acarina* have a pulsating organ called the heart.

The reproductive system occupies a large part of the lateral and posterior portions of the abdomen. In the case of the male, the organs consist of a large central gland, the testis, which has two ducts, the vasa deferentia, leading from it. These unite to form the ejaculatory duct, which opens through a small penis. The reproductive organs of the female consist of a paired or unpaired ovary, and of two large oviducts which pass backwards along the sides of the abdomen to its posterior end, to form there the vagina, which opens to the exterior through a large protrusible ovipositor. The ovipositor is usually trifid, and may possess a few small hairs on its distal end. In specimens treated with glycerine and acetic acid, the large ovipositor may often be seen in repose with its proximal end against the posterior wall of the abdomen and its distal end at the entrance of the genital opening.

Life History.

Most *Oribatoidea* are oviparous; some species, however, according to Michael, are ovoviviparous, and a few viviparous. It is believed by some that many if not all the *Oribatoidea* are parthenogenetic. Up to the present time they have never been found in copulation.

The larvæ, as in the case of most of the *Acarina*, have only three pairs of legs, which always have tarsi with monodactyle claws.

When the larvæ transform into the nymphs they have the full number of legs of the adult, but in other respects are very different from the mature forms. Instead of being a dull brown or black color, they frequently are tinted with red, yellow, or pink, and, more marked yet, their external form may be very different from that of the adult. Instead of having a body almost or quite free from any integumentary projections, as is generally the case in the adult, they may have large, leaf-like, or sword-shaped integumentary processes. These integu-

mentary processes are sometimes so large that they almost completely conceal the rest of the body. In the case of the nymphs of some of the species of *Liacarus*, the leaf-like appendages are radially arranged around the central part of the body, giving the whole creature a beautiful stellate appearance. In the nymphal state the integument is usually poorly chitinized. As would be expected, the sexual organs are not developed in the case of the nymphs.

About ten days are passed by the inert nymph preliminary to the appearance of the adult. Upon the splitting of the old nymphal skin the adult usually emerges, leaving its "old clothes" behind; but this is not always the case, as is shown by the genus *Neoliodes*, the members of which carry throughout life the cast nymphal skin—which can readily be removed by treatment with potassium hydroxide. The members of the genus *Damæus* almost always bear a part of the old nymphal skin supported by means of the bristles on the dorsum of the abdomen, but not adhering firmly to the newly formed integument as in the case of the species of *Neoliodes*. The adults immediately after emerging from the nymphal skin are usually lighter in color than the older forms; in other respects they are the same.

Habits.

The *Oribatoidea* are very small creatures of about the size of a pin-head, or even smaller. They may be easily found under logs (slightly decayed), under bark, in rubbish, under stones, in moss, or may be shaken from the branches of trees or collected in grass sweepings. They live very largely upon fungi, or, to some extent, upon plant juices, and apparently are never predaceous although the *Hoplodermidæ* have large and powerful mandibles. Most of the beetle-mites, though blind, are very sensitive to light, and avoid it when possible. I have found that they have a very sensitive touch and also have the power of smell, which sense may be situated in the so-called pseudostigmatic organs.

Not being well armed for aggressive warfare, this group is very remarkable in its adaptation for defense. The thick chitinous integument of the group when taken into consideration with the special structures of the *Oribatidæ*, the pteromorphæ or abdominal wings, affords an excellent protection against some of their smallest, though most troublesome, enemies. When the least disturbed, most of the species with these chitinous abdominal wings will fold the legs up underneath the body and close down the abdominal wings over them, so that they are almost or quite completely concealed and protected. In case of the *Hoplodermidæ*, which have the cephalothorax hinged to the abdomen, they at once feign death upon being disturbed, fold themselves into a small ball by bending the cephalothorax down over the ventral surface of the abdomen, at the same time drawing up the legs, and are thus completely covered by the cephalothorax.

In their movements the *Oribatoidea* are sluggish as compared with the other *Acarina*. As a rule the smooth, shiny species are more active than the larger, rough species. The species of the genera *Neoliodes* and *Nothrus* are especially slow in their movements. One species, *Zetorchestes micronychus*, which though common in Europe has been found in only one place in America, is quite unique in being the only oribatid which is saltatorial.

Many of the *Oribatoidea* pass the winter in moss. Some of the species which live upon the leaves of trees, apparently winter under the bark.

The Taxonomy of the Higher Groups of the Oribatoidea.

Michael, the expert acarologist already mentioned, regards the group of beetle-mites as a family, and in his monograph of them in "Das Tierreich" (Lief. 3, 1898) divided the group into seven subfamilies. I can hardly agree with this author in all respects as to this division, for although the characters which separate some of his subfamilies are fundamental and are correlated with differences in habit as well as structure, others are somewhat variable and hardly of more than generic im-

portance. I refer for example to the separation of his subfamily *Notaspidinæ* from the subfamilies *Damæinæ* and *Nothrinæ*, based upon the absence or presence of the lamellæ. While the lamellæ are sometimes very constant in their shape and size in a single species, yet, taking all the species together, we can get an insensible gradation from forms with enormous shelf-like expansions, which conceal much or most of the cephalothorax from above, to small chitinous ridges or only wrinkles of the integument which may vary in some cases so as to be almost invisible. This fact, taken together with the fact that there are few if any supplementary characters in support of this division, make it rather artificial, if not unwarrantable, to accord it the same rank with his other divisions of the group. On the other hand, his separation of those forms which have the cephalothorax anchylosed to the abdomen from those which have the cephalothorax hinged to the same (his *Phthiracarinæ*) is certainly based on characters of family portance. This is more convincingly evident when we consider the other important points of difference, which are given below.

Forms with Cephalothorax Anchylosed to Abdomen.	*Forms with Cephalothorax Hinged to Abdomen.*
Body frequently depressed.	Body always compresed.
With tracheæ.	Without tracheæ.
Ventral plate anchylosed to dorsal plate	Ventral plate not anchylosed to dorsal plate.
Genital and anal openings situated apart.	Genital and anal openings usually together
Legs frequently long or slender or moniliform.	Legs always stout.
Mouth-parts very small, or rudimentary.	Mouth-parts large, mandibles enormous.
Palpi with five segments.	Palpi with only four segments.
Femora generally stouter than the other segments of the legs.	Femora subequal in width to the other segments of the legs.
Cephalothorax never with a median carina.	Cephalothorax often with a median carina.

Abdomen never with a chitinous hood-like projection from its anterior margin.	Abdomen sometimes with a chitinous hood-like projection from its anterior margin.
Claws of legs usually small and monodactyle; if tridactyle the dactyles are usually unequal.	Claws of legs always stout; if tridactyle the dactyles are subequal.

When we consider all these points of difference, it appears to us that they are not only of sufficient importance for the separation of the two forms into different families, but that they might even justify a wider separation and a higher rank. About the only important characters the two have in common are the chitinous integument and the presence of the pseudostigmata and the pseudostigmatic organs. Mr. Banks, in his treatise on "The Acarina, or Mites" (Proc. U. S. Nat. Mus., Vol. XXVIII., p. 1–114), separates those forms which have the cephalothorax hinged to the abdomen from the other oribatids, under the family name of *Hoplodermidæ*. This separation and name the author of this paper has adopted.

Mr. Michael's separation of those forms which possess abdominal wings from those which do not ("*Apterogasterea*") we accept, raising both forms, however, to family rank, and giving the first-mentioned the old name *Oribatidæ*, since it contains the old genus *Oribata*. This division is not altogether happy for two reasons: first, many authors may consider the small, shelf-like chitinous expansions from the shoulders of the abdomen in the case of some genera (as *Notaspis* and *Tegeocranus*) as homologous with the true abdominal wings, or pteromorphæ; second, there are not many other fundamental characters in support of the division. Notwithstanding these facts, we consider the development of abdominal wings—especially when taking into account their defensive value and the habits of mites possessing them, and some other points of difference as well—as of sufficient importance to entitle such forms to family rank.

Since we have applied the family name *Oribatidæ* to those forms having abdominal wings, the remaining forms, the "*Apterogasterea*", we naturally consider as constituting a family, us-

ing for it the name *Nothridæ*, derived from the genus *Nothrus*, which name has been previously so applied by G. Canestrini and made a subfamily name by Mr. Michael.

Having thus created three families out of the group to which the old family name *Oribatidæ* was given, we regard the group as a superfamily, as suggested by Mr. Banks, including in it, however, as already stated, three families for the two (*Oribatidæ* and *Hoplodermidæ*) recognized by that author. The following is a summary of the characters of the superfamily *Oribatoidea*:

Integument generally well chitinized, which gives the individuals a beetle-like appearance. Cephalothorax with a pair of funnel-shaped or cylindrical structures on the dorsum which are called pseudostigmata, from each of which projects an elongate specialized organ, or seta, the pseudostigmatic organ; chitinous blade-like expansions termed lamellæ often present. Palpi small, with five segments, generally hidden by the rostrum; mandibles chelate. Abdomen usually oval; ventral surface covered by a large chitinous plate termed the ventral plate; dorsal surface often with a large chitinous wing-like expansion on each side, known as the pteromorpha. Legs composed of five segments, the distal segment bearing a claw (unguis) which is either monodactyle or tridactyle.

KEY TO THE FAMILIES OF ORIBATOIDEA.

1. Cephalothorax and abdomen immovably fused together; body never compressed; mouth-parts small; with tracheæ opening at the acetabula of the legs; legs often long or slender ..... 2.

   Cephalothorax hinged to the abdomen and capable of being folded down over the ventral surface of the same; body compressed; mouth-parts large; without tracheæ; legs stout ..... HOPLODERMIDÆ.

2. Abdomen possessing chitinous wings, or pteromorphæ; integument usually smooth and shiny and always well chitinized; legs never stout or with swollen segments ..... ORIBATIDÆ.

Abdomen without wings; integument often rough or sculptured and sometimes very little chitinized; legs frequently stout or moniliform..... NOTHRIDÆ.

The three families of the superfamily *Oribatoidea* we divide into 29 genera, which are distributed as follows: *Oribatidæ*, 5 genera; *Nothridæ*, 21 genera; and *Hoplodermidæ*, 3 genera.

KEY TO THE GENERA OF ORIBATIDÆ.

1. Superior bristles of body spatulate; mandibles long and slender; integument sometimes rough or pitted.. PELOPS.
   Superior bristles never spatulate; integument smooth... 2.
2. Tarsi of first pair of legs broad at the tip; pteromorphæ attached to the sides of the cephalothorax as well as to the abdomen..... GYMNOBATES.
   Tarsi of first pair of legs tapering at the tip; pteromorphæ attached to the abdomen only..... 3.
3. Claws of the tarsi tridactyle..... 4.
   Claws of tarsi monodactyle..... ORIBATODES.
4. Lamellæ large, attached to the cephalothorax by their posterior margins only..... ORIBATELLA.
   Lamellæ moderate, attached to the cephalothorax by their inner margins..... ORIBATA.

KEY TO THE GENERA OF NOTHRIDÆ.

1. Mandibles rod-like, serrate..... SERRARIUS.
   Mandibles chelate..... 2.
2. Last pair of legs distant from the others and saltatorial..... ZETORCHESTES.
   Last pair not distant from the others, nor saltatorial, being used for crawling..... 3.
3. Abdomen apparently divided into three parts by a pair of oblique sutures passing backward from the posterior edge of the cephalothorax to the middle of the lateral margins of the abdomen..... TRIZETES.
   Abdomen without such oblique sutures..... 4.
4. Integument thin and little chitinized; variously colored.. 19.

Integument well chitinized; color brown..... 5.
5. Cephalothorax with lamellæ ..... 6.
Cephalothorax without lamellæ ..... 12.
6. Body smooth..... 7.
Body rough..... 8.
7. Last three pairs of legs situated under the body.. Liacarus.
Last three pairs of legs situated at the sides of the body ..... Notaspis.
8. No demarcation between the cephalothorax and abdomen ..... Scutovertex.
Cephalothorax and abdomen plainly divided..... 9.
9. Ungues monodactyle; femora I and II pedunculate..... 10.
Ungues tridactyle..... 11.
10. Lamellæ large, blade-like..... Tegeocranus.
Lamellæ merely low chitinous ridges..... Carabodes.
11. Femur I pedunculate..... Chaunoproctus.
Femur I not pedunculate..... Cepheus.
12. Legs slender, longer than body, segments pedunculate.. 13.
Legs short and stout..... 14.
13. Cephalothorax and abdomen coalescing at the median plane..... Amerus.
Cephalothorax and abdomen plainly divided..... Damæus.
14. Ungues monodactyle; dorsum of abdomen convex..... 15.
Ungues tridactyle ..... 16.
15. Genital and anal covers separate; situated in the ventral plate..... Hermannia.
Genital and anal covers contiguous; no ventral plate present..... Lohmannia.
16. Dorsum of abdomen convex..... 17.
Dorsum of abdomen flat or concave..... 18.
17. Abdomen with concentric rings on the dorsum; ventral plate present..... Neoliodes.
Abdomen without concentric rings on the dorsum; ventral plate absent..... Tumidalvus.
18. Body elliptical; leg II with tectopedia..... Cymbæremæus.
Body rectangular; leg II without tectopedia.... Nothrus.

19. Abdomen without transverse suture.... Trhypochthonius.
Abdomen with transverse suture..... 20.
20. Ungues tridactyle, with inner dactyle less than half as long as the others; cephalothorax truncate in front..... Parhypochthonius.
Ungues either monodactyle or tridactyle, if tridactyle, dactyles of equal length; cephalothorax not truncate in front..... Hypochthonius.

KEY TO THE GENERA OF HOPLODERMIDÆ.

1. Genital and anal openings situated apart; ventral plate large..... Mesoplophora.
Genital and anal openings situated together; ventral plate small or rudimentary..... 2.
2. Ungues monodactyle; genital and anal covers separate..... Hoploderma.
Ungues tridactyle; genital and anal covers coalescing. ..... Phthiracarus.

Descriptions of Species.

Thirty-three species from Illinois are described in the following pages, and of this number twelve are new. In every case the author has made figures illustrating the new species, and a few figures have been made of some of our most common American species. The species are arranged in the natural order under each genus, a key being given to aid in their identification. The genera and families are similarly arranged, the leading characters being given for each group.

Family ORIBATIDÆ.

Forms with the cephalothorax and abdomen immovably fused together; body not compressed; mouth-parts very small; tracheæ opening at the acetabula of the legs. Abdomen possessing chitinous wing-like expansions called pteromorphæ; integument usually smooth and shiny. Legs never with swollen or moniliform segments.

Genus Oribatella Banks.

Ungues tridactyle; pteromorphæ attached to the abdomen only; lamellæ large, attached to the cephalothorax by their posterior margins.

Two species:

Pteromorphæ truncate, not extending beyond the anterior margin of abdomen..... *quadridentata.*
Pteromorphæ extending almost to the tip of the rostrum. ..... *ovalis.*

Oribatella quadridentata Banks.

1895. *Oribatella 4-dentata*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 9.
1898. *Oribata quadridentata*, Michael, Das Tier., Lief. 3, p. 19.

Dark brown; integument brittle; surface slightly rough.

Cephalothorax about as broad as long and almost entirely hidden from above by the lamellæ, which are very large, projecting beyond the rostrum and ending each in two subequal cusps; lamellæ almost touching each other and twice as long as broad. No translamella. Lamellar hairs almost straight, pectinate and directed forward. There are two very much curved, pectinate rostral hairs; also a pair of similar but straight interlamellar hairs; pseudostigmatic organ large, clavate, and pectinate, about two thirds as long as the lamellæ. Just behind each pseudostigma is a short, stout, pectinate bristle.

Abdomen almost as broad as long, pteromorphæ truncate, not extending beyond the anterior margin of the abdomen, their anterior margin slightly concave. There is a whorl of about a dozen stout, curved, pectinate bristles around the margin of the abdomen. Anal covers slightly larger than the genital covers, and situated about their own length from the posterior margin of the abdomen and twice their length from the genital plates. Legs small and short.

Length, 0.56 mm.; breadth, 0.38 mm.

Under logs and boards. Collected by the writer at Urbana, Ill. Many specimens. Mr. Banks has confirmed the determination of this species.

Oribatella ovalis C. L. Koch.

1835. *Oribates ovalis*, C. L. Koch, Crust. Myr. Arach., Heft 3, Tab. 5.
1877. *Oribates ovalis*, Canestrini & Fanzago, Atti Ist. Venet., Ser. 5, Vol. IV., p. 82.
1855. *Oribata nitens*, Nicolet, Arch. Mus. Paris, T. VII., p. 433, Pl. IV., Fig. 6.
1884. *Oribata punctata*, Michael, Brit. Orib., Vol. I., p. 253, Pl. IX., Fig. 1–14.
1883. *Oribates nicoletii*, Berlese, Acari, Myr., Scorp., Fasc. III., Nr. 3.
1895. *Oribatella armata*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 9.
1898. *Oribata ovalis*, Michael, Das Tier., Lief. 3, p. 19.

Dark walnut-brown; integument thick and very resistant; surface pitted.

Cephalothorax short and almost entirely hidden by the large lamellæ. Lamellæ greatly enlarged, as long as the cephalothorax; pseudostigmata pyriform; pseudostigmatic organ large, clavate, and about two thirds as long as the cephalothorax.

Abdomen oblong. Pteromorphæ very large, almost as long as the entire body, and ending anteriorly in a long, sharp-pointed process. Anal covers about half as long again as the genital covers.

Legs rather small and hidden by the large pteromorphæ. The anterior pair project about half their length in front of the apex of the rostrum; the posterior extend slightly beyond the posterior margin of the abdomen. Tibia of the first two pairs rather short.

Length, 0.60 mm.; breadth, 0.42 mm.

In moss. Collected by C. A. Hart, from the pitcher-plant (*Sarracenia purpurea*), in bog, at Cedar Lake, Ill., and by the author at Homer, Ill.

Genus Oribata Latreille.

Superior bristles not spatulate; mandibles stout; integument usually smooth; pteromorphæ attached to the abdomen only; ungues tridactyle; lamellæ attached by means of their inner margins to the dorsal surface of the cephalothorax.

KEY TO SPECIES.

1. Pteromorphæ rounded anteriorly and extending almost to the tip of the rostrum..... 2.
   Pteromorphæ truncate in front and not extending beyond the anterior margin of the abdomen..... ..... 4.
2. Pteromorphæ smooth; antero-ventral margin deeply emarginate..... ..... *emarginata.*
   Pteromorphæ somewhat wrinkled; antero-ventral margin irregularly rounded..... .... 3.
3. Abdomen unicolor; with four large, subequal bristles situated on the posterior margin..... .... *robusta.*
   Abdomen with eight dark spots on the dorsum; no bristles on the posterior margin..... ... *octopunctata.*

---

4. With a translamella..... ..... 5.
   Without a translamella..... ..... 10.
5. Pseudostigmatic organ short, subcapitate..... 6.
   Pseudostigmatic organ long, clavate or lanceolate..... 9.
6. Translamella short, very broad, being as broad as long. ..... *spinogenuala.*
   Translamella very narrow, almost reduced to chitinous ridges..... .... 7.
7. Translamella curved gradually backward from the ends to the center..... ..... *unimaculata.*
   Translamella doubly curved, giving rise to a small median cusp .... 8.
8. Lamellar hairs one and a half times as long as the lamellæ..... *turgida.*
   Lamellar hairs scarcely as long as the lamellæ..... *minuscula.*
9. Femora of legs II with lateral blade-like expansions. *fuscipes.*
   Femora of legs II without lateral blade-like expansions..... ..... *artilamellata.*

---

10. Abdomen oblong, being much longer than broad..... 11.
    Abdomen globose .... 13.
11. Pseudostigmatic organs slender, lanceolate, and clavate. 12.
    Pseudostigmatic organs short, subcapitate..... *arborea.*

12. Lamellæ large, broad, three fourths as long as the cephalothorax..... ....*virginica.*
Lamellæ very small, short, about one fourth as long as the cephalothorax..... ..... *parrilamellata.*
13. Abdomen hairless..... ..... *illinoisensis.*
Abdomen with prominent hairs..... ..... *banksi.*

Oribata emarginata Banks.

1895. *Oribata emarginata*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 7.

Dark brown; integument very hard; surface smooth.

Lamellæ absent. Rostrum stout, with a rounded anterior end; rostral hairs curved and pectinate; tectopedia blade-like and two thirds as long as the rostrum; pseudostigmatic organ clavate and pectinate, about as long as the tarsus of leg 1; interlamellar hairs stout and pectinate.

Abdomen slightly pyriform and hairless; pteromorphæ slightly pointed, extending forward almost to the tip of the rostrum; anal and genital openings far apart; genital covers about two thirds as long as the anal covers. Females with a long, segmented ovipositor, which is often extended when the mite is killed in hot water. This ovipositor is trilobed distally, each fork bearing two large bristles.

Legs subequal in length; fourth pair longest; second pair with very stout femora. First pair of legs twice as long as the cephalothorax; tarsus the longest segment, bearing a large plumose hair at a point about one third the distance from the proximal to the distal end of the segment; tibia much shorter than the tarsus and globose distally; genual as long as the tibia, but only about half as broad; femur large; coxa small.

Length, 0.89 mm.; breadth, 0.50 mm.

Under logs and in rubbish. Collected by the writer at Arcola, Urbana, Galesburg, Chicago, and Marshall, Ill. Mr. Banks has confirmed the determination of this species.

Oribata robusta Banks. (Pl. XXXIII., Fig. 4.)

1895. *Oribata robusta*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 7.

Uniform light brown; integument thin and brittle.

Cephalothorax broader than long. The lamellæ and translamella consist each of a narrow blade on edge; translamella slightly narrower than the lamellæ and continuous with them, the whole being sublunate; lamellar hairs as long as the cephalothorax, straight and pectinate; rostral hairs stout, curved, and pectinate, a little longer than the pseudostigmatic organ.

Abdomen broader than long, with a few small hairs; pteromorphæ very long and prominent, projecting beyond the tip of the rostrum, rounded in front and pointed behind. Anal covers three fifths as broad as long, and situated one half their length from the posterior margin of the abdomen; genital covers about two thirds as long as the anal covers, similar to them in form, and situated about twice their length from the same.

Legs subequal in length; hind pair slightly longest; tibia and tarsus of leg I subequal, genual one half as long as the tibia, femur a little longer than the genual. The femur of leg II is very much enlarged, and is half as long again as the femora of the two posterior legs.

Length, 0.88 mm.; breadth, 0.62 mm.

Collected by myself at Urbana, Ill. Three specimens. Mr. Banks has confirmed this determination from specimens sent to him by the author.

Oribata octopunctata, n. sp. (Pl. XXXIV., Fig. 7.)

Light yellowish brown; integument thin.

Cephalothorax broad; pseudostigmatic organ very long, recurved, with a thin peduncle and a much enlarged, pectinate, subcylindrical head; interlamellar hairs straight, pectinate, short, and inclined toward the median plane, but projecting very little forward; rostral hairs similar to the lamellar hairs but curved.

Abdomen broad, hairless, with a longitudinal row of four small, oval dark spots on each side, the anterior spots being much the largest; a few similar but very minute spots on the dorsum also. Pteromorphæ free, projecting almost to the tip of the rostrum; both the anal and genital covers situated about their length anterior to the anal covers.

Length, 0.54 mm.; breadth, 0.40 mm.

In moss. Collected by the writer at Homer, Ill. Several specimens.

Oribata spinogenuala, n. sp. (Pl. XXXIII., Fig. 1.)

Dark reddish brown; integument thick and brittle.

Cephalothorax broad; lamellæ horizontal and broad, being broadest at the tips; lamellæ with cusps; lamellar hairs as long as the lamellæ and pectinate; pseudostigmatic organ short, with small peduncle and large clavate head; interlamellar hairs long, pectinate, and straight; rostral hairs about as long as the lamellar hairs and curved.

Abdomen two thirds as broad as long; pteromorphæ narrow, truncate, and lying close to the sides of the body; genital covers two thirds as long as the anal covers and situated twice their own length in front of the latter. There is a row of short, stout, almost straight hairs around the margin, and about eight hairs on the summit of the dorsum.

Legs short and subequal.

Length, 0.60 mm.; breadth, 0.46 mm.

Collected by the writer at Arcola, Ill. Several specimens.

Oribata unimaculata Banks.

1906. *Galumna unimaculata*, Banks, Proc. Acad. Nat. Sci. Phila., Nov. 1906, p. 490, Pl. XVIII., Fig. 33.

Dark reddish brown; integument thick; surface smooth.

Lamellæ large, about two thirds as long as the cephalothorax, broader anteriorly than posteriorly; lamellar cusps prominent, slightly bifid in front, the long, straight, pectinate lamellar hairs extending from them; translamella about a third as broad as the lamellæ; anterior free edge concave. There are two pairs of tectopedia, of which the inner pair is the longer, extending forward almost as far as do the tips of the lamellar cusps, curved slightly toward the median plane, and bearing a pair of long, curved, pectinate bristles. The outer pair of tectopedia are much thicker and shorter than the inner pair and bear no bristles. Interlamellar hairs similar to lamellar hairs but longer. Pseudostigmatic organs short and clavate, about as long as the genual of leg I.

Abdomen subglobose, the dorsum bearing ten pairs of short, stout, slightly curved pectinate bristles; two pairs are situated just above the pteromorphæ, two pairs on the crown of the dorsum, two pairs are posterior in position, and four pairs occur around the margin of the abdomen. The pteromorphæ are attached to the anterior half of the side of the abdomen; are truncate in front, and do not extend beyond the anterior margin of the abdomen. Genital covers about three fourths as long as the anal covers and situated one and a half times their length in front of the latter.

Anterior pair of legs about two thirds as long as the body; tarsus and tibia subequal; genual more than half as long as the tibia. The tibia and genual of leg I each bear laterally a very stout, slightly curved enlarged spine. Genual of leg II with a similar spine. Ungues tridactyle.

Length, 0.80 mm.; breadth, 0.60 mm.

Under old boards. Collected by the writer at Arcola, Ill. Several specimens. Mr. Banks has confirmed this determination from a specimen sent him by the author.

Oribata turgida Banks.

1906. *Galumna turgida*, Banks, Proc. Acad. Nat. Sci. Phila., 1906, p. 493.

Very light brown; integument smooth.

Cephalothorax short and wide; lamellæ narrow, about half as long as the cephalothorax, broader at the anterior than at the posterior end; translamella equal to the lamellæ in width. Lamellar hairs long, straight and barbed, about one and a third times as long as the lamellae; interlamellar hairs slightly longer than the lamellar hairs; antero-lateral hairs about two thirds as long as the lamellar hairs and curved as usual. Pseudostigmatic organ short, subcapitate.

Abdomen about as broad as long, broadest near the middle, hairless. Pteromorphæ small, truncate anteriorly, and not extending beyond the anterior margin of the abdomen. Genital covers slightly over half as long as the anal covers and situated about twice their length in front of the latter.

Anterior pair of legs about as long as the abdomen. Tarsus and tibia of leg I subequal; genual about a third as long as the tibia; femur equal to tibia in length. At the distal end of tibia of leg I, there is a small tubercle from which extends a long tactile bristle, longer than the segment itself. Ungues tridactyle; dactyles almost equal.

Length, 0.50 mm.; breadth, 0.42 mm.

Shaken from elm and from papaw by C. A. Hart, at Muncie, Ill.

Oribata minuscula Banks.

1907. *Galumna minuscula*, Banks, Proc. Acad. Nat. Sci. Phila., Vol. LVIII., p. 492, Pl. XV., Fig. 11.

Dark reddish brown, legs paler; integument slightly rough, heavily chitinized.

Cephalothorax about three fifths as long as the abdomen; lamellæ large horizontal blades, anteriorly a fourth as broad as long and at the posterior end a mere line; translamella a small ridge. Lamellar hairs long, straight, and pectinate, about four fifths as long as the cephalothorax. Pseudostigmata circular and low, pseudostigmatic organ short, with a very short peduncle and a spherical head. Interlamellar hairs almost exactly like the lamellar hairs. Rostral hairs much shorter than these and slightly curved.

Abdomen as broad as long, hairless; pteromorphæ one fourth as broad as long, truncate anteriorly, extending backward half the length of the abdomen and not projecting much beyond the anterior margin; anal covers a third longer than the genital covers and situated about half their length from the posterior margin of the abdomen; genital covers situated about twice their length in front of the anal covers.

Legs subequal in length; femora of the last two pairs much enlarged, being two thirds as broad as long, tibia and tarsus subequal. At the distal end of the tibia on the first and the last pair of legs is situated a tactile hair slightly longer than the segment itself.

Length, 0.72 mm.; breadth, 0.52 mm.

Collected by myself at Urbana, Ill. Many specimens. The identification of this species has been confirmed by Mr. Banks from a specimen sent him by the author.

Oribata fuscipes C. L. Koch.

1835. *Zetes ephippiatus*, C. L. Koch, Crust. Myr. Arach., Heft 3, Tab. 7.
1884. *Oribata fuscipes*, Michael, Brit. Orib., Vol. I., p. 241, Pl. VII., Fig. 1, 2.
1895. *Oribatella bidentata* (?), Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 8.
1898. *Oribata fuscipes*, Michael, Das Tier., Lief. 3, p. 13.

Dark brown; integument thick and tough; surface almost smooth.

Cephalothorax short; lamellæ large, horizontal, twice as long as broad, truncate in front and bearing there a straight plumose hair as long as the lamellæ themselves; translamella a short blade; pseudostigmatic organ long, filiform, becoming stouter apically, almost erect.

Abdomen two thirds as broad as long, with a row of long, slightly curved bristles on the posterior margin and a few hairs on the sides. Pteromorphæ small, truncate in front. Anal covers situated about two thirds their length from the posterior margin of the abdomen; genital covers about two thirds as long as anal covers.

Legs subequal; a small blade present on each of the femora of the first two pairs; the tarsus of leg I with a long bristle near its proximal end; all the tarsi well clothed with hairs.

Length, 0.70 mm.; breadth, 0.44 mm.

Under boards and in moss. Collected by the writer at Arcola, Ill. Four specimens. A specimen of this species was sent to Michael, and he also identified it as *O. fuscipes*.

Oribata artilamellata, n. sp. (Pl. XXXIII., Fig. 2.)

Dark olive; integument of medium thickness, not very resistant, finely pitted.

Cephalothorax about a third as long as abdomen; lamellæ narrow blades on edge, of uniform width, with small cusps; translamella a narrow blade, about half as broad as the lamellæ; pseudostigmata cylindrical, longer than broad; pseudostigmatic

organ clavate and pectinate, recurved, and of medium length; interlamellar hairs subequal to lamellar hairs; rostral hairs much smaller than these and very slightly curved.

Abdomen large, almost spherical, hairless; pteromorphæ rudimentary; anal covers about twice as long as genital covers; genital covers situated about three times their length in front of anal covers.

Legs subequal; femur of leg I extending to tip of rostrum, tibia and tarsus subequal, genual a little less than half as long as the tibia.

Length, 0.70 mm.; breadth, 0.46 mm.

Collected by the author at Arcola, Ill. Several specimens.

Oribata arborea Banks.

1895. *Oribata arborea*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 7.

Light chestnut-brown; integument smooth.

Cephalothorax half as long as the abdomen, triangular; lamellæ long narrow blades, of about uniform width and about two thirds as long as the cephalothorax; lamellar hairs straight and apparently without barbs, about as long as the lamellæ; interlamellar hairs similar to lamellar hairs; antero-lateral hairs but slightly curved and about three fourths as long as the lamellar hairs. Pseudostigmata cup-shaped, slightly projecting; pseudostigmatic organ clavate, recurved, and very slightly barbed at the end.

Abdomen two thirds as broad as long, hairless; pteromorphæ truncate anteriorly and not extending beyond the anterior margin of the abdomen; anterior margin slightly emarginate above; genital covers almost as long as the anal covers but much narrower, situated about one and a half times their length in front of the latter.

Anterior pair of legs two thirds as long as the abdomen. Tarsus and tibia of leg I subequal; genual one half as long as the tibia. From a small tubercle on the distal end of the tibia of leg I extends a long tactile bristle, longer than the segment itself. Ungues tridactyle; dactyles unequal.

Length, 0.45 mm.; breadth, 0.30 mm.

Under bark. Collected by J. Douglas Hood at Muncie, Ill. One specimen.

Oribata virginica Banks. (Pl. XXXIV., Fig. 5.)

1906. *Galumna virginica*, Banks, Proc. Acad. Nat. Sci. Phila., Nov., 1906, p. 493, Pl. XVI., Fig. 18 and 20.

Walnut-brown; integument brittle; surface rough.

Cephalothorax abont a third as long as the abdomen; lamellæ broad, blade-like, almost as long as the cephalothorax, broadest at the middle, each with blunt apex bearing the lamellar hair; lamellar hair straight, simple, about two thirds as long as the cephalothorax; pseudostigmata large, funnel-shaped; pseudostigmatic organ serrate, with long, thin, recurved peduncle and clavate head; interlamellar hairs long, thin, and pectinate; rostral hairs subequal to lamellar hairs and slightly curved; three pairs of tectopedia, the first pair blade-like and very narrow, the second and third pairs rounded.

Abdomen two thirds as broad as long, hairless; pteromorphæ very narrow, truncate in front, and extending about two thirds the length of the abdomen; anal covers triangular, fully twice as long as the genital covers; genital covers rectangular, small, and situated about twice their length in front of the anal covers.

Legs subequal, the anterior pair extending in front of the rostrum by about half their length.

Length, 0.50 mm.; breadth, 0.34 mm.

Under boards, bark, and logs, and in moss. Collected by the writer at Homer, Ill. Several specimens.

Oribata longa, n. sp. (Pl. XXXIV., Fig. 6.)

Light yellowish brown; integument rather thin; surface rough.

Cephalothorax short; lamellæ mere ridges; lamellar hairs rather short, pectinate, and slightly curved; pseudostigmata cup-shaped; pseudostigmatic organ long, recurved, lanceolate, and strongly serrate on the anterior edge only, the posterior

edge being smooth; interlamellar hairs short and pectinate, inclined away from the median plane; rostral hairs small and curved.

Abdomen twice as long as broad, hairless, dorsum irregularly covered with small denticles; pteromorphæ very long and narrow, truncate in front; anal covers very much enlarged, being twice as long as the genital covers; genital covers narrow and situated about twice their length in front of the anal covers.

Legs small, first pair projecting about one third their length beyond the rostrum.

Length, 0.54 mm.; breadth, 0.28 mm.

In moss. Collected by the writer at Homer, Ill. One specimen.

Oribata illinoisensis, n. sp. (Pl. XXXIII., Fig. 3.)

Olive brown; integument rather thick and tough, not very resistant, somewhat rough.

Cephalothorax about a fourth as long as abdomen; lamellæ broad horizontal blades about three fifths as long as the cephalothorax, broadest towards the middle, and with small cusps; lamellar hairs simple, straight, as long as the cephalothorax; three pairs of tectopedia, the first pair blade-like, the second large, rounded, and ending anteriorly in a long, sharp point, the third rounded; pseudostigmatic organ short and stout, with short peduncle and large, pectinate, clavate head; interlamellar hairs straight, pectinate, and about two thirds as long as the lamellar hairs; rostral hairs stout, curved, and pectinate.

Abdomen slightly longer than broad, hairless; pteromorphæ prominent, truncate in front, with concave anterior margin, and extending backward about two thirds the length of the abdomen; anal and genital covers subequal; anal covers situated about half their length from the posterior margin of abdomen; genital covers about one and a half times their length in front of the anal covers.

Legs small, with several stout plumose bristles; the two anterior pairs subequal, the first pair projecting half their length in front of the rostrum.

Length, 0.48 mm.; breadth, 0.34 mm.

Collected by the writer at Arcola, Ill. One specimen.

Oribata banksi, n. sp. (Fig. 2 and 3, pp. 339, 340.)

Dark chestnut-brown, integument heavily chitinized; surface pitted.

Cephalothorax about a third as long as the abdomen; lamellæ blade-like, about half as long as cephalothorax, broadest at the anterior end, without cusps; lamellar hairs straight, pectinate, and about as long as the cephalothorax; first pair of tectopedia very similar to lamellæ; second pair round, cup-like. Pseudostigmata cylindrical, distal end cup-shaped; pseudo stigmatic organ slightly recurved.

Abdomen two thirds as broad as long, the dorsum with four rows of long, curved, pectinate bristles, about five in each row; pteromorphæ large, truncate in front, not extending in front of the anterior margin of abdomen, but extending backward about half the length of the abdomen; anal and genital covers rectangular, the anal ones a third longer than the genital ones.

Legs stout; anterior pair about as long as the abdomen; third pair smallest; femur of leg I about two thirds as long as the cephalothorax.

Length, 0.54 mm.; breadth, 0.40 mm.

Under bark of dead trees and under rubbish of various kinds. Collected by the author at Galton, Arcola, and Homer, Ill., and by C. A. Hart from pitcher-plants (*Sarracenia purpurea*) in bog at Cedar Lake, Ill. Several specimens.

Family NOTHRIDÆ.

Cephalothorax and abdomen immovably fused or coalescing; body never compressed; tracheæ opening at the acetabula of the legs; abdomen without wings; integument frequently rough, sculptured, or reticulate, and sometimes very little chitinized; legs frequently very stout, sometimes long and moniliform.

Genus Liacarus Michael.

Mandibles chelate; legs I and II approximate, as also legs III and IV; lamellæ present; body smooth; last three pairs of legs inserted under the body.

KEY TO SPECIES.

1. Abdomen almond-shaped..... *lucidus.*
   Abdomen oval..... ..... 2.
2. Color brown; integument thin and delicate..... *minutus.*
   Color black; integument thick and resistant..... 3.
3. Translamella with a central cusp..... *niger.*
   Translamella without a central cusp..... *nitidus.*

Liacarus lucidus, n. sp. (Pl. XXXIV., Fig. 9.)

Light pea-green; integument thin and brittle; surface smooth.

Cephalothorax long. Lamellæ two thirds as long as cephalothorax. They are blades on edge, of almost uniform width, and without cusps; lamellar hairs about as long as lamellæ, curved and pectinate; translamella similar to lamellæ but only about half as broad. Pseudostigmata funnel-shaped; pseudostigmatic organ stout, short, pectinate, clavate, and slightly recurved; interlamellar hairs subequal to lamellar hairs but inclined away from the median plane; palpi prominent.

Abdomen almond-shaped, dorsum with four rows of short, curved bristles, of which there are about six in each of the outer rows and four in each of the inner ones.

Legs short, subequal; femora slightly enlarged.

Length, 0.48 mm.; breadth, 0.28 mm.

Collected by the writer at Arcola, Ill. Several specimens.

Liacarus minutus, n. sp. (Pl. XXXV., Fig. 10.)

Brown; integument thin and delicate.

Cephalothorax rather short; lamellæ narrow, being mere blades on edge, two thirds as long as the cephalothorax, and each bearing a long, straight, pectinate lamellar hair, as long as the lamellæ themselves. Rostrum broad but somewhat

pointed at the apex; rostral hairs long, pectinate, curved slightly toward the median plane. Palpi large, with four segments; proximal and distal segments each with a curved bristle; pseudostigmata small; pseudostigmatic organ as long as the femur of leg I, narrow at the base, clavate, pointed apically. Interlamellar hairs twice as long as the pseudostigmatic organ.

Abdomen almost as broad as long. The progaster curves convexly down to meet the cephalothorax. There are a few short hairs present on the abdomen. Ventral plate large; anal covers approximate to the dorsal margin of the abdomen, and more than twice as large as the genital covers; genital covers situated three times their length in front of the anal covers.

Legs subequal in length; femur and tarsus of the first pair subequal, genual half as long as the tibia. No long bristles on the first pair of legs; tibia of leg III with a bristle as long as the segment itself.

Length, 0.50 mm.; breadth, 0.32 mm.

Collected by the writer at Urbana, Ill. A single specimen.

Liacarus niger, n. sp. (Pl. XXXV., Fig. 11.)

Black; integument thick and very resistant.

Cephalothorax about half as long as the abdomen. Lamellar hairs long, straight, and pectinate, projecting beyond the tip of the rostrum. Rostral hairs curved, stout, and pectinate. Pseudostigmatic organ long, clavate, and pectinate. The lamellæ are horizontal blades, bifid in front.

Abdomen oblong, with a few small hairs. Legs of moderate length, the anterior pair projecting beyond the tip of the rostrum by one third its length.

Length, 1.00 mm.; breadth, 0.64 mm.

In moss. Collected by the writer at Homer, Ill. Two specimens.

Liacarus nitidus Banks.

1895. *Cepheus nitidus*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 10.

Very dark brown; integument stout, smooth.

Cephalothorax pyramidal. Lamellæ blade-like, broad, extending almost the entire length of the cephalothorax and united at their anterior ends by a very short but broad translamella; with small cusps. Lamellar hairs small, straight, about three fifths as long as the lamellæ; interlamellar hairs similar to the lamellar ones but slightly larger; antero-lateral hairs about as long as the lamellar ones and almost straight. Pseudostigmatic organ fusiform, about two thirds as long as the lamellæ.

Abdomen subglobose; hairless. Genital covers much smaller than the anal covers; anal covers slightly broader posteriorly than anteriorly, and situated one third their length from the posterior margin of the ventral plate.

Anterior pair of legs about as long as the abdomen. Tarsus and tibia of leg I subequal; genual about three fifths as long as the tibia; femur almost twice as long as the genual. Tactile bristle of tibia I about as long as the segment itself. Claws with three equal dactyles, and situated on small tarsal pedicels.

Length, 0.88 mm.; breadth, 0.72 mm.

Collected by the writer at Arcola, Ill.

Genus Notaspis Hermann.

Integument well chitinized; cephalothorax with lamellæ; body smooth; last three pairs of legs situated laterally.

KEY TO SPECIES.

1. Abdomen without hairs ..... *pyrostigmata.*
   Abdomen with hairs..... 2.
2. Outer margins of lamellæ slightly emarginate near middle; length of body not over 0.60 mm..... *spinipes.*
   Outer margins of lamellæ straight; length of body about 0.90 mm..... *bipilis.*

Notaspis pyrostigmata, n. sp. (Pl. XXXV., Fig. 12.)

Very light yellowish brown; surface of integument rough.

Cephalothorax long; lamellæ narrow blades, broadest at the anterior ends; lamellar hairs about half as long as the

cephalothorax, slightly curved, pectinate; translamella a straight cross-bar; pseudostigmata cup-shaped; pseudostigmatic organ with a small short peduncle and a large pyriform head; interlamellar hairs of medium length, straight, and pectinate.

Abdomen almond-shaped, hairless; anal covers contiguous to the posterior margin of the abdomen; genital covers two thirds as long as the anal covers, and situated about three times their length in front of them.

Hind pair of legs longest, but not reaching to the posterior margin of the abdomen; the other pairs subequal.

Length, 0.42 mm.; breadth, 0.20 mm.

Collected by the writer at Arcola, Ill. Many specimens.

Notaspis spinipes Banks.

1906. *Oppia spinipes*, Banks, Proc. Acad. Nat. Sci. Phila., Nov., 1906, p. 496, Pl. XVII., Fig. 22.

Chestnut brown; surface of integument smooth.

Cephalothorax very long and narrow, almost as long as the abdomen; lamellæ very long, narrow, their blades extending the entire length of the cephalothorax; lamellar cusps prominent, pectinate, straight, and short; pseudostigmatic organ long, straight, and pectinate; interlamellar hairs straight, pectinate, pointing almost directly forward; rostral hairs small, simple, and curved.

Abdomen circular, with two pairs of large, straight, pectinate spines on the dorsal margin; anal covers about the same size as the genital covers and contiguous to the posterior margin of the abdomen.

Legs subequal, with several stout, curved, plumose bristles; tactile hairs on the tibiæ of the first two pairs about twice as long as the segments themselves.

Length, 0.56 mm.; breadth, 0.34 mm.

In moss. The author has collected specimens at Arcola, Ill. The determination has been confirmed by the original describer of the species.

Notaspis bipilis Herm.

1804. *Notaspis bipilis*, Hermann, Mém. Apt., p. 95.
1841. *Murcia acuminata*, C. L. Koch, Crust. Myr. Arach., Heft 31, Tab. 24 (Nymph).
1844. *Oppia cornuta*, C. L. Koch, Crust. Myr. Arach., Heft 38, Tab. 8.
1855. *Notaspis bipilis*, Nicolet, Arch. Mus. Paris, Vol. VII., p. 448, Pl. III., Fig. 6.
1883. *Notaspis bipilis*, Berlese, Bull. Soc. Ent. Ital., Vol. XV., p. 219.
1885. *Oppia bipilis*, Berlese, Acari, Myr., Scorp., Fasc. XX., Nr. 8.
1888. *Notaspis bipilis*, Michael, Brit. Orib., Vol. II., p. 356, Pl. XXVII., Fig. 1–9.
1898. *Notaspis bipilis*, Michael, Das Tier., Lief. 3, p. 46.

Chestnut brown; integument smooth.

Cephalothorax large, one half as long as the entire body. Lamellæ very long and slender, almost as long as the entire body and of almost the same width throughout; anterior two fifths of lamellæ free. There is only a slight indication of a translamella. Lamellar hairs straight, pectinate, about half as long as the lamellæ; interlamellar hairs very large, as long as the entire cephalothorax, pectinate, and situated at the posterior margin of the latter; antero-lateral hairs straight, similar to lamellar hairs but smaller. Pseudostigmata but slightly projecting, funnel-shaped; pseudostigmatic organ long, filiform, pectinate.

Abdomen globose, bearing on its postero-dorsal aspect two pairs of large, straight bristles, and on its postero-ventral aspect a transverse row of four subequal straight ones, about half as long as the dorsal bristles. Genital covers semicircular, situated slightly more than their length from the anal covers; anal covers much larger than the genital covers, and situated about a third their length from the posterior margin of the ventral plate.

Anterior pair of legs about as long as the entire body; tarsus one and a half times as long as the tibia; tactile bristle of tibia straight, as long as the tarsus. Claws of tarsi with three unequal dactyles.

Length, 0.90 mm.; breadth, 0.68 mm.

In moss. Collected by L. M. Smith at Parker, Ill., and by the writer at Arcola, Ill. My determination of this species has been confirmed by a comparison of my specimens with a mounted one of *bipilis* sent me by Michael.

Genus *Tegeocranus* Nicolet.

Body rough; cephalothorax and abdomen plainly divided; ungues monodactyle; lamellæ large, blade-like.

Two species:

Integument granular ..... *velatus.*
Integument reticulate ..... *lamellatus.*

Tegeocranus velatus Michael.

1880. *Tegeocranus velatus*, Michael, Jour. Roy. Micr. Soc., Vol. III., p. 189, Pl. VI., Fig. 6–9.
1884. *Tegeocranus velatus*, Michael, Brit. Orib., Vol. I., p. 313, Pl. XXXI., Fig. 9–15.
1895. *Tectocepheus velatus*, Berlese, Acari, Myr., Scorp., Fasc. LXXVII., Nr. 2.
1898. *Tegeocranus velatus*, Michael, Das Tier., Lief. 3, p. 35.

Light brown; integument coarsely granular.

Cephalothorax trapezoidal. Lamellæ almost as long as the cephalothorax, the anterior lamella one third free; translamella reduced almost to a line. Lamellar hairs short, stout, and pectinate on their outer borders only, peculiar in that they are so greatly curved inward that their tips may touch; interlamellar hairs wanting. Pseudostigmata cup-shaped, slightly projecting; pseudostigmatic organ subcapitate, with a long pectinate head.

Abdomen almost as broad as long and peculiar in possessing a lateral, chitinous, shelf-like expansion at the shoulders, which extends backward along the lateral margin to about the middle of the abdomen, and is transversely wrinkled. Genital covers much smaller than the anal covers, and situated about their length from the latter; anal covers situated about a third their length from the posterior margin of the abdomen.

Legs rather short, subequal, about three fourths as long as the abdomen, sparsely clothed with rather short, stout hairs. Tibia slightly longer than the tarsus; claw of tarsus stout, two thirds as long as the segment itself.

Length, 0.38 mm.; breadth, 0.30 mm.

In moss. Collected by the writer at Muncie, Ill.

Tegeocranus lamellatus Banks.

1906. *Cepheus lamellatus*, Banks, Proc. Acad. Nat. Sci. Phila., 1906, p. 497.

Very dark brown, almost black; integument strengthened with an irregular network of chitinous ridges.

Cephalothorax short, broad. Lamellæ very large, each about half as broad as the cephalothorax and extending almost the entire length of the latter; lamellæ united in front by a very short, broad translamella. Lamellar hairs stout, curved strongly inward, about two thirds as long as the lamellæ; interlamellar hairs very short, almost straight, and approximate to the lamellæ. Pseudostigmata cup-shaped, projecting; pseudostigmatic organ consisting of a stout, straight pedicel with a small, oblong, pectinate head.

Abdomen almost as broad as long, semicircularly rounded behind. Dorsum with rather stout shoulder bristles and with several other bristles at the posterior end. Genital covers slightly smaller than the anal covers, and situated about half their length from the latter; anal covers situated their length from the posterior margin of the abdomen.

Anterior pair of legs three fourths as long as the abdomen. Tarsus of leg I one and a half times as long as the tibia. Tarsal claws stout, sharp, and strongly curved. Legs sparsely clothed with long straight bristles.

Length, 0.76 mm.; breadth, 0.66 mm.

In moss. Collected by the writer at Arçola, Ill. One specimen.

Genus Damæus C. L. Koch.

Mandibles chelate; legs slender, much longer than the body, I and II approximate, as also III and IV; legs IV crawling organs; lamellæ absent; cephalothorax and abdomen clearly demarcated from each other.

Two species:

Pseudostigmatic organ simple, not pectinate..... *sufflexus.*
Pseudostigmatic organ pectinate..... *nitens.*

Damæus sufflexus Michael.

1885. *Damæus sufflexus*, Michael, Jour. Roy. Micr. Soc., Ser. 2, Vol. V., p. 394, Pl. VII., Fig. 9.
1888. *Damæus sufflexus*, Michael, Brit. Orib., Vol. II., p. 415, Pl. XXXIV., Fig. 9, 10.
1895. *Belba sufflexa*, Berlese, Acari, Myr., Scorp., Fasc. LXXIV., Nr. 4.
1898. *Damæus sufflexus*, Michael, Das Tier., Lief. 3, p. 58.

Light brown, legs almost yellow; integument of cephalothorax rather rough, abdomen smooth.

Cephalothorax subrectangular, pointed at apex, with a rather large boss under each pseudostigma. Lamellar hairs absent; rostral hairs stout, slightly curved. Pseudostigmata long, nearly upright, cylindrical; pseudostigmatic organ filiform, very long, about equal in length to the cephalothorax.

Abdomen globular; progaster rounded; notogaster with a row of about five short, stout, slightly curved hairs on each side, which project slightly beyond the side of the abdomen. Ventral plate small; anal and genital covers of almost exactly the same size and form, with a very narrow margin between them.

Legs rather long, of medium thickness, and typical of the genus. Femur of leg I twice as long as the genual, and with two large bristles on the outer distal margin; genual two thirds the length of the tibia; tibia two thirds the length of the tarsus; tarsus globose proximally and tapering distally, with a very stout bristle on the outer proximal margin.

Length, 0.70 mm.; breadth, 0.42 mm.

Under logs. Collected by the writer at Urbana, Ill.

Damæus nitens C. L. Koch. (Fig. 1, p. 339.)

1834. *Oppia nitens*, C. L. Koch, Crust. Myr. Arach., Heft 3, Tab. 10.
1888. *Damæus nitens*, Michael, Brit. Orib., Vol. II., p. 409, Pl. XXXIV., Fig. 1–8.
1895. *Belba minuta*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 12.
1898. *Damæus nitens*, Michael, Das Tier., Lief. 3, p. 57.

Light yellowish brown; integument polished.

Rostrum broad, about a third the length of the cephalothorax; translamella absent; pseudostigmata very small; pseu-

dostigmatic organ slender, pectinate, and clavate. The general shape of the cephalothorax is that of an isosceles triangle with its base corresponding to that of the cephalothorax.

Abdomen oval, with about twelve short, slightly curved bristles; progaster curved down convexly to meet the cephalothorax. Ventral plate large; anal covers large, almost attaining the posterior margin of the abdomen, and about twice their length from the genital covers, which are about three fourths as long as the anal covers and situated very near the anterior margin of the ventral plate.

First pair of legs almost as long as the body, and each succeeding pair slightly longer than the preceding one. Tarsus of the first pair of legs somewhat globose at the distal end; coxæ of the third pair globular, each bearing a large bristle on its anterior end; tibiæ of fourth pair each bearing on the anterior distal margin a large bristle as long as the tibia itself.

Length, 0.50 mm.; breadth, 0.28 mm.

Collected by the writer at Urbana, Ill. Many specimens. I find that my examples of this species agree with a European specimen of *nitens* sent to me by Mr. Michael.

Genus Hermannia Nicolet.

Without lamellæ; legs short and stout; ungues monodactyle; dorsum of abdomen convex; genital and anal covers separate and placed in a ventral plate.

One species—*bistriata*.

Hermannia bistriata Nicolet.

1840. *Nothrus palliatus*, C. L. Koch, Crust. Myr. Arach., Heft 30, Tab. 4 (Nymph).

1880. *Hermannia bistriata*, Michael, Jour. Roy. Micr. Soc., Vol. III., p. 42.

1885. *Nothrus bistriatus*, Berlese, Acari, Myr., Scorp., Fasc. XVII., Nr. 9.

1888. *Hermannia bistriata*, Michael, Brit. Orib., Vol. II., p. 462, Pl. XLII., Fig. 8-14.

1898. *Hermannia bistriata*, Michael, Das Tier., Lief. 3, p. 63.

Dark chestnut-brown; integument rough, and in some places slightly pitted.

Cephalothorax fully half as long as the abdomen, with two chitinous ridges on the dorsal surface, which, beginning at the

rostrum, pass backward almost parallel to each other for about one half the length of the cephalothorax, then diverge, passing to the outer border of the pseudostigmata, with which they fuse, and from the posterior border of which they turn transversely toward the median plane, where they meet. There is a single pair of stout hairs on the dorsal surface at the base of the rostrum, which are curved towards the median plane. Pseudostigma a circular chitinous ridge; pseudostigmatic organ straight, slightly clavate, and directed anteriorly.

Abdomen subrectangular, two thirds as broad as long, sides convex, posterior end rounded. An irregular chitinous ridge lies on each side near the median plane; about midway between this ridge and the lateral margin of the abdomen is situated on each side a more regular chitinous ridge which curves similarly toward the lateral margin. There are several short, curved bristles on the lateral margins, two rows parallel to the median plane, and six rather prominent pairs near the posterior margin, all of which curve inward. Ventral plate triangular, genital and anal covers together extending almost its entire length.

Anterior pair of legs about as long as the abdomen. Tarsus of leg I longer than the tibia but not so stout; claw of tarsus almost half as long as the segment itself. All the segments of the legs except the tarsus possess stout, curved bristles. The bristles of the tarsus are slender and more numerous than those of the other segments.

Length, 0.85 mm.; breadth, 0.48 mm.

Under logs and in moss. Collected by J. Douglas Hood at Urbana, Ill., and by the writer at Arcola, Ill.

Genus Hypochthonius C. L. Koch.

Mandibles chelate; last pair of legs not distant from the others; integument thin, little chitinized, variously colored; abdomen with a transverse suture; cephalothorax not truncate in front.

One species,—*rufulus*.

Hypochthonius rufulus C. L. Koch.

1835. *Hypochthonius rufulus*, C. L. Koch, Crust. Myr. Arach., Heft 3, Tab. 19.
1855. *Leisoma ovata*, Nicolet, Arch. Mus. Paris, T. VII., p. 395, Pl. II., Fig. 5 (Nymph).
1888. *Hypochthonius rufulus*, Michael, Brit. Orib., Vol. II., p. 534, Pl. XLIX., Fig. 6-13.
1898. *Hypochthonius rufulus*, Michael, Das Tier., Lief. 3, p. 77.

Body reddish; legs brown.

Cephalothorax very long,two thirds as long as the abdomen. Pseudostigmata short, cylindrical; pseudostigmatic organ long and recurved, with a row of long teeth on the anterior side; a pair of long bristles, almost as long as the pseudostigmatic organ itself, in front of the pseudostigmata; palpi very prominent

Abdomen broad, divided by a transverse suture into two equal parts; flattened at the sides, forming blades which extend almost the entire length of the abdomen; many large bristles.

Legs short, stout, and subequal; segments cylindrical.

Length, 0.66 mm.; breadth, 0.40 mm.

Collected by the writer at Arcola, Ill. Two specimens.

Family HOPLODERMIDÆ.

Cephalothorax hinged to the abdomen and capable of being folded down upon its ventral surface so as completely to hide the legs and mouth-parts; body generally compressed; no tracheæ present; mouth-parts large, mandibles powerful; legs stout, never with swollen or moniliform segments; cephalothorax frequently with a median carina.

Genus Hoploderma Michael.

Genital and anal openings situated together but with their covers separate; ventral plate small or rudimentary; ungues monodactyle.

Two species:

Total length of body not over 0.60 mm..... *sphærula.*
Total length of body over 1.00 mm ..... *dasypus.*

Hoploderma sphærula Banks.

1895. *Hoploderma sphærula*, Banks, Trans. Amer. Ent. Soc., Vol. XXII., p. 16.

Dark brown; integument smooth.

Cephalothorax one half as long as high; dorsal surface with two pairs of bristles,—a very long, almost straight pair, three fourths as long as the cephalothorax itself, situated near the posterior border, and a small, curved pair near the tip. Pseudostigmata round, situated at the postero-lateral extremity of the cephalothorax; pseudostigmatic organ slightly recurved.

Abdomen subglobose; upper half of the anterior margin concave, lower half straight; ventral margin moderately convex; dorsum with two rows of submedian bristles, six bristles in each row. Genito-anal covers almost completely concealed when viewed from the side, the anterior corner, however, visible as a triangular chitinous projection.

Anterior pair of legs stouter than the other pairs, which are subequal. Tarsus of leg I nearly twice as long as the tibia; tibia slightly longer than the genual; femur longer than the tibia and genual combined. Claws slightly more than half as long as the tarsi from which they extend. All the legs are sparsely clothed with rather long, simple bristles.

Length, 0.55 mm.; height, 0.40 mm.

Under a log. Collected by the writer at Mahomet, Ill.

Hoploderma dasypus Ant. Dugès.

1834. *Oribata dasypus*, Ant. Dugès, Ann. Sci. Nat., Sér. 2, T. II., p. 47.
1841. *Hoplophora lentula*, C. L. Koch, Crust. Myr. Arach., Heft 32, Tab. 16.
1841. *Phthiracarus contractilis*, Perty, Allg. Naturg., Bd. III., p. 874.
1868. *Hoplophora contractilis*, Claparède, Zeit. Wiss. Zool., Bd. XVIII., p. 507.
1877. *Hoplophora contractilis*, Murray, Econ. Ent., Apt., p. 222.
1883. *Hoplophora dasypus*, Berlese, Acari, Myr., Scorp., Fasc. VI., Nr. 4.
1885. *Hoplophora dasypus*, Canestrini, Prosp. Acar. Ital., Pt. I., p. 46.
1887. *Tritia lentula*, Berlese, Acari, Myr., Scorp., Fasc. XXXVI., Nr. 3.
1888. *Hoplophora dasypus*, Michael, Brit. Orib., Vol. II., p. 560, Pl. L., Fig. 8–14.
1898. *Hoploderma dasypus*, Michael, Das Tier., Lief. 3, p. 79.

Pale drab; integument thick and tough but not brittle.

Cephalothorax a fourth as long as abdomen, with a single

pair of small hairs; pseudostigmatic organ small, scarcely visible, clavate, and simple. Palpi and labial organs prominent.

Abdomen almost as broad as long, rounded behind, with three rows of long bristles on each side of the dorsum, the inner row having the largest bristles; three bristles in each of the outer rows.

Legs subequal, with many long hairs.

Length, 0.84 mm.; height, 0.56 mm.

In decayed wood. Collected by myself at Arcola, Ill. A specimen of this species was sent to Michael to get his confirmation of the identification. He writes that my specimen agrees with *dasypus* except that it has no hairs on the abdomen. These hairs had evidently been broken off, as they are present on the other specimens which I have.

Genus Phthiracarus Perty.

The characters are the same as for the genus *Hoploderma* except that the genital and anal covers coalesce and the tarsal claws are tridactyle.

Two species:

Cephalothorax hairless..... *flagelliformis.*
Cephalothorax with six long hairs..... *americanus.*

Phthiracarus flagelliformis, n. sp. (Pl. XXXV., Fig. 13.)

Dark olive-brown; integument thick but not brittle; surface rough.

Cephalothorax about a third as long as the abdomen, hairless; pseudostigmata round and flat, with radiating furrows; pseudostigmatic organ flagelliform and of moderate length; labial organs and palpi prominent.

Abdomen two thirds as broad as long, pointed at the posterior end, and with a few fine hairs. Legs subequal, clothed with many hairs.

Length, 0.72 mm.; height, 0.40 mm.

Under logs. Collected by myself at Homer, Ill. A few specimens.

Phthiracarus americanus, n. sp. (Pl. XXV., Fig. 14.)

Pale pinkish brown; integument well chitinized and covered with small pits.

Cephalothorax twice as long as broad; mandibles very stout and prominent, capable of retraction until invisible; pseudostigmatic organ clavate, of medium length. From each pseudostigma a ridge runs forward along the side of the aspis to its lateral edge. A pair of hairs about two thirds as long as the cephalothorax is situated at its posterior margin, and in front of this pair is a similar one, the hairs about two thirds as long; rostral hairs about two thirds as long as this last pair.

Abdomen about three fifths as broad as long and very narrow, pointed behind, truncate in front, covered with small pits. The dorsum has four rows of long, slightly curved bristles, about five in each row; and there are four pairs of short, straight bristles on the posterior ventral surface.

Legs subequal, as long as cephalothorax; claws tridactyle, and half as long as the tarsi; tarsus twice as long as the tibia, and with many long hairs. The tarsus of leg I bears a long tactile bristle half as long again as the tarsus itself; tibia and genual subequal.

This species differs from *Phthiracarus arduus* in that the pseudostigmatic organ is much shorter and clavate, while on the side of the aspis there is only one ridge instead of two.

Length, 0.70 mm.; height, 0.36 mm.

Under logs and boards. Collected by the writer at Danville, Arcola, and Urbana, Ill. Many specimens.

A List of the Known North American Species of Oribatoidea.

In the following list the same natural order is observed with respect to the families and genera as is used in the preceding keys and descriptions, but the species are arranged alphabetically. The single citation for genus or species is to the original description. All the known habitats and localities are given.

Family ORIBATIDÆ.

Genus Pelops C. L. Koch.

Pelops C. L. Koch. Crust. Myr. Arach., Heft 2, 1835.

P. americanus Ewing. Psyche, Vol. XIV., p. 111.
In moss, Batavia, Ill.

Genus Gymnobates Banks.

Gymnobates Banks. Can. Ent., Vol. XXXIV., 1902, p. 175.

G. glaber Banks. Can. Ent., Vol. XXXIV., 1902, p. 176.
From dry gall, Washington, D. C.

Genus Oribatodes Banks.

Oribatodes Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 10.

O. mirabilis Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 10.
In rotten debris, Sea Cliff, N. Y.

Genus Oribatella Banks.

Oribatella Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 8.

O. aquatica Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 9.
On aquatic plants, Sea Cliff, N. Y.

O. borealis Banks. Insects, etc., Commander Isl., 1899, p. 349.
Glinka, Commander Isl.

O. minuta Banks. Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 76.
Under bark, Sea Cliff, N. Y.

O. obesa Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 9.
Olympia, Wash.

O. ovalis C. L. Koch (*Oribates*). Crust. Myr. Arach., Heft 3, Tab. 5.
Under old boards, Arcola, Ill.

O. perfecta Banks. Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 75.
Swept from low herbage, Pine Island, N. Y.; Norfolk, Va.

O. quadridentata Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 8.
Under boards, Urbana, Ill.; Sea Cliff, N. Y.

O. setosa Banks. Jour. N. Y. Ent. Soc., 1895, p. 129.
From wet *Sphagnum*, Roslyn, N. Y.

O. signata Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 9.
Sea Cliff, N. Y.

Genus Oribata Latreille.

This is the *Oribata* used in Michael's "Oribatidæ" (Das Tier., Lief. 3). Since the publication of that work in 1898 Dr. A. C. Oudemans has stated that the *Oribata* of Latreille is not, in his opinion, the *Oribata* of "Das Tierreich", but is a *Damæus*, and he gives the name *Notaspis* Herm. to this genus.

O. affinis Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 6.
Under loose bark, Washington, D. C.

O. alata Packard. Cave Memoir, 1887, p. 42.
Dixon's Cave, Ky.

O. americana Haller. Arch. Naturg., Jahrg. 50, Bd. I., p. 222, Taf. XV., Fig. 4.
America.

O. arborea Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 7.
On cedar- and peach- trees, Sea Cliff, N. Y.

O. armipes Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 492.
Falls Church, Va., and Fort Lee, N. J.

O. artilamellata, n. sp.
Arcola, Ill.

O. banksi, n. sp.
Under bark of trees, Martinsville, Marshall, Urbana, and Havana, Ill.; in moss, Arcola, Ill.

O. centro-americana Stoll. Biol. Centr. Amer., Arach. Acar., p. 21, Pl. XV., Fig. 1.
British Honduras.

O. clavilanceolata Ewing. Psyche, Vol. XIV., p. 112.
Under stones, Batavia, Ill.

O. clavipectinata Ewing. Psyche, Vol. XIV., p. 112.
In moss, near Chicago, Ill.

O. curva Ewing. Psyche, Vol. XIV., p. 113.
Under logs, near Chicago, Ill.

O. depressa Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 6.
Sea Cliff, N. Y.

O. emarginata Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 7.
Under old logs, Urbana, Arcola, and Marshall, Ill.; in moss, Sea Cliff, N. Y.; Brazos county, Texas.

O. fuscipes C. L. Koch. Crust. Myr. Arach., Heft 6, Tab. 8.
In moss, New York State(?); under old pieces of wood, Arcola, Ill.

O. hirsuta Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 7.
Under dead leaves, Sea Cliff, N. Y.

O. illinoisensis, n. sp.
Arcola, Ill.

O. imperfecta Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 492.
Indianapolis, Ind.

O. magna Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 6.
Sea Cliff, N. Y.

O. minuscula Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 492.
From young peach- and apple-trees, Alma, Ill.; Bay Ridge, Md.

O. mœsta Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 6.
On the ground, Sea Cliff, N. Y.

O. multipilosa Ewing. Psyche, Vol. XIV., p. 113.
Under logs, near Chicago, Ill.

O. nitidula Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 491.
Franconia, N. H.

O. octopunctata, n. sp.
In moss, Homer, Ill.

O. pallida Banks (*Oribatula*). Proc. Acad. Nat. Sci. Phila., 1906, p. 494.
Fort Lee, N. J.

O. palustris Banks. Jour. N. Y. Ent. Soc., 1895, p. 128.
From wet *Sphagnum*, Roslyn, N. Y.

O. parvilamellata, n. sp.
Homer, Ill.

O. persimilis Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 491.
Franconia, N. H.

O. pratensis Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 6.
On grass, Sea Cliff, N. Y.

O. robusta Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 7.
Under bark of walnut, Urbana, Ill.; Sea Cliff, N. Y.; Fort Lee, N. J.; Washington, D. C.

O. rugifrons Stoll. Biol. Centr. Amer., Arach. Acar., p. 25, Pl. XV., Fig. 2.
British Honduras.

O. slossonæ Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 490.
Franconia, N. H.

O. spinogenuala, n. sp.
Arcola, Ill.

O. texana Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 494.
San Antonio, Tex.

O. turgida Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 493.
Palm Springs, Calif.

O. unimaculata Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 490.
Under boards, Arcola, Ill.; Franconia, N. H.

O. virginica Banks (*Galumna*). Proc. Acad. Nat. Sci. Phila., 1906, p. 493.
Under old pieces of wood and under bark, Homer, Ill.; Falls Church, Va.

Family NOTHRIDÆ.

Genus Liacarus Michael.

Liacarus Michael. Das Tier., Lief. 3, 1898, p. 40.

L. abdominalis Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 495.
Claremont, Calif.

L. carolinensis Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 494.
Black Mountain, N. C.

L. frontalis Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 495.
Falls Church, Va.

L. globifer P. Kramer (*Leisoma*). Bibl. Zool., Vol. XX., 1897, p. 80.
Greenland.

L. lucidus, n. sp.
Arcola, Ill.

L. minutus, n. sp.
Urbana, Ill.

L. modestus Banks. Proc. Calif. Acad. Sci., Ser. 3, Vol. III., 1904, p. 367.
Los Angeles, Calif.

L. niger, n. sp.
In moss, Homer, Ill.

L. nitidus Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 10.
Quite common on ground under wood, bark, stones, etc., Sea Cliff, N. Y.; Fort Lee, N. J.

Genus Notaspis Hermann.

Notaspis Hermann. Mém. Apterol., 1804, p. 87.

N. arctica Banks (*Eremæus*). Insects, etc., Commander Isl., 1899, p. 349.
Glinka, Commander Isl.

N. burrowsi Mich. Proc. Zool. Soc. Lond., 1890, p. 418, Pl. XXXVII., Fig. 1-4.
Lake Winnipeg, Canada.

N. canadensis Banks (*Oppia*). Proc. Acad. Nat. Sci. Phila., 1906, p. 497.
Ottawa, Canada.

N. carbonaria Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 496.
Humboldt, Calif.

N. floridana Banks (*Eremæus*). Proc. Acad. Nat. Sci. Phila., 1904, p. 145.
Punta Gorda, Fla.

N. montana Banks (*Oppia*). Proc. Acad. Nat. Sci. Phila., 1906, p. 497.
Franconia, N. H.

N. pilosa Banks (*Scutovertex*). Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 11.
Under bark of trees. Sea Cliff, N. Y.; Fort Lee, N. J.

N. punctulata Banks (*Cepheus*). Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 10.
In decaying fungus and in weeds, Sea Cliff, N. Y.

N. pyrostigma, n. sp.
Arcola, Ill.

N. spinipes Banks (*Oppia*). Proc. Acad. Nat. Sci. Phila., 1906, p. 496.
Falls Church, Va.

Genus Scutovertex Michael.

Scutovertex Michael. Jour. Roy. Micr. Soc., Vol. II., 1879, p. 241.

S. marinus Banks (*Nothrus*). Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 77.
On rocks between tide marks, Sea Cliff, N. Y.

S. petrophagus Banks. Ent. News, Vol. XVII., 1906, p. 194.
In cavities in the surface of wet rock, Traghanic [Taughannock?] Falls, N. Y.

Genus Tegeocranus Nicolet.

Tegeocranus Nicolet. Arch. Mus. Paris, T. VII., 1855, p. 464.

T. lamellatus Banks (*Cepheus*). Proc. Acad. Nat. Sci. Phila., 1906' p. 497.
Falls Church, Va.

Genus Carabodes C. L. Koch.

Carabodes C. L. Koch. Crust. Myr. Arach., Heft 3, 1835.

C. apicalis Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 13.
Sea Cliff, N. Y.

C. brevis Banks. Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 77.
Dead fungus, Sea Cliff, N. Y.

C. dorsalis Banks. Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 77.
Sea Cliff, N. Y.

C. granulatus Banks. Jour. N. Y. Ent. Soc., 1895, p. 129.
From wet *Sphagnum*, Roslyn, N. Y.

C. niger Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 12.
In decaying fungi and under bark, Sea Cliff, N. Y.

C. oblongus Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 13.
Under bark, Sea Cliff, N. Y.

Genus Damæus C. L. Koch.

Damæus C. L. Koch. Crust. Myr. Arach., Heft 3, 1835.

D. angustipes Banks (*Oribata*). Proc. Ent. Soc. Wash., Vol. VII., 1906, p. 136.
In dead leaves, Mt. Vernon, Va.

D. australis Banks (*Belba*). Trans. Amer. Ent. Soc., Vol XXII., 1895, p. 12.
Shreveport, La.

D. bulbipedatus Packard. Cave Memoir, 1887, p. 42.
End of Dixon's Cave, Ky.

D. californicus Banks (*Oribata*). Proc. Calif. Acad. Sci., Ser. 3, Vol. III., 1904, p. 367.
Mt. Shasta, Calif.

D. floridanus Banks (*Belba*). Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 76.
Punta Gorda, Fla.

D. longiseta Banks (*Oribata*). Proc. Acad. Nat. Sci. Phila., 1906, p. 498.
Falls Church, Va.

D. nitens C. L. Koch (*Oppia*). Crust. Myr. Arach., Heft 3, Tab. 10.
Urbana, Ill.

D. puritanicus Banks (*Oribata*). Proc. Acad. Nat. Sci. Phila., 1906, p. 498.
Middlesex Fells, Mass.

D. sufflexus Michael. Jour. Roy. Micr. Soc., Ser. 2, Vol. V., 1885, p. 394.
In moss, Dedham, Mass.

Genus Hermannia Nicolet.

Hermannia Nicolet. Arch. Mus. Paris, T. VII., p. 468, 1855.

H. quadriseriata Banks. Insects, etc., Commander Isl., 1899, p. 349.
Glinka, Copper Isl.

H. trinebulosa Riley. Hubbard's Orange Insects, 1885, p. 216.

Genus Neoliodes Berlese.

Neoliodes Berlese. Bull. Soc. Ent. Ital., Vol. XX., 1888, p. 47.

N. concentrica Say. Jour. Phila. Acad., Vol. II., 1821, p. 73.
Under bark of elm-tree, Washington, D. C.; Enterprise, Fla.; and from Pennsylvania.

N. floridensis Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 499.
Lake Worth, Fla.

Genus Tumidalvus Ewing.

Tumidalvus Ewing. Ent. News, Vol. XIX., 1908, No. 6, p. 243.

T. americana Ewing. Ent. News, Vol. XIX., 1908, No. 6, p. 244.
In moss, Arcola, Ill.; in rubbish, Columbia, Mo.

Genus Cymbæremæus Berlese.

Cymbæremæus Berlese. Acari, Myr., Scorp., Fasc. LXXVIII., 1896.

C. marginalis Banks (*Æremæus*). Trans. Amer. Ent. Soc., Vol. XXIII., 1896, p. 76.
On bark, Sea Cliff, N. Y.

Genus Nothrus C. L. Koch.

Nothrus C. L. Koch. Crust. Myr. Arach., Heft 2, 1835.

N. banksi Michael. Das Tier., Lief. 3, 1898, p. 70.
Olympia, Wash.

N. bipilis Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 14.
From *Sphagnum*, Sea Cliff, N. Y.

N. excisus Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 15.
On the bark of spruce-trees, Sea Cliff, N. Y.

N. rugulosus Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 15.
Under bark, Sea Cliff, N. Y.

N. simplex Banks. Jour. N. Y. Ent. Soc., 1895, p. 130.
From wet *Sphagnum*, Roslyn, N. Y.

N. taurinus Banks. Proc. Acad. Nat. Sci. Phila., 1906, p. 499.
Falls Church, Va.

N. truncatus Banks. Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 14.
From *Sphagnum* and in moss, Sea Cliff, N. Y.

Genus Hypochthonius C. L. Koch.

Hypochthonius C. L. Koch. Crust. Myr. Arach., Heft 3, 1835.

H. rufulus C. L. Koch. Crust. Myr. Arach., Heft 3, Tab. 19.
Arcola, Ill.

Family HOPLODERMIDÆ.

Genus Hoploderma Michael.

Hoploderma Michael. Das Tier., Lief. 3, 1898, p. 77.

H. dasypus Ant. Dugès (*Oribates*). Ann. Sci. Nat., Sér. 2, Vol. II., p. 47.
In decayed wood, Arcola, Ill.

H. granulatum Banks. Can. Ent., Vol. XXXIV., 1902, p. 175.
Ottawa, Canada.

H. setosum Banks (*Hoplophora*). Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 16.
On the ground, Sea Cliff, N. Y.

H. sphærulum Banks (*Hoplophora*). Trans. Amer. Ent. Soc., Vol. XXII., 1895, p. 16.
Sea Cliff, N. Y.

Genus Phthiracarus Perty.

Phthiracarus Perty. Allg. Naturg., III., 1841, p. 874.

P. americanus, n. sp.
Under logs and old boards, Danville, Arcola, and Urbana, Ill.

P. arctatus Riley (*Hoplophora*). Riley's 6th Mo. Rep., 1874, p. 53.
Sea Cliff, N. Y.; Florida; Missouri.

P. cryptopus Banks. Proc. Calif. Acad. Sci., Ser. 3, Vol. III., 1904, p. 367.
Claremont, Calif.

P. flagelliformis, n. sp.
Under logs, Homer, Ill.

P. flavus Ewing. Ent. News, Vol. XIX., p. 450.
In moss, Urbana, Ill.

P. glabratus Say. Jour. Phila. Acad., Vol. II., 1821, p. 73.
Sea Cliff, N. Y.

P. magnus Ewing. Psyche, Vol. XIV., 1907, p. 114.
Under old logs, Pine, Ind.

P. rotundus Ewing. Ent. News, Vol. XIX., p. 451.
Under a log, Batavia, Ill.

EXPLANATION OF PLATES.

PLATE XXXIII.

Fig. 1. *Oribata spinogenuala*, n. sp., × 34; 1*a*, pseudostigmatic organ; 1*b*, bristle on the tip of the genual of leg II; 1*c*, anal and genital covers.

Fig. 2. *Oribata artilamellata*, n. sp., × 34; 2*a*, pseudostigmata and pseudostigmatic organ.

Fig. 3. *Oribata illinoisensis*, n. sp., × 58; 3*a*, pseudostigmata and pseudostigmatic organ.

Fig. 4. *Oribata robusta* Banks, × 34; 4*a*, pseudostigmata and pseudostigmatic organ; 4*b*, anal and genital covers.

PLATE XXXIV.

Fig. 5. *Oribata virginica* Banks, × 58; 5*a*, pseudostigmata and pseudostigmatic organ.

Fig. 6. *Oribata parvilamellata*, n. sp., × 34; 6*a*, pseudostigmata and pseudostigmatic organ; 6*b*, ventral surface.

Fig. 7. *Oribata octopunctata*, n. sp., × 58; 7*a*, pseudostigmata and pseudostigmatic organ.

Fig. 8. *Oribata minuscula* Banks, × 34; 8*a*, pseudostigmata and pseudostigmatic organ; 8*b*, anterior ends of lamellæ and the translamella.

Fig. 9. *Liacarus lucidus*, n. sp., × 58; 9*a*, pseudostigmata and pseudostigmatic organ.

PLATE XXXV.

Fig. 10. *Liacarus minutus*, n. sp., × 58; 10*a*, pseudostigmata and pseudostigmatic organ.

Fig. 11. *Liacarus niger*, n. sp., × 34; 11*a*, pseudostigmata and pseudostigmatic organ.

Fig. 12. *Notaspis pyrostigma*, n. sp., × 58; 12*a*, pseudostigmata and pseudostigmatic organ; 12*b*, palpus and mandible.

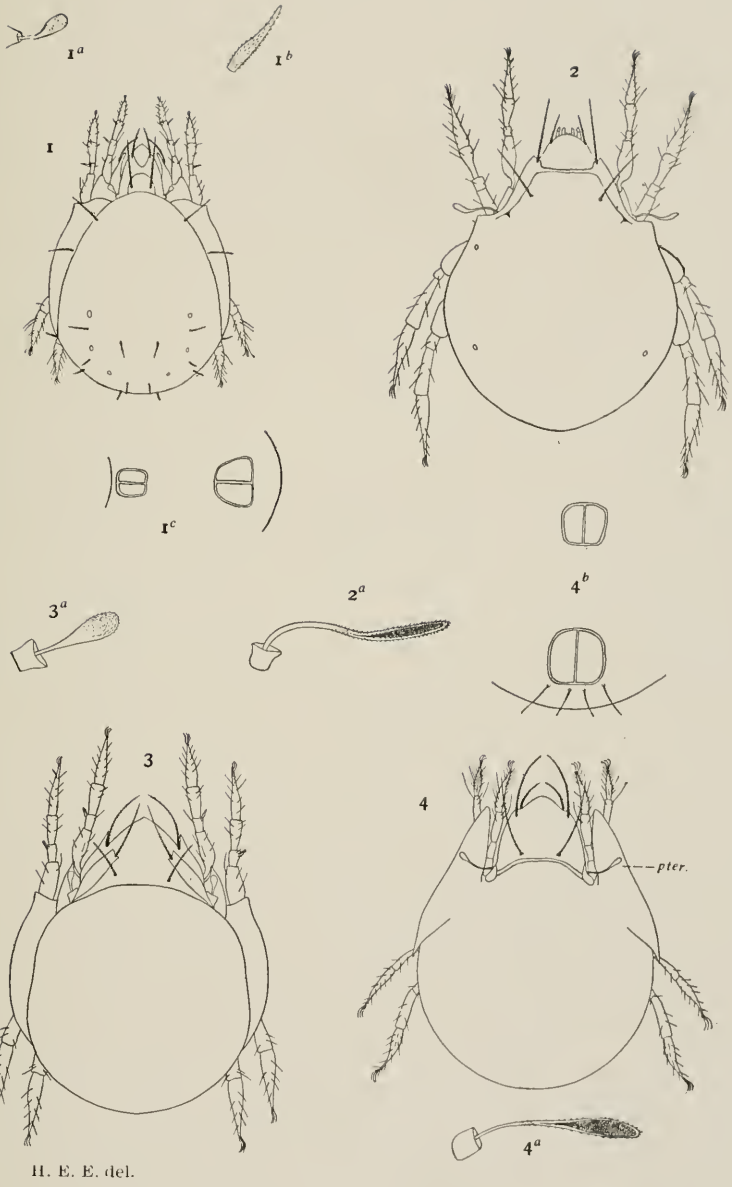
Fig. 13. *Phthiracarus flagelliformis*, n. sp., × 34; 13*a*, pseudostigmata and pseudostigmatic organ; 13*b*, mandible; 13*c*, distal end of tarsus of leg I.

Fig. 14. *Phthiracarus americanus*, n. sp., × 34; 14*a*, pseudostigmata and pseudostigmatic organ; 14*b*, distal end of tarsus of leg I.

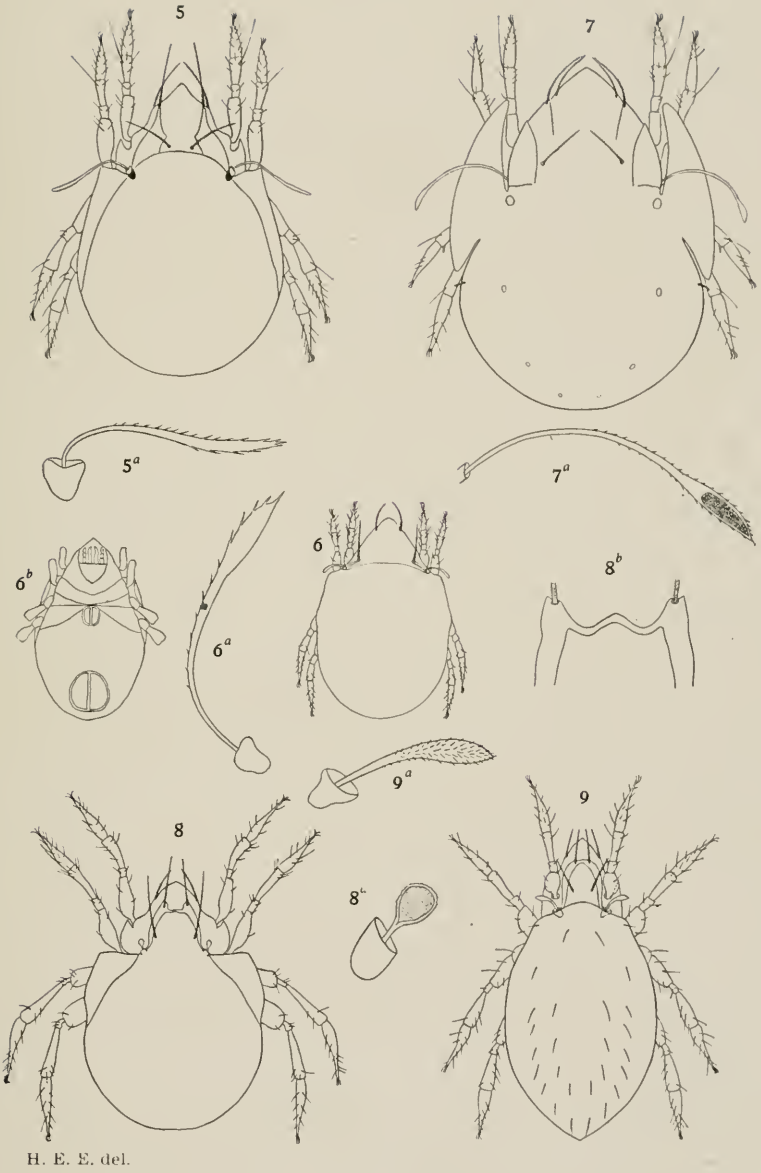
Issued September 25, 1909.

ERRATUM.

Page 378, line 1, for *XXV.* read *XXXV.*

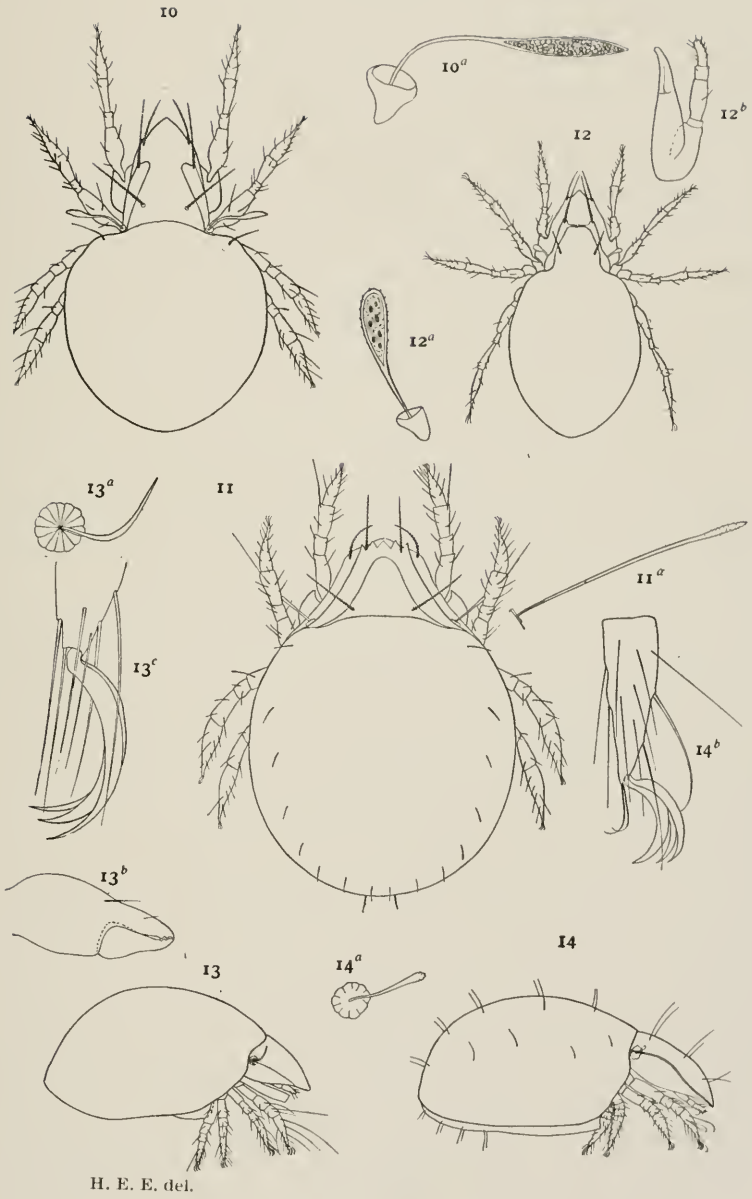


ILLINOIS ORIBATOIDEA.



H. E. E. del.

ILLINOIS ORIBATOIDEA.



H. E. E. del.

ILLINOIS ORIBATOIDEA.