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ACARINIDA.

By J. N. HALBERT, M.R.I.A.

Section II.—Terrestrial and Marine Acarina.

Plates IV–VIII.

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INTRODUCTION.

The following report contains a record of certain groups of the terrestrial mites and also of the marine species belonging to the family Halacaridae found during the recent Survey of Clare Island and the surrounding district.

Except as regards one or two of these groups the list must be looked on as very incomplete. During the field work of the Survey it was necessary to give a good deal of attention to insects and other invertebrates so that little time was available for collecting the Acarina. Gradually, however, a number of species were got together, especially during my later visits to the district, and through the help of friends in sending gatherings of moss and other materials in which these small creatures may be found.

As a result, there is now available a list of 186 species which, together with the 80 fresh-water mites, recorded in the previous section of this paper (39 i), bring the known acarine fauna of the district up to 266 species. Incidentally, there are included some records of mites from other parts of Ireland identified while the present paper was being prepared; these are printed in italics, and include the only records of Irish mites outside the limits of the Clare Island district, at least in so far as the groups dealt with are concerned.

The bulk of the species belong to those two dominant groups of the free-living mites, the Gamasoidea and the Oribatoidea. As a matter of fact the list is made up as follows:—

Gamasoidea,	72 species (including Labidostomma).
Ixodoidea,	1 species.
Oribatoidea,	60 species.
Sarcoptoidea,	5 species.
Thrombidoidea,	48 species (including the Halacaridae).

In some respects the most interesting mites found during the Survey belong to the group Gamasoidea. These are small and medium-sized Acarina of extremely varied habits and structure. The free-living forms may be found in moist places amongst moss, in fungi, under the bark of decayed trees, &c. Some peculiar forms are found only in ants' nests while others must be sought for between tide-marks on the sea-shore. Many species of this group live parasitically on the bodies of other animals, with the exception of two kinds found on field mice no attempt was made to collect these parasitic forms.

This group is apparently in need of a general revision, and as the species pass through two or three nymphal stages during their life-history the identification of one's captures is not always an easy matter. On this account and partly also because there are several new species to be described, it was necessary to enter into considerable detail in the following list. It is hoped that the accompanying figures of the new and little-known species will leave no doubt of their identity in the light of future work on the Acarina in this country.

Dr. Berlese's well-known work (1) on the Italian mites is of the greatest help in this as in other groups, and the same author has recently published an excellent account of the species of Gamasus (13) which greatly simplifies identifications in so far as that genus is concerned. If we except Mr. Michael's paper on the family Uropodidae (49) and Mr. Donisthorpe's notes on the Acarina living in ants' nests very little is known of the gamasid fauna of these countries, so that many of the species in the following list are new British records.

Amongst the Oribatoidea, the so-called "Beetle Mites," exactly sixty species were collected including many not previously recorded from Ireland. This list is doubtless incomplete, yet it is probably fairly representative of the oribatid fauna of the district. These mites are very uniformly distributed and may usually be found in numbers in their favourite habitats especially amongst mosses. In contrast to the previous group the British species are fairly well known, thanks to Mr. Michael's admirable monograph (48). Thus, of the sixty kinds recorded in the following paper, representing many hundreds of specimens collected in an unexplored part of the country, only two species and a few varieties are not mentioned in Mr. Michael's work. One of these, *Oribata alpina* n. sp., is not uncommon amongst moss in the mountainous parts of the district, while a Notaspis found in numbers on the sea-shore at Mulranny agrees with a form recently described by Berlese under the name of *Oribatula venusta*.

Very few tyroglyphid mites were observed, but the occurrence of the

marine species *Hyadesia fusca* on the British coast is of interest, a number of specimens were found amongst coralline sea-weeds in rock-pools on the shore of Clare Island. Another interesting species is the ants' nest mite *Tyroglyphus Wasmanni*, the hypopial nymph occurred in nests of the common black ant, *Formica fusca*, at Mulranny, apparently the first definite record of the species from Britain.

The mites of the group Thrombidoidea, including such creatures as the earth mites, spinning mites, &c., were but little collected, except for the aquatic kinds. Indeed this part of the list is a record of casually collected species often represented by single specimens. For the sea-mites of the family Halacaridae I am mainly indebted to Mr. R. Southern who kindly collected a number of these minute acarids during the scientific expeditions of the Fisheries cruiser "Helga." Of the seventeen forms collected two species and a variety are undescribed; two of these were dredged in Clew Bay in 24 f. on what has been described as "Polygordius ground." This consists of a bottom of gravel and shelly sand yielding a very interesting fauna of polychaete worms and other creatures (see Parts 47 and 67).

A special search was made on the coast of Mayo for examples of the interesting littoral fauna recorded by Berlese, Trouessart and others from the coasts of southern Europe. I am glad to record success in this respect; quite a number of these mites were found in their characteristic habitat including a few new forms, the most interesting being *Thinozercon Michaeli* sp. nov. a peculiarly isolated acarid which must be regarded as the type of a new family of the Gamasoidea, while the new genus Haluropoda is represented by two species found commonly on the sea-shore and in salt marshes.

The more truly maritime forms are found well below high-tide mark where they survive continual immersion by the sea. During the tides they retire into minute crevices in the rocks, or under stones partly embedded in sandy mud where small quantities of air are imprisoned; such species are—*Halolaelaps glabriusculus*, *Gamasus Trouessarti*, *Cyrthydrolaelaps hirtus*, *Pachylaelaps littoralis* n. sp., *Hydrogamasus Giardi* (Dublin coast), *Thinozercon Michaeli* n. sp., *Phaulocylliba Berlesii* n. sp. (Dublin coast), *Bdella decipiens*, *Bdella capillata* (or var.), *Rynchолophus rubripes*, *Rhagidia halophila* and *Halotydeus hydrodromus* var. *albolincatus*. Of the Pachylaelaps and Phaulocylliba only single specimens were found, both are apparently undescribed and in common with the other species mentioned they occurred under stones well below high-water mark.

There are also some species which live under stones and seaweed at or about high-water mark yet they do not appear to relish the continuous

submergence to which the more decidedly maritime forms are subjected; to this fauna belong *Gamasus Kempersi*, *Gamasus immanis*, *Halolaelaps celticus* n. sp., *Gamasolaelaps aurantiacus*, *Haluropoda interrupta* n. sp., *H. minor* n. sp. and the oribatid mites *Scutovertex bilineatus* and *S. corrugatus*.

Much observation is needed with regard to the exact "zoning" of these littoral forms, and there are some interesting points in their structure and life-history which would repay investigation. In the species *Halolaelaps glabriusculus*, for instance, the ambulacra are highly modified from the ordinary gamasid type, while in the allied *Halolaelaps celticus*, occurring higher up at about high-water mark, these organs, though of similar type, are less highly specialized. Similarly in the protonymph of Cyrthydrolaelaps the ambulacra are less modified than in the adult.

It is well known that many kinds of mites are only found in ants' nests where they live on friendly terms with the ants. Mr. Michael was the first acarologist to study these interesting creatures (48A), and Berlese has published a very useful paper (12) with descriptions of all of the known myrmecophilous forms, these belong, with few exceptions, to the group Gamasoidea. The district is not rich in these mites, the following species occurred:—*Urotachytes formicarius*, *Urodiscella philoctena*, *Laelaps montanus*, *L. vacuus*, *L. styliferus* n. sp., *L. acutus*, and the hypopial nymph of *Tyroglyphus Wasmanni*.

An undoubted sphagnum fauna occurs in very wet places on the mountains and also in sphagnum pools on the moors, the following species may be referred to in this connexion:—*Crytolaelaps transisalae*, *Paraseius serratus* n. sp., *Seiulus minutus* n. sp., *Oribata sphagni*, *Notaspis lacustris*, *Nothrus glaber*, *N. tardus*, and *N. monodactylus*, *Smaris expalpis*, *Microthrombidium valgum*, and others. The last two species I have found in sphagnum pools in company with the *Arrhenurus Stecki* and other water mites on the Mulranny moors.

As regards the general results obtained in the present report it may be mentioned that this is apparently the first attempt to record a local fauna dealing with more than one group of the Acarina in this country, or, indeed, in the British Isles. It has been found necessary to define three new gamasid genera and there are descriptions and figures of 22 new species and 5 new varieties of the Acarina. Apart also from the extension in the known range of many species at least 90 are recorded from Britain for the first time, due to the scarcity of British records in the groups Gamasoidea and Thromboidea, while at least 156 species were previously unrecorded from Ireland.

The classification made use of is mainly that proposed a few years ago by

Dr. E. Reuter,[1] at least as regards the super-family and family groups. It is difficult not to agree with the same writer's remarks on the undesirability of changing the well-known name Gamasidae in favour of the less suitable one Parasitidae as has been done recently by some acarologists. Gamasus is retained in the present paper.

Order ACARINA.

Sub-Order **GAMASOIDEA.**

Family GAMASIDAE.

Gamasus (Gamasus) fimetorum Berl.

An immature male example of this species occurred under bark in the Westport demesne in July.

Distribution.—Germany (Voigts and Oudemans); Italy ("in fimetis totius Italiae" Berl.); Corfu (Thon).

Gamasus (Gamasus) Kempersi Oudms.

1902. Oudemans **74**, p. 36. 1906. Berlese **13**, p. 143.

Westport, ♂ and ♀ under stones on the sea shore, July; Mulranny, ♂, ♀ and nymphs on the shore of Bellacragher Bay, September.

This species is apparently common, where it occurs, on the sea-coast. I have also found it in numbers under stones between tide-marks at Howth, County Dublin.

Gamasus Kempersi is a rather weakly chitinized species which may be recognized by the armature of the second legs in the male, the bilobed process on the basal segments of the palps, and the absence of a tritosternum, a structure which is present, however, in the female of the species.

In his original description of this mite Oudemans remarks that the patella of the second legs is armed with a *bifid* process, and that the epistome "does not show any spines," which has led Berlese to conclude that the Dutch specimens represent a variety for which he suggests the name var. *denticulata*. However this may be, the Irish specimens agree with those described by Berlese, in which the patella has a small cone-shaped process, and the epistome carries the usual three spines.

Distribution.—Sea-shores of southern Italy (Berlese); Norway; Holland (near Nijkirk, Oudemans).

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[1] Zur Morphologie und Ontogenie der Acariden. Acta Soc. Scient. Fennicae. Tom. xxxvi n. 4.

Gamasus (Gamasus) lunaris Berl.

1882. *G. rubescens* G. et R. Canestrini **23**, p. 40. 1892. *G. rubescens* Berlese **1**, Fasc. lxix, n. 9. 1903. *G. rubescens* Oudemans **60**, p. 78. 1906. *G lunaris* Berlese **13**, p. 147.

A female of this species occurred on the sea-shore at Westport in company with *Gamasus Kempersi*, to which it bears a superficial resemblance, chiefly due to similarity in the outline of the endogynium. A careful comparison of the two forms shows many differences.

Distribution.—Throughout Italy and elsewhere in Europe (Berlese).

Gamasus (Gamasus) coleoptratorum (Linn.).

Immature specimens of both sexes occurred under bark of decayed trees near Westport in July; the nymph was also found on the sea-shore at Mulranny in September.

Distribution.—Common and widely distributed in Europe. This species has been noted in Scotland as an ectoparasite of the Red Grouse (Proc. Zool. Soc. London, 1909, p. 309).

Gamasus (Eugamasus) magnus Kram.

1876. Kramer **36**, p. 91. 1906. Berlese **13**, p. 177.

Found amongst moss in Knappagh Wood near Westport, August.

Distribution.—Germany (Kramer); Italy (northern, Berlese); Holland (Oudemans); France (Moniez). A variety of this species, *cavernicola*, Trägardh, has been described from caves in France.

Gamasus (Eugamasus) immanis Berl.

1903. Berlese **6**, p. 262. 1906. Berlese **13**, p. 179.

Under stones at high-water mark on the sea-shore close to Westport, July. Has also occurred, in a similar situation, at Howth, and at Glandore on the Cork coast.

This fine species, the largest of the sub-genus Eugamasus, was first described by Berlese from Norwegian specimens. Apparently it has not yet been found in southern Europe. The largest of the Irish specimens measures 2510μ in length.

Distribution.—Already recorded from the Irish coast by Berlese (**13**, p. 180); Norway. Mr. King has recently found this species at Millport in the Firth of Clyde, and gives an interesting account of its life-history (Proc. Roy. Phys. Soc. Edinb. xix, p. 129).

Gamasus (Eugamasus) Trouessarti Berl.

1889. *G. thalassinus* Berlese et Trouessart **17**. 1892. Berlese **2**, p. 67.

Both sexes occurred commonly under stones at high-water mark on the sea-shore at Westport, July. It is also an abundant species on the Dublin coast.

It should be noted that this species appears under the name of *G. excurrens* in Berlese's tabular synopsis of the species of Eugamasus (**13**, p. 165).

Distribution.—Has been recorded from the coasts of Norway and France.

Gamasus (*Eugamasus*) *Kraepelini* Berl.

I have found the male of this species on decayed fungi in woods at Glendalough, Co. Wicklow, September.

Gamasus (*Eugamasus*) *cornutus* G. et R. Can.

Male found under bark at Stepaside, Co. Dublin, April.

Gamasus (Amblygamasus) septentrionalis var. **norvegicus** Berl.

1902. *P. septentrionalis* Oudemans **60**, p. 39. 1906. **1**, p. 190.

The remains of an adult male of this species were found in moss at Delphi in county Mayo.

The type-form of this distinct species was described from Holland by Oudemans. In his monograph of the species of Gamasus Berlese subsequently described two varieties under the names of *germanicus* and *norvegicus*. The Irish specimen is to be referred to the latter form.

Distribution.—The species is now known to occur in Norway, Germany, Holland, and Britain.

Gamasus (Pergamasus) runcatellus Berl. (Pl. IV, fig. 1.)

1903. Berlese **5**, p. 237. 1906. Berlese **13**, p. 209.

Clare Island, amongst moss, in July.

The single male specimen found in this locality is not quite typical in the armature of the second legs. The processes of the patella and tibia are distinctly larger, in proportion to the segments from which they spring, than they are shown in Berlese's drawings of *P. runcatellus*. In this respect they approach *P. minor* Berl. The chelicerae agree closely with those of the Venetian form figured by Berlese (**13**, pl. xii, fig. 8*a*).

Distribution.—Italy and Germany (Bremen, Poppe).

Gamasus (Pergamasus) runciger Berl. et var. **armatus** nov. (Pl. IV, fig. 2*a–g*.)

1903. Berlese **6**, p. 263. 1906. Berlese **13**, p. 214.

Achill Island, male found under bark of decayed fir trees, September.

Mulranny, in rotten wood, September. Has also been found on Lambay Island in November.

Distribution.—Norway; Holland.

A form of *G. runciger* found amongst decayed wood at Mulranny, county Mayo, in all probability represents a variety of that species. It is of about the same size (length 819μ), and differs in the armature and smaller size of the second legs (fig. 2*e*). Compared with the type the femoral spur is longer and more slender, and there is no trace of a protuberance at its base; the axillary process is comparatively long and knife-shaped, resembling that of *G. runcatellus*. The process of the patella is more decidedly cone-shaped; the process of the tibia is also larger. The last pair of legs measures about 768μ in length; the lower outline of the trochanter (fig. 2*f*) is interrupted by a small process. The chelicerae (fig. 2*g*) greatly resemble those of the type-form, as figured by Berlese, but the two teeth on the fixed chela are not so distinct. As this is possibly a permanent form of *G. runciger* I propose for it the varietal name *armatus*.

Gamasus (*Pergamasus*) *parvulus* Berl.

A male of the type-form has been found at Lucan, county Dublin; and I have also found an adult male of the variety *dilatatellus* Berl., in rotten wood, at Glendalough during September. This variety is recorded by Berlese from the Apennines.

Gamasus (Pergamasus) robustus Oudms.

Clare Island, adult males taken in March, June, and July. Achill Island, adults and nymphs, in moss and under fallen pine-needles, September. The Bills, male and female, June. Westport, Knappagh Wood, in moss, August.

Apparently common in the district. It is a very distinct species, remarkable for the strong armature of the second legs in the male. Originally described as a variety of *Gamasus longulus*, its specific distinctness was recognized later, both by Oudemans (**65**, p. 82) and Berlese (**13**, p. 219).

Distribution.—Norway and Swedish Lapland, Germany, Holland, Britain. I have seen specimens taken at Barmouth, in Wales, by Mr. C. D. Soar.

Gamasus (*Pergamasus*) *alpestris* Berl.

A fine male example of this species was found amongst moss, at Lucan, in February.

Gamasus (Pergamasus) diversus sp. nov. (Pl. IV, fig. 3*a–e*.)

This species has the usual characters of the sub-genus Pergamasus, so that it is unnecessary to give a detailed description of the entire animal. It

is clearly intermediate between *Gamasus robustus* and *Gamasus lapponicus*, differing from both of these species in the armature of the second legs, and in the male chelicerae. A notable feature is the presence of a sharply pointed process on the inner margin of the maxillary lobes.

Male, length about 800μ. Femoral process of the second legs (fig. 3*a*) long, comparatively straight and bluntly pointed; immediately in front of this there is a broad knife-like process; the outer distal margin of the segment is bordered with a chitinous ridge, which is produced at one end in a blunt point; patella unarmed, except for a long ventral bristle. On the tibia there is a discoidal prominence, which appears in side view as a crescentic ridge. On the outer side of this there is a long bristle, bent at the tip. Trochanter of the fourth pair of legs strongly convex on its dorsal side, and there is a rounded ventral prominence (fig. 3*b*).

Capitulum as in the allied species, hair armature of the maxillary plate consisting of four pairs of long bristles, three of which are placed near the base of the maxillary lobes. The latter are moderately sinuate, armed on the inner side with a *sharply pointed spur* (fig. 3*c*). Chelicerae robust; fixed chela armed beyond the middle with one blunt tooth, behind which are three or four extremely minute teeth; free chela also with one strong tooth (fig. 3*d*).

Locality.—Under stones on the shore of Castlebar Lough, Co. Mayo, July.

Gamasus (Pergamasus) lapponicus Trägardh.

1910. Trägardh **88**, p. 408.

Clare Island, ♂ in moss, July; Achill Island, ♂ and ♀, under bark and fallen fir-cones, September; Westport district, under bark; Knappagh Wood, ♂ ♂, August; Lough Fenagh, ♂, ♀, October; Croaghpatrick, ♂, immature, October.

Apparently a common species in the district; both sexes were usually found in moss gatherings in company with *G. robustus* Oudms., to which species it is allied; it is, however, a smaller mite, and the armature of the second legs is characteristic. I have also found it at Glendalough, Lambay Island, and elsewhere in the Dublin district.

Distribution.—Swedish Lapland (Sarekgebirge, Trägardh).

Gamasus (Pergamasus) processiferus sp. nov. (Pl. IV, fig. 4*a–c*.)

This species is allied to *G. decipiens* and *G. lapponicus*, differing from both in the armature of the trochanter of the fourth legs, also in the chelicerae and the structure of the area genitalis.

Female.—Length 742μ, breadth 384μ. Shape. a long oval, shoulders only slightly marked. The fourth leg measures 691μ in length, process of the trochanter (fig. 4*a*) large, the outer margin of this process is straight, extremity pointed and slightly hooked, lower margin rounded. and there is a blunt conical papilla at its inner corner where the process joins the trochanter. Central foramen of the endogynium triangular, with a much smaller triangular aperture appearing beneath the apex of the larger opening (fig. 4*b*). Fixed chela with about six teeth, the third from the extremity truncated, free chela with three distinct teeth, the proximal one being the strongest (fig. 4*c*). The male was not found.

Locality.—An ovigerous female of this form occurred amongst moss in the Westport district in July.

Gamasus (Pergamasus) crassipes L. (Pl. IV, fig. 5*a–c*.)

Clare Island, Achill Island, and in the Westport district, occurs commonly in moss and under bark.

At least two forms of this common species are found in Europe; the type form is very widely distributed, while the variety *longicornis* Berl. is found in the north.

In his monograph of the species of Gamasus Berlese figures (**13**, Pl. viii, fig. 9) the second leg of the type-form. I can only say that, compared with this figure, the form, which presumably represents the type in Ireland, has a somewhat different armature, at least as regards the large tibial process. I have seen, however, an Italian male of this species obtained some years ago from Dr. Berlese. This male, which was found at Florence, agrees closely with my Irish specimens in the armature of the second legs. As it is difficult to describe in words the exact shape of these processes, a figure of the armature of the femur, patella, and tibia of one of these Irish specimens is given (fig. 5*a*, *b*).

The variety *longicornis* Berl., is also common in the district. I have specimens from Clare Island, Achill, Delphi, and the Westport district. A figure of the tibial armature of the second leg is given (fig. 5*c*). Dr. Trägardh records its occurrence in French caves (**89**, p. 523).

Gamasus (Ologamasus) calcaratus C. L. Koch.

The variety *excisus*, Berlese, occurred commonly in moss on Achill Island, also on the seashore at Westport and Mulranny. Type form not definitely determined.

Distribution.—This and the two following species are no doubt widely distributed in Europe.

Gamasus (Ologamasus) pollicipatus Berl.

A female Ologamasus found amongst moss on Clare Island is probably to be referred to the present species.

The genital area of this specimen does not agree very well with Berlese's figures of the typical form, but resembles more closely that of the variety *excipuliger*. The species must be recorded with reserve until male examples are found.

Gamasus (Ologamasus) inornatus Berl.

Found amongst moss on Clare Island in March.

Berlese does not attempt to tabulate the females of Ologamasus, but the present species is mentioned on account of the simple structure of the endogynium. In the other known species the females have this structure more or less elaborated.

Gamasoides carabi (G. et R. Can.).

1885. *Poecilochirus carabi* G. et R. Can. **24**, pp. 56 and 99. 1892. *Poecilochirus fucorum* Berl. **1**, Fasc. lxix, n. 4. 1892. *Poecilochirus carabi* Berl. **2**, p. 73. 1906. *G. carabi* Berl. **13**, p. 291. 1903. *G. carabi* Berl. **6**, p. 280.

Westport, a single specimen in the coleoptrate nymph stage found attached to a ground beetle (*Pterostichus niger*).

The genus Poecilochirus contains a few species of acarina which were known only as *nympha coleoptrata*, or mites in the wandering nymphal stage. The essential characters of Berlese's account of the genus, originally described by Canestrini, are as follows:—"Mandibulae digitus fixus saepius apophysi hyalina anterius porrecta auctus.—Corniculi labiales aliquando curtiores, forcipem quasi cum malis maxillarum interioribus sistentes." (**1**, Fasc. lxx, n. 11.)

In the same reference Berlese characterizes another genus, Iphidosoma, for certain species of Poecilochirus, which was also based on immature forms, and in a later work (**2**, p. 73) his arrangement of the species is as follows:—*Poecilochirus carabi* Can.; *P. spinipes* Koch; *P. interruptus* Koch; *Iphidosoma fimetarium* Can.; *I. ovatum* Berl.

The genus Gamasoides was proposed by Berlese in 1903 (**6**, p. 280), with *G. carabi* Canestrini as the type species.

Gamasoides spinipes (C. L. Koch).

The Bills Rocks, in old nests of Puffins and Black-backed Gulls, June; Achill Island, in fungi, September; Mulranny, under stones on the sea-shore, September.

The specimens from these localities are in the coleoptrate nymph stage, with armed second legs as figured by Berlese (1, Fasc. lxix, n. 4), also by Oudemans (73).

Distribution.—A wide-spread form, ranging from Siberia to Italy.

Gamasoides bispinosus sp. nov. (Pl. IV, fig. 6, *a*, *b*.)

Closely allied to *G. spinipes*, with which species it agrees in general structure, differs, however, in the armature of the second legs.

Nympha colcoptrata. MALE, length 539μ, breadth 341μ. Second legs (fig. 6*a*), instead of the single knife-shaped spine present on the underside of the femur in *G. spinipes*, this species is armed with two such spines; patella with a single strong spine placed on the distal margin of the segment; tibia *unarmed*; tarsus with two spines, the terminal one is, however, closely adpressed, so that it looks like a strong keel along the underside of the segment. Epistome trispinous, side teeth strongly developed. The chelicerae resemble those of *G. spinipes*, fixed chela with at least five distinct teeth; free chela with a very long proximal tooth, and two smaller ones between this and the end of the segment (fig. 6*b*).

Localities.—Found amongst moss near Lough Fenagh, Co. Mayo, in October. I have also found it amongst moss sent from Poyntzpass, Co. Armagh.

Halolaelaps glabriusculus Berl. et Trouess.

1875. *Gamasus marinus* Brady **19**, p. 307. 1889. *H. glabriusculus* Berlese et Trouessart **17**, p. 2. 1890. *Zercon marinus* Moniez **52**, p. 13. 1902. *Parasitus marinus* Oudemans **60**, p. 281. 1906. *H. glabriusculus* Berlese **13**, p. 109.

A few specimens, including the male and female, of this interesting species were found under stones between tide-marks on the sea-shore at Westport in July.

The genus is remarkable for the structure of the ambulacra, and for the fact that the second and third pairs of legs are armed with stout spines in the male. There is also a short bristle-like spine on the underside of the femur of the first pair of legs, and in the following species there are three stout spines in this position. In common with certain other shore-frequenting mites, the ambulacra are of peculiar structure. In the present species they are armed with two pairs of plates, i.e., a pair of leaf-like central lobes, and a pair of long acuminate lateral lobes. It is of interest to note that the ambulacra of the first pair of legs which in the *Gamasidae* are used as tactile organs are less modified from the ordinary type than in the case of the other pairs.

Berlese is of opinion that the mite described by Brady as *Gamasus marinus* is synonymous with the present species, which is probably the case, although the description scarcely contains anything by which one can fix the identity of his species. Practically the only character which would lead one to believe that he had a Halolaelaps before him is furnished by the drawing of one of the leg extremities; this shows, in side view, an ambulacrum which is suggestive of that of the present genus.

Distribution.—Evidently a south and west European form, as it has been recorded only from the sea coasts of France and Spain and also of Great Britain. Brady records it as occurring "pretty commonly in crevices of magnesian limestone rocks, between tide-marks, near Sunderland." I have found the species commonly in a very similar habitat at Malahide on the Dublin coast. Firth of Clyde (King in *Proc. Roy. Phys. Soc.* Edinb. xix, p. 135).

Halolaelaps celticus sp. nov. (Pl. IV, fig, 7*a–e.*)

Occurring in a very similar habitat to *H. glabriusculus* is another species which seems to me to belong to the present genus; it is apparently undescribed. This form resembles *H. glabriusculus* in the presence of two dorsal shields, and in the arrangement of the plates of the ventral surface. It is, however, a smaller species with stouter and differently armed legs; the epistome is produced in a long central spine, and the ambulacra, though of very similar structure, are less highly modified; other differences are also apparent.

Male (fig. 7*a*). Length 716μ, breadth 409μ. Shape much as in *H. glabriusculus*. The dorsal shields almost cover the upper surface, extremely finely punctured, first shield with a few scattered hairs, second shield with numerous spine-like hairs placed close to the side margins; the hinder ones have pectinated extremities, and there is a central spatulate hair on the end of the body. Sternum separated by a short interval from the ventro-anal plate, with long processes between the last three pairs of legs; two strong spines replace the usual fifth pair of hairs on the hinder margin of the sternum. Genital foramen circular, with a short duct. Ventro-anal plate very large, occupying most of the end region of the body, finely punctured with about eight pairs of hairs. Peritreme placed close to the lateral outline of the body, slightly undulate; stigma in the normal position.

Capitulum quadrate, with the usual hair armature; maxillary lobes small, curved, and widely separated. Epistome (fig. 7*c*) produced in a long, spinous, central process, at the base of which there are strong, lateral teeth. Chelicerae (fig. 7*c*) rather slender; the free chela has two teeth, the hinder

one is bifid at the extremity; the free chela has a strong triangular tooth. Palps small and weakly armed.

The leg measurements are approximately 517μ, 440μ, 451μ, and 605μ. The last three pairs are stout, and the second pair is a little thicker than the others. Armature consisting of short hairs and spines, many of the latter spring from peduncles, and some are pectinated. The following are the more important characteristics:—First pair, a row of three stout pedunculated spines on the ventral side of the femur; second pair, femur with a blunt conical tooth; beside this there is a sharp spine springing from a slightly raised base, and there are two other spines on the lower side of the segment; third pair, a strong posteriorly directed spur on the femur; fourth pair without special armature, but there are two strong bristles on the femur. The ambulacra fig. 7*d*) are reduced to two pairs of appendages, as in *H. glabriusculus*, but the upper lobes are longer; the lateral lobes consist of short triangular pieces; the inferior lobe is reduced. In fact the ambulacra are somewhat intermediate in structure between those of *H. glabriusculus* and the typical gamasid.

Female (fig. 7 *b*). Length 742μ, breadth 435μ. Shape oval, relatively broader than the male, hinder lateral margins with five or six pairs of bristles. First dorsal shield large, finely punctured, hinder margin produced in a rounded prominence; second shield smaller and narrower, concave in front and widely rounded behind. Sternal plate small and narrow, with the usual hairs. The three pairs of triangular endopodial plates are widely separated from the sternum, and send off long processes between the coxae. Genital plate trapezoidal, as in the type species, anal plate large and of semicircular form, the width is about 341 μ (in *H. glabriusculus* it is smaller, measuring only 165μ). Peritreme, capitulum, epistome and palps like those of the male. Chelicerae straight, free chela with a group of three teeth set close together at a little distance from the terminal tooth; fixed chela with a large channelled tooth. Legs, with the exception of the second pair, a little shorter than in the male, approximate length 506μ, 440μ, 407μ, and 517μ without the special armature of the male.

Localities.—Under stones just below high-tide mark on the sea-shore at Westport, in July. I have also found it commonly in a similar habitat at Howth on the Dublin coast in September.

Gamasolaelaps aurantiacus Berl.

1879. ? *Seius excisus* L. Koch **35**, p. 122. 1903. *Cyrtolaelaps* (?) *aurantiacus* Berlese **5**, p. 241. 1904. *Metaparasitus suboles* Oudms. et Voigts **75** p. 655. 1906. Berlese **13**, p. 101.

Coast of Mayo at Westport and Mulranny, the *nympha coleoptrata* occurred in both of these localities in July and September. I have also found the adult female under stones in a brackish place a little above high-water mark at Howth, county Dublin, in September.

This species may be readily recognized by its golden-brown colour, the incised dorsal shields, and the peculiar form of the epistome, which, as Berlese points out, is intermediate in character between the species of Cyrtolaelaps and Gamasus. The legs, especially the last pair, are very long.

Although Berlese's name for this species was published before that of Oudemans, it is a question whether Koch's *Seius excisus* is not identical with the present species and should, therefore, have priority over both. The figure of the dorsal surface of his *Seius excisus*, shows clearly the incised dorsal plate, the undulate outline of the second dorsal shield, the prominent spines of the epistome, and the long attenuated legs. While his figure of the ventral surface of the animal, though not complete, is sufficiently like that of Gamasolaelaps.

Berlese considers that *Metaparasitus suboles*, Oudemans, is certainly identical with the present species, in spite of the fact that the figures accompanying Oudemans and Voigts' later description of the species depict the male genital foramen on the sternal shield a short distance from the front margin. There is evidently some discrepancy here as Berlese illustrates it on the front margin of the sternal shield, the usual position for it in the family Gamasidae.

Distribution.—Assuming that L. Koch's species from northern Siberia is identical with the British form, this species must have a very wide range on the western coasts of the Palaearctic region. The recorded localities are Bremen under stones (Oudemans and Voigts). Siberia; Yenisei: south of Troitzkoj (L. Koch).

Cyrthydrolaelaps Berlese.

This interesting genus was described by Berlese from specimens taken on the Spanish coast by Dr. Trouessart. A short account of the male previously unknown, the protonymph, and the *nympha coleoptrata* is contained in the present paper. As Berlese points out the general characters are very similar to those of the genus Cyrtolaelaps except for the curious structure of the ambulacra. Instead of the usual hyaline lobes present on the ambulacra of the typical gamasid, these organs are reduced, in the adult, to form two pairs of long blade-like hairs. This modification would appear to be an adaptation to suit the peculiar aquatic habitat of the species, which lives between tide-marks on the sea-shore.

What I assume to be the protonymph of *C. hirtus* occurs abundantly on the Irish coast. I was at first inclined to believe that it belonged to another species, chiefly on account of the rather differently armed ambulacra, which have two *broad* upper lobes, however, there is no reason why these organs should not undergo modification as the creature reaches maturity.

Cyrthydrolaelaps hirtus Berl. (Pl. V, fig. 8*a-g.*)

1904. *C. hirtus* Berlese 7, p. 19.

Mulranny, the ♀, ♂ and nymphs occurred under stones partly imbedded in sandy mud. about four or five feet below high-water mark, September; Westport, July. I have also found this species on the Dublin coast (Malahide and Howth), running actively on the exposed limestone rocks, and also under stones between tide-marks in May and June.

Female.—Length 1331μ, breadth 768μ. Colour a golden-brown, resembling Gamasolaelaps. Shape, oblong ovate, end of the body double-margined. Dorsum with the usual two plates, clothed with long bristles; the second plate smaller, with a truncated hinder margin. Sternal shield long, reaching to the end of the third coxae, emarginate in front, and there are three pairs of long hairs. Jugularia absent. Genital shield narrow in front, widening into a broad, bilobed extremity; the front margin has a small, deep concavity at each side, from which springs a spur-like process, and between these is the circular genital foramen. Ventral and anal shields much as in Cyrtolaelaps. The peritreme originates opposite the base of the first legs, and runs in a slightly sinuate line to the stigma opposite the fourth legs. Tritosternum with a long, slender stem and two filaments. The epistome is described by Berlese as follows—"Epistoma spina media longa, acuta, nuda, utrinque ad basim mucronato-bispinosum." In Irish specimens the long central spine is undulate, ornamented by minute spines. Maxillary processes of moderate size, curved and articulated much as in Eugamasus. On the maxillary plate are four pairs of long hairs, the hinder pairs are widely separated. Chelicerae, fixed chela armed, distally, with three low, rounded teeth; free chela with one blunt tooth in addition to the more acuminate terminal one. Legs very long, clothed with long bristles.

Male (fig. 8*a*).—The largest of my specimens measures 1228μ, by 716μ, shape and armature of the dorsum much as in the female, the second shield is larger, reaching to the posterior margin of the body. Sternal shield very broad in front, terminating in a rounded extremity close to the small anal shield, and with lateral extensions which partly enclose the last pair of coxae. The genital foramen lies in a concavity in the front margin of the

sternal shield, there are seven pairs of long, median bristles. Stem of tritosternum very long and slender. Peritreme and anal shield as in the female. Capitulum cup-shaped, with four pairs of long hairs on the maxillary plate. Chelicerae (fig. 8*b*), fixed chela with a truncated apex inside of which there is a group of three or four very minute teeth and separated from these by a wide interval is a strong, pointed tooth ; free chela without distinct teeth, articulated on the outer side of the base is a broad hyaline process, about two-thirds as long as the free chela. Palps normal. The leg measurements are approximately 1920μ, 1280μ, 1280μ, and 1664μ. Second legs (fig. 8*c*) very thick, trochanter with a blunt prominence on its ventral side ; femur feebly armed with two small teeth, proximal one conical, distal one thorn-like and directed forwards, patella and tibia unarmed ; there is a small hump on the dorsal side of the tarsus. Ambulacra (fig. 8*d*).

Protonymph (fig. 8*e-j*). Female.—The dorsal plates are like those of the adult, except that the second shield has a deep longitudinal incision in its front margin. Sternal plate narrower, with three pairs of bristles. A small tongue-shaped plate lies immediately in front of each of the second pair of legs. Genital plate (fig. 8*e*), rounded posteriorly, fitting into the cavity of the ventral plate, the side indentations of the anterior margin are without the horn-like processes of the adult ; genital foramen trapeziform. Peritreme originating near the front margin long and curved. Epistome (fig. 8*f*), as in adult. Legs robust, with shorter bristles, inner margin of last three pairs of coxae emarginate. The dorsal lobes of the ambulacra (fig. 8*g*) are reduced to a single pair of rather broad membranous plates which are pointed at their extremities.

Male (fig. 8*h*).—Length 500μ to 570μ, breadth 308μ. Shape as in the female, dorsal shields larger, especially the second one, which is not incised in front and encloses the sides of the body. The sterno-genital plate widens out beyond the fourth legs and extends in a broadly rounded extremity to the small anal plate. Peritreme a bowed line, stigma opposite the fourth coxae. Legs very similar to those of the female, second pair unarmed. The epistome (fig. 8*i*) differs from that of the female, in having a short central spine reaching only a little beyond the side processes, the latter may have two or four spines on each side. The chelicerae (fig. 8*j*) are very small, fixed chela straight with two distinct teeth, free chela more slender, armed with one tooth at a little distance from the apex, a large hyaline process springs from its base.

Nympha Coleoptrata.—Found in company with the adult ; easily recognized as belonging to the present species by the characteristic form of the epistome and ambulacra.

The dorsal surface is like that of the female, except for the smaller size of the plates; the hinder one is not so truncated at the extremity. Hair armature, much as in the adult. The ventral surface has the usnal V-shaped sternal plate, with four pairs of long marginal bristles.

One of the specimens is apparently a male; in this the sternal plate is larger, and the legs are decidedly stouter, especially the second pair; on the underside of the tarsus there is a small rounded papilla. This specimen measures 1049μ in length.

Distribution.—Spanish coast (Finisterre, Berlese). There seems little doubt that the male recorded by Tietze from the Italian coast as "Gamasus sp.?" (82, see also 22, p. 948) is the protonymph of the present species. The variations which he describes and figures in the shape of the epistome represent the different form of this organ in the two sexes.

Cyrtolaelaps nemorensis (C. L. Koch).

Females of this very distinct species were found in moss on Clare Island in July; and also on Achill Island under the bark of fir trees in September.

Distribution.—Probably a common European species; has been recorded from Germany, Holland, and Italy.

Cyrtolaelaps cervus (Kramer).

Apparently not uncommon; Achill Island, under bark, September; Mulranny, under stones in nest of *Lasius niger*; Knappagh Wood and Lough Fenagh, in moss.

Distribution.—Widespread in Europe.

Cyrtolaelaps transisalae Oudms. (Pl. V, fig. 9.)

1902. Oudemans 60, p. 28, Plate iii, figs. 43–46.

Clare Island, in moss on Croaghmore, July; Achill Island, under bark, September; Knappagh Wood, August; Coolbareen Lough, several in sphagnum, July.

Apparently a common species in suitable localities in the district, especially on the hills; quite a number were obtained from a small quantity of sphagnum gathered on the slopes of Croaghpatrick.

The species may be easily recognized by the shape of the epistome (fig. 9). The side incisions of the dorsal plate are comparatively straight, and less bent downwards than in the allied species.

Amongst my specimens there are a few which are presumably in the deutonymphal stage. These are smaller and less chitinized than the others

and carry two separate dorsal plates, shaped almost exactly as in the deutonymph of *C. Kochi* Trägardh. Oudemans has figured a similar nymphal stage in the case of *C. cervus* (Kramer).

Distribution.—Probably widespread in western Europe; recorded from Holland and France (Pyrénées orientales, Trägardh).

Crytolaelaps Kochi Trägardh. (Pl. V, fig. 10.)

1910. Trägardh **88**, p. 416, figs. 78, 79.

Of this delicately organized species a single female example was found amongst mosses in Clare Island during July.

A full description of this mite will be found in the above reference. The Clare Island specimen is an ovigerous female of rather broad shape, in comparison with its length, which is 768μ. The epistome (fig. 10) is rather like that of *C. nemorensis* (Koch).

Distribution.—Trägardh records this species from Siberia, Novaya Semlya, Greenland, and Swedish Lapland (Sarekgebirge).

Pachylaelaps pectinifer (G. et R. Can.). var. **magnus** nov.

To a variety of this species must be referred a female Pachylaelaps, found amongst moss in the Westport district. Compared with the typical form, this specimen is remarkable for its large size, the length being about 1280μ and the breadth 793μ. It agrees in this respect, however, with one of the Italian specimens which the authors refer to as an "esemplare gigante" (**23**, p. 64).

Compared with the type, this large Irish form is also remarkable for the more quadrate shape, and the pointed anterior extremity is much more acuminate. The epistomal process has a decidedly shorter stem than is shown in Berlese's figures of the species, and the broad comb-like extremity is armed with at least six strong teeth, most of which are finely branched at their extremities. The length of the last pair of legs is about 1075μ.

As it seems likely that this forms represents a variety of *P. pectinifer*, I would suggest for it the varietal name *magnus* (n. var.).

There are few records of this species. Trägardh has recently described a female Pachylaelaps, which he identifies, with reserve, as the present species. Judging by the structure of the epistome and other characters detailed in his paper (**89**, p. 560), not to mention the unusual cave habitat, the form probably represents a distinct species or variety.

Distribution.—Italy; France (Lille, Moniez; Département de l'Ariège, Grotte de Capetes); N. Africa (Tunis).

Pachylaelaps littoralis nov. sp. (Pl. V, fig. 11*a–d*.)

On the sea-coast at Mulranny there occurred a male Pachylaelaps, which is apparently unrecorded. The species is remarkable on account of the broad, dagger-like process of the chelicerae, the structure of the epistome, and the processes of the second pair of legs.

Male (fig. 11*a*).—Length 819μ, breadth 410μ. Colour yellow, with black patches showing through the dorsum. Body strongly produced in front, shoulders sufficiently pronounced, sides slightly emarginate, width across posterior third equal to that of the shoulders, end of the body evenly rounded. Dorsal surface smooth, with four rows of rather stout bristles, including one marginal, upturned, row. There are two pairs of frontal bristles. Ventral surface protected by the usual large bluntly pointed shield, leaving a free marginal area, which is wider than in *P. pectinifer*. The genital foramen is small and circular; two minute inguinal plates are fused in the margin of the ventral shield. Peritreme undulate with a rather large circular stigma.

The epistome (fig. 11*c*) ends in a rather broad process, the apex of which is concave, with about eight teeth, which are distinctly branched at their extremities, somewhat resembling in this respect *P. furcifer* Oudemans (**10**). On the ventral plate there are four pairs of bristles, three of which are placed close to the maxillary lobes. Movable finger of the chelicerae (fig. 11*d*) with two strong teeth, under surface raised, and immediately in front of the prominence there is articulated a broad, dagger-like process, which is distinctly sinuate at the base. Apex of fixed chela bidentate. Palps of the usual type, fourth segment not armed. The tritosternum is weakly developed, base long and narrow, terminal filaments with strong widely separated pectinations (fig. 11*d*).

Legs comparatively long, the respective lengths are about 793μ, 563μ, 486μ, and 665μ, second pair (fig. 11*b*), thick; femur armed with a stout conical spur, which is weakly serrated in front, at its base is a bristle-bearing papilla; patella with a much smaller bluntly pointed tooth, and the tibia is unarmed. The tarsus carries the usual two terminal spurs, which are rather long and slender in the present species. Ambulacra wide, upper membranes consisting of a three-lobed central piece, and a pointed lateral lobe on each side.

Locality.—The male of this species occurred under stones about four or five feet below high-tide mark on the shore of Bellacragher Bay, near Mulranny, in the month of September.

Pachylaelaps longisetis sp. nov. (Pl. V, fig. 12*a–d*.)

Compared with *P. pectinifer*, the present species is remarkable for its very regular oval shape, the much longer hair vestiture of the body, the rather narrow anal plate, and other details of its structure, notably of the peritreme.

Female (fig. 12*a*).—The length is 793μ, breadth 460μ. Shape a long oval, shoulders scarcely at all indicated. Dorsal surface smooth, with very long, scattered hairs, consisting of a regular marginal row, and at least two double inner rows. Ventral surface with the usual plate armature, sternal shield with four pairs of long hairs; metapodial shield extending backwards in a sharply pointed process. The peritreme is bent sharply inwards between the acetabula of the second and third legs, much as in *P. furcifer* Oudms.; stigmata small, placed opposite the front margin of the last coxae. Genito-ventral plate of the usual shape, slightly flattened on the hinder margin. Anal plate as long as it is broad, differing in this respect from the allied species. The hair vestiture of the ventral surface is also very long; apart from marginal hairs, there are at least six long curved hairs on each side of the anal plate.

Capitulum short and broad; epistomal process (fig. 12*b*) very broad and only slightly constricted, terminal comb with nine or ten uniform teeth. Seen from the side the chelicerae (fig. 12*c*) are short and stout, the free chela has too strong widely separated teeth; the fixed chela has one tooth and the sinuate membranous flap behind this tooth is very finely striated at the margin. Maxillary lobes long and slender. Palps small, much as in *P. pectinifer*, ventral face of second segment with two stout bristles. Tritosternum feebly developed, filaments with fine, closely set pectinations.

Legs rather slender; the lengths are approximately 561μ, 495μ, 363μ, and 517μ. Femur of second pair with only a slight distal prominence. There is a small conical papilla on the dorsal side of the trochanter. Hair and tarsal spine armature much as in *P. pectinifer*, except that the hairs are longer in the present species (fig. 12*d*).

Locality.—The female of this species occurred in a decayed tree trunk at Glendarary, Achill Island, during November.

Hydrogamasus Giardi (Berl. et Trouess.).

This is evidently a true tide-mark species. I have found it commonly on limestone rocks, exposed by the tide, on the seashore near Malahide, Co. Dublin.

Holostaspis longispinosus (Kramer).

Clare Island, in moss, during March; Achill Island, in moss and under bark, *nympha generans* and mature female, September.

Distribution.—A widespread European species; recorded from Germany; Holland; Italy, &c.

Holostaspis longulus Berlese.

1887. Berlese **1**, Fasc. xliii, n. 9. 1902. Oudemans **74**, p. 42.

Clare Island, ♀ in moss, during March; Mulranny, ♀ in rotten wood, September; Castlebar, *nympha coleoptrata* under stones on lake shore, July. I have also found it on the sea shore at Howth, Co. Dublin.

In his "New List" (**74**) Oudemans points out that the epistome has a straight spinous margin, and is not produced at the centre as it is shown in the original figure. This is also true of the few Irish specimens that I have seen. In one of these the bifurcated apex of the central process is distinctly rebranched so that there are, on each side, at least four finely pointed extremities. The dorsal shield is very distinctly punctured, and has crenulate side-margins, clothed with a number of stout pectinated spines, and there are some plain bristles on the central part of the dorsum.

Distribution.—Italy (Berlese records this species as occurring in moss in Sicily); Holland (Oudemans, among decayed leaves); France (Moniez **53**).

Holostaspis tridentinus G. et R. Can.

Clare Island, ♂ in moss, July; Achill Island, ♀ in moss and under bark in September; Croaghpatrick, ♀ in sphagnum, 600 feet, October; Knappagh Wood. near Westport, in moss, August.

Distribution.—Evidently a common European species, the recorded localities ranging from Lapland (Trägardh) to Italy, where, according to Berlese, it occurs chiefly in mosses on mountains.

Holostaspis terreus (Can. et Fanzago). (Pl. V, fig. 13.)

1877. Canestrini et Fanzago **25**, p. 48. 1882. G. et R. Canestrini **23**, p. 27. 1889. Berlese **1**, Fasc. lii, 7. 1902. Oudemans **74**, p. 43.

Achill Island, ♀ in fungi, September; Kappagh Wood, near Westport, in moss, August. I have also found it under bark of old pine stumps at Howth, Co. Dublin.

This beautifully sculptured species was first described, without figures, by Canestrini and Fanzago. Berlese referred it to a variety of his *Holostaspis alpinus*, a form which he subsequently identifies as the *nympha generans* stage of *H. longispinosus* (**2**, p. 70).

The specimens here recorded are females, apparently in the deutonymphal stage, they are of a pale yellowish-brown colour, the length is about 717μ. The dorsal shield is large, gradually narrowed, and just reaches the hinder margin of the body. Surface finely punctured and marked with a hexagonal pattern which is more distinct in front and along the side margins. The latter are minutely crenulate, there is a hair armature of strongly pectinated spines.

Margin of the epistome (fig. 13) toothed, the long central process has a finely spinous stem, and terminates in two flattened branches, the extremities of which show three or four deep indentations. Over this central process there are two shorter, outwardly curved processes. Sternal shield widely separated from the genital plate. Anal shield circular, with two pairs of spinous hairs. Lying between the genital and anal shields are a number of small plates, at least two of these carry hairs. Legs rather long and of robust build, hairs of the last pair very finely spinous, stronger than those of the other pairs. Fixed chela with one large tooth, free chela with two rather small teeth.

Distribution.—Canestrini says this species lives under plants, in moss, and in damp earth (Italy), and Oudemans records it from a number of Dutch localities where it occurs amongst decaying leaves.

Holostaspis marginatus (Herm.) var. **littoralis** nov. (Pl. V, fig. 14*a*.)

On the sea-shore at Westport I have found both sexes of a Holostaspis, which is probably referable to a variety of *H. marginatus* (Herm.).

The male example found is not mature, but the females are fully developed. It closely resembles the mite described by Berlese under the name of *H. badius* (**1**, Fasc. lii, 3). In a later reference (**2**, p. 70) he definitely identifies this species as the tritonymph of *H. marginatus* (Herm.).

The following is a short description of the male (fig. 14*a*) :—Length, 600μ, breadth, 380μ. Colour yellow, outline of the body strongly emarginate in front of the shoulders, which are well marked, and from thence the side margins become gradually narrower, end of the body somewhat truncated. The skin is finely punctured and scaly, and the hair vestiture is short; the two frontal bristles are very small and close together. Sternal plate, with five pairs of short hairs, separated from the anal plate; male genital foramen funnel-shaped. The peritreme runs straight down from the shoulders, only slightly sinuate, with the usual club-like stigmal area.

The capitulum (fig. 14*b*) is nearly quadrate, hair armature of ventral plate normal. Maxillary lobes lanceolate, placed rather close together. Epistome (fig. 14*c*) shaped much as in *H. marginatus* (Herm.), extremities of

both processes finely pointed. Mandibles small, teeth much as in Berlese's figure of *H. badius* (1, lii 3, fig. 4), free mandible with a strongly bent spur directed posteriorly. Palps slender, the ventral armature is as follows:— First segment, with two bristles near middle; second segment, a strong distal spine; fourth segment, with two stout distal spines on the outer face of the segment. Legs, lengths about 550μ, 462μ, 407μ, 616μ, femur of second leg (fig. 14*e*) armed with a stout spur undulated in front and with neighbouring bristles, there is a small conical papilla on the ventral side of the patella and the tibia. Fourth pair with two small sharply pointed femoral spurs, one of these springs from an equally long peduncle.

Female (fig. 14*e*), length 896μ, closely similar to *H. badius*, as figured by Berlese (1, Fasc. lii, 3). The chelicerae are short and robustly built, fixed chela with one very large triangular tooth, and between this and the apex there is a smaller tooth; free chela with two stout teeth placed close together and another much smaller one a little in advance of these (fig. 14*d*). Capitulum, epistome, frontal bristles as in the male.

It seems likely that this mite is a shore-frequenting form of *H. marginatus*.

Dendrolaelaps n. gen.

Shape subquadrate. Dorsal shield divided near the middle. Sternum separated from the ventro-anal shield. The latter is very large, incised on the front margin, and in the male sex it is continuous with the second dorsal shield. In the male the second legs are very stout, and the tarsus is armed on the inner side with a stout, sharply pointed spur; ambulacra present on all legs. Male chelicerae with a long process. Epistome trispinous. Type species *D. Oudemansi* sp. nov.

This genus is allied to Gamasellus, Berlese, which was originally described as a subgenus of Cyrtolaelaps. The presence of a strong tarsal spur, and the fused ventro-anal plates would appear to distinguish it from that genus.

Dendrolaelaps Oudemansi n. sp. (Pl. VI, fig. 15*a–d*.)

A small species which greatly resembles *Gamasellus captator* (Berlese) in superficial appearance, especially in the shape and hair armature of the body.

Male (fig. 15*a*).—Length 484μ; breadth 253μ. The sternum is narrow in front, with a cup-shaped hollow for the genital foramen, ending in a pointed extremity at the end of the last pair of coxae; sides strongly produced between the second and third legs, and to a lesser extent between the two last pairs of legs, hair armature consisting of five pairs of short spines. Immediately behind the sternum is a pair of small, triangular plates,

each with a hair, and behind these are two small plates placed transversely. The ventro-anal shield is of peculiar structure, it is very large, and is certainly continuous with the second dorsal shield; its anterior margin is incised, leaving a wedge-shaped piece projecting from the centre of the shield. The peritreme runs in a sinuate line close to the body margin, stigma opposite the last acetabula.

Capitulum transverse, hinder margin strongly convex, and there are four pairs of hairs on the maxillary plate; the lobes are rather club-shaped with pointed extremities. Epistome trispinous, central spine shorter than the others. Chelicerae (fig. 15*b*), the free chela is greatly swollen at the base, and the claw-like terminal part is without teeth, a very long, slender process springs from the base, it is like that of *Gamasellus captator*, but its extremity is not curved round, as it is in that species, but is continued on a sinuate line; fixed chela with one strong tooth. Palps small and rather stout, inner side of last segment with a bifurcated spine at the base. Legs short and robust, second pair extremely thick, femur with a strong curved spine, patella and tibia with a small tooth; on the inner side of the tarsus (fig. 15*c*) there is a stout knife-like spur with a pointed extremity reaching as far as the end of the segment; fourth leg stouter than the third, upper side of femur with two stout hairs.

Female.—A figure of what I believe is the female of this species will be found on Pl. VI, fig. 15*d*. The length is 352μ and the breadth 154μ.

Localities.—Found under bark of decayed trees in the Westport demesne in July; the above-mentioned female specimens occurred on fallen pine-cones on Achill Island in September. I have also found the male under bark of fir trees at Friarstown in the Dublin mountains during April and at Drimnagh near Dublin in January.

Family LAELAPTIDAE.

Laelaps (Eulaelaps) stabularis C. L. Koch.

A number of specimens, including both young and adult forms, were found on a field mouse caught on Clare Island by Dr. Patten.

Distribution.—Europe, parasitic on rodents.

Laelaps (Eulaelaps) agilis C. L. Koch.

A single specimen of this species occurred in the same habitat in company with the preceding species.

Distribution.—Widespread in Europe.

Laelaps (Pseudoparasitus) meridionalis G. et R. Can.

The Bill Rocks off Clare Island, in debris from nests of sea birds. I have also found this mite in an ant's nest (*Formica fusca*) at the Scalp in county Dublin, possibly an accidental occurrence. Oudemans suggests (**74**, p. 29) that as in the male of this species the second legs are much stronger than the others it should be referred to the family Gamasidae instead of to the Laelaptidae, and proposes a new genus, Pseudoparasitus, for its reception.

Distribution.—Berlese records this species from central and southern Europe.

Laelaps (Ololaelaps) tumidulus C. L. Koch.

Females of this common species were found amongst moss on Clare Island in August; also on Achill Island in September.

Distribution.—A widespread European species.

Laelaps (Ololaelaps) confinis Berl.

Found amongst moss on Achill Island in November.

This species is briefly described by Berlese (**6**) as follows: "Facies *L. placentulae* Berl. sed setis corporis, praecipue posticis, minimus. Foem. tantum nota. Ad 750μ. long. (maior quam *L. venetus* Berl.)" There is little doubt that a female specimen collected in the above-mentioned locality is to be referred here. Its length is 742μ, and the hairs on the upper surface of the body are decidedly shorter than in *L. placentulae*: I may add that the outline of the body is more spherical. This species may be easily overlooked as *L. tumidulus* Koch.

Distribution.—Collected by Thor in Norway.

Laelaps (Hypoaspis) oblongus sp. nov. (Pl. VI, fig. 16.)

The following is a short description of a Laelaps which was found under bark of decayed trees in the Westport demesne during the month of July. It is allied to *L. myrmecophilus* Berlese, an ants' nest species, but differs in form, in the presence of a prolonged peritrematic shield, as well as in other characters.

Female (fig. 16).—Shape oblong ovate (length 691μ, breadth 384μ), shoulders fairly well marked. Dorsal shield almost entirely covering the upper surface, with scale-like markings, which are more distinct and tend to become hexagonal towards the side margins; the hair vestiture is scanty, frontal bristles strong. The sternum is wide in front, hind margin straight reaching a little beyond the middle of the second acetabula. The genito-ventral plate is large and trapezoidal, much as in *L. myrmecophilus*, it is

devoid of hairs except for two pairs placed on the actual margins of the plate. Anal shield triangular (breadth 140μ), pedal plates well developed, enclosing the last pair of acetabula; peritreme slightly waved, strengthened in its outer side by a chitinous plate which is prolonged well beyond the last acetabula.

The capitulum is transverse, end margin rounded, central part of the maxillary plate produced, lobes small and straight, and there are four pairs of hairs, one pair set further back near the lateral margin. Epistome hood-like, indistinctly serrated; chelicerae, fixed chela with four teeth, two of these much stronger than the others, and on the free chela are two strong teeth placed rather close together. Palps small and slender, length about 260μ, of the usual laelaptid type. Legs long and robust, length of last pair 528μ. An immature specimen occurred with the adult, it is small and transparent (length 665μ, breadth 358 μ).

Laelaps (Hypoaspis) ovatulus sp. nov. (Pl. VI, fig. 17*a*, *b*.)

This species is closely allied to the preceding in most of the details of its structure, the following differences may be noted:—

Female (Pl. VI, fig. 17*a*).—The size is smaller (length about 550μ, breadth 297μ), and the shape is more regularly oval. Dorsal shield similarly sculptured, but narrower, leaving more of the body margin uncovered. Sternal shield narrower in front, hinder margin rounded. The small jugular plates are united by a porous chitinous plate. Peritreme not bordered externally, post-stigmatic part continuous with the outer margin of the pedal plates as it is in *L. oblongus*. The epistome is wide, but little produced in the centre and very minutely serrated on its front margin.

Chelicerae (fig. 17*b*), fixed chela with two strong teeth and in front of the distal one is a row of four or five minute, closely set teeth; free chela with two widely separated teeth. Legs comparatively shorter, basifemur of second pair with a short, stout spine near the centre of its ventral surface, the posterior tarsi are also less elongate.

Locality.—Found in the flowers of Campanula on the sandhills at Mulranny in September.

Laelaps (Hypoaspis) acutus Michael.

Mulranny, in nests of the ant *Myrmica scabrinodis* under stones, September.

Distribution.—Austria (Tyrol, in ants' nests, Michael). Probably widespread in Europe, though Berlese says it has not been found in Italy (12).

Laelaps (Hypoaspis) longipes sp. nov. (Pl. VI. fig. 18*a–b*.)

This is a long oval, weakly chitinized species with a rather dense hair vestiture, and the male chelicerae are peculiarly armed.

Male (fig. 18*a*).—Shape an elongate oval, colour very pale yellow. Length about 742μ, breadth 384μ. Dorsal shield entire, widest at the shoulders, narrowing to a blunt point posteriorly, surface smooth, frontal bristles stout and finely setose. Hair armature rather long and dense. The fused ventral plates are of the laelaptid form, narrower and more pointed posteriorly than the dorsal shield (indicated by dots in drawing), hairs on the sternal part long. Pedal-plates present, but weakly developed; peritreme bent slightly inward towards the stigma.

Capitulum distinctly transverse, with four pairs of long, finely setose hairs on the maxillary plate, three pairs of these are grouped at the base of the maxillary lobes, the latter are straight. Epistome produced at centre, but not strongly so, margin serrate. Chelicerae, free chela with a strongly curved apex and one triangular tooth, the male process projects slightly beyond the end of the segment, and sends off a short spur which, in dorsal view, is seen to be directed upwards; fixed chela without teeth, and with a marked concavity for the reception of the tooth on the free chela (fig. 18*b*). Palps rather long and slender, on the ventral surface the first segment has two strongly setose hairs, the second segment has a stout setose hair both on its outer and inner side near the apex, third segment with two stout curved spines, fourth segment with a long ventral hair, and on its upper surface one or two very stout spines project over the last segment. Legs very long, the approximate lengths are 742μ, 540μ, 563μ, 793μ, with long hair armature, tarsi of last pair elongate.

Locality.—There is no note as to the actual habitat in which this species occurred, except that it was found in the Westport district in July.

Laelaps (Cosmolaelaps) vacuus Michael.

Occurs commonly at Mulranny in nests of the ants *Lasius niger* and *Myrmica scabrinodis*.

Berlese has described two varieties of this species. The Mulranny specimens vary a little in colour and size; yet, I believe, they are all referable to the type form.

Distribution.—Probably widespread in Europe; has been recorded from the Austrian Tyrol, Italy, and Britain.

Laeleps (Cosmolaelaps) styliferus sp. nov. (Pl. VI, fig. 19*a–c*.)

Allied to the preceding species, but it is smaller, and the male armature of the legs and palps is different.

Male.—Length 473*u*, pale straw colour. Second leg very stout, trochanter armed on its outer side with a strong spur (fig. 19*a*), fourth pair (fig. 19*b*) equally stout, seen from the under side the corners of the trochanter are slightly produced and spur-like, the end margin of the patella has a short stout spine, which is apparently much stronger than in *L. vacuus*; tibia with three well-marked prominences. Chelicerae small (fig. 19*c*), free chela with two very distinct teeth, fixed chela with a strong tooth, the male appendage is comparatively straight with a tooth-like process near apex, thence strongly narrowed. Near the middle of the ventro-anal region there is a long dagger-shaped process which is directed forwards, and reaches to about the middle of the last pair of acetabula.

A female specimen found in the same nest probably belongs to this species. The length of the body is the same (473μ). The genital plate is of uniform breadth, and its truncated hinder margin lies close to the anal shield.

Locality.—Found in a nest of the small yellow ant *Lasius flavus* at Mulranny in September.

Laelaps (Cosmolaelaps) claviger Berl.

I have found females of this well-marked species at Lucan and Howth in Co. Dublin, and in moss received from Birr, King's County, in November.

Laelaps (Oolaelaps) montanus Berl.

Mulranny, females found in nests of the ant *Formica fusca*, in September.

A few specimens of a Laelaps found on the lower slopes of the Curraun mountains are to be referred to the present form which does not appear amongst the recorded British species of ants' nest mites. It is closely allied to *L. oophilus* Wasm., but the smaller size (484μ, in the Irish specimens) more elongate chelae, and the somewhat longer legs, serve to distinguish it from that species.

Distribution.—With *Formica fusca* in Italy (Berlese **12**).

Seiulus.

The acari belonging to the Seius group of the family Laelaptidae are, as regards their genera, badly in need of revision. It seems clear that the generic name Seius must be restricted to Koch's *Seius togatus*, a peculiar form which happens to be the first species described by Koch under that genus. Berlese has recently founded a new genus Ameroseius (**2**, p. 258)

without any diagnosis, but *Seius echinatus* Koch was indicated as the type-form. This seems to be an unfortunate selection for the reason that it is admittedly synonymous with *Seius hirsutus* Koch, and Berlese had already proposed the name Seiulus (1, Fasc. xli, n. 3) for the *nympha generans* stage of that species. As a matter of fact Koch's *Seius hirsutus* has been selected as the type species of no less than *three* genera, these are, Seiulus Berlese, Echinoseius Ribage, and Ameroseius Berlese.

In the following paper only two genera are made use of in the *Seius* group, namely, Paraseius Trägardh (88. p. 432). and Seiulus Berlese. To the first of these are referred three species, with the undermentioned characters, for which *Ameroseius italicus* Berlese may well serve as a type. Trägardh selects *Seius mollis* (Kramer) as the type of the genus, but this species belongs to a different genus (Epicrius).

I have found three species of Paraseius in Ireland, two of these occurred amongst wet moss growing on stones in mountain streams, and the third (*P. serratus* sp. nov.) is common in very wet sphagnum, also on mountains. In all probability the peculiar armature of the acetabula is an adaptation to a semiaquatic habitat, as it is quite different from that of the typical Seiulus, and reminds one of the ambulacra of certain gamasid mites found living between tide-marks on the sea-shore.

Seiulus spathuliger (Leonardi).

Achill Island, not uncommon in moss, November.

The original description (39, p. 6) of this well-marked species may be supplemented in a few particulars. The Achill specimens measure about 396μ by 253μ. The dorsal plate is large and has serrated margins, anterior surface with granules which tend to form short transverse ridges: hairs ornate, those of the hinder part of the plate are broad, with a median keel and deep pectinations, the last three pairs of the marginal series are strongly clavate and stand out conspicuously from the end margin of the body; the latter is distinctly crenulate. Ventro-anal plate completely covering the epigastric region, the hinder part of the shield is granulated. Tritosternum feebly developed with two pairs of lateral spines close to the filaments. The peritreme is strengthened by a porous shield, and its canal lies close to the acetabula.

Capitulum rather short and broad; epistome trispinous. Fixed chela with four teeth almost equidistant from one another, and there are two teeth on the free chela. In his description of the jaw armature Leonardi evidently includes the apical tooth, as he mentions one more tooth for each chela.

Distribution. — Italy (found on plants, in moss, and in decayed wood, Leonardi). Holland. Berlese suggests that the species described by Oudemans (**74**, p. 17) under the name of *Seiulus plumosus* represents two distinct forms, one being identical with the present species (**16**, p. 276).

Seiulus remiger (Kramer). (Pl. VI, fig. 20.)

Achill Island, the female occurred commonly in the hollow stems of a large agaric at Glendarary in September; also at Mulranny. I have found both sexes at Glendalough, Co. Wicklow, under the fungus-grown bark of decayed birch trunks during the month of November.

This beautifully sculptured mite does not seem to have been noticed since Kramer described it under the name *Gamasus remiger* (**36**, p. 93), in reference to the curious oar-like hairs on the end margin of the body. It undoubtedly belongs to the Seius group, and as the male is undescribed it may be useful to give a short account of the species.

Female (fig. 20).—length about 665μ, breadth 378μ. Shape sub-oval, shoulders but slightly marked, fore body strongly produced, frontal bristles small. On the dorsal shield there are two circular pits, surface with distinct network pattern, also with squamous and granulate markings. Hair armature feeble, the marginal series increases in length towards the hinder corners of the body where the hairs spring from tubercles, the last pair of hairs are long, and have a narrow apical blade. Sternal and genital plates of the usual laelaptid type, the latter reticulated in front. Ventro-anal plate large and rotund, lying in front of it is a transverse row of six small plates. The peritreme is protected by a narrow chitinous border fusing beyond the stigma with the pedal plates.

Capitulum longer than broad, hair armature as usual, maxillary lobes small. Epistome trispinous, the lateral spines are minutely pectinated on their outer margins, and the central spine is longer than the others, with a widened and spinous extremity. Each chela of the chelicerae is furnished with two teeth. Palps normal. Legs of moderate length, spine armature rather weak, in part pedunculate, a pair of long, up-curled hairs spring from the upper side of the tarsus of the last three pairs of legs.

Male.—Smaller, length about 517μ, breadth 286μ. Sternal plate reaching the end of the fourth coxae, with five pairs of short hairs; genital foramen rather large. The ventro-anal shield is very large, and the two inguinal plates, which are separate in the female, are fused with its front corners.

Capitulum more quadrate. Sexual differences are noticeable in the chelicerae, the free chela has only one tooth, and a sinuate process of uniform

breadth springs from its base and extends well beyond the apex of the segment, fixed chela armed with two teeth.

Distribution.—Germany (under fallen leaves, Kramer).

Seiulus minutus sp. nov. (Pl. VIII, fig. 31.)

The following is a short description of a Seiulus found amongst sphagnum moss from Croaghmore Mountain, Clare Island, during the month of August. It is apparently an undescribed species, remarkable for its small size and peculiar shape, and the distinct puncturation which greatly resembles that of one of the Oribatidae, *Nothrus monodactylus*, also found in sphagnum. Owing to the small size and delicate structure of the single specimen it did not seem advisable to risk the dissection of the mouth parts, so that the structure of the jaws and the epistome are not included in the description.

Female.—The length is about 286μ, breadth 165μ. Colour faint yellow, translucent. The body is rounded in front, side margins sub-parallel, end margin truncated. Dorsum with distinct light-refracting punctures, and irregularly shaped markings towards the front and sides; there are two double rows of short hairs on the back, and a somewhat stronger marginal row springing from rather widely separated serrations on the sides of the body.

Sternum and genital plate of the usual laelaptid shape, the latter is long and narrow; anal plate of moderate size, broadly trapezoidal, lying close to the end of the body with about eight pairs of neighbouring hairs which are stronger than those of the upper surface. Peritreme well developed, stigmal expansion large, extremity partly enclosing the last pair of coxae, strengthened on its outer side by a narrow chitinous plate.

Capitulum large and cup-shaped, maxillary plate with three pairs of hairs, one pair placed close to the small maxillary lobes. Palps comparatively large, armature normal. Legs, especially the last three pairs, very robust, with strong hairs; upper lobe of the ambulacra hood-like, with uninterrupted margin, immediately over the small ambulacra of the first pair of legs is a long hair with a distinctly lanceolate extremity.

Seiulus levis Oudms. et Voigts. (Pl. VI, fig. 21).

Lough Fenagh and Delphi, ♀ ♀ in moss, September; Croaghpatrick, ♀ amongst sphagnum, October.

A preliminary description of this species appeared in the "Zoologischer Anzeiger" for 1904, and a fuller account with figures appeared in a later paper (**75**, p. 232). *S. levis* is remarkable for its oval shape, comparatively

smooth surface, which is but faintly sculptured with scale-like markings, and the hair vestiture is very scanty. The ventro-anal shield is large and rounded posteriorly, and on the anterior margin there is a wide emargination which receives the hinder margin of the genital plate.

Distribution.—Germany (Bremen).

Seiulus hirsutus (C. L. Koch).

Found amongst moss at Portmarnock, County Dublin, in January.

Seiulus muricatus (C. L. Koch).

I have a single specimen of this species, found at Glendalough, County Wicklow, in November.

Euphis ostrinus (C. L. Koch).

Achill Island in moss and under decayed fir cones lying on the ground, September; Knappagh Wood near Westport, in moss, August.

This little species is conspicuous in the field on account of its bright red colouring and polished surface.

Distribution.—Widespread in Europe.

Paraseius Trägardh.

Epistome trispinous. Sternal, genital and ventro-anal plates of the usual laelaptid type. The peritrematic and outer pedal plates are very highly developed, and are fused together. Legs long, tarsi of the last pair attenuated Ambulacra consisting of a lanceolate upper lobe, a pair of narrow membranous lobes, and a pair of bristle-like lateral blades; there are also two long tarso-ambulacral hairs.

Paraseius italicus (Berl.). (Pl. VI, fig. 22*a–b*.)

A single ovigerous example of this species occurred amongst moss gathered from partly submerged stones in a stream on the slopes of Croaghpatrick in July.

Berlese gives but a short description (**9**, p. 234) of this acarid, two figures of the upper and under surface were published in a later reference (**10**).

The length of the Irish specimen is 561μ, breadth 385μ. The dorsal plate is distinctly reticulated. The fused extremities of the pedal and peritrematic plates project in a triangular shape a little beyond the hinder margin of the genital shield. Anal plate very large. The legs measure approximately 572μ, 451μ, 440μ, and 572μ.

Distribution.—Northern Italy (found under dead leaves on a marsh, Berlese).

Paraseius serratus sp. nov. (Pl. VI, fig. 23*a–d*.)

As far as one can judge from a short description this species is allied to a Norwegian form *Ameroseius borealis*, Berlese (6, p. 259). It is a narrow, straw-coloured mite, which would appear to possess characteristics in its small size, the sculpturing of the dorsal shield, the form of the pedal plates, and in other details.

FEMALE (fig. 23*a*).—Length 440μ, breadth 286μ. Shape a long oval; dorsal shield large, surface transversely wrinkled in front with angular marking at the shoulders and towards the sides, which are distinctly serrated. Central hair armature weak, becoming stronger towards the margins of the shield where the hairs are adpressed; frontal bristles strong. Sternal plate wide in front, hinder corners rounded. There are two small metasternal plates, each carrying a hair. Ventro-anal plate comparatively large, almost circular, with three pairs of marginal hairs. The united pedal and peritrematic plates are produced in a broadly rounded extremity well beyond the last acetabula; peritreme sinuate with a post-stigmal continuation bordering, and apparently fused with, the outer margin of the pedal plates.

Capitulum transverse, hinder margin rounded, hairs normal; epistome (fig. 23*d*) trispinous, lateral spines with bifurcated tips; maxillary lobes lanceolate and well separated. Basal segment of palp swollen, armed with two hairs, the inner one long and undulate. The tritosternum is remarkable, instead of the usual narrow base and long filaments, the latter are welded together, terminal part ciliated at the sides, with a brush of long bristles at the extremity.

The legs are comparatively shorter and stouter than in *A. italicus*, the lengths are about 528μ, 418μ, 319μ, and 396μ. Ambulacra (fig. 23*e*) with the upper lobe more acute, and the tarso-ambulacral hairs are much shorter. The fixed chela has a group of at least five distinct teeth, while the free chela has only one strong tooth.

Locality.—Found commonly in sphagnum, gathered on the slopes of Croaghpatrick at an elevation of about 600 feet, during the month of October.

Paraseius tenuipes sp. nov. (Pl. VI, fig. 24*a–e*.)

The chief points in which the species differs from *P. italicus* are, the larger size, the form of the pedal plates, the smaller anal shield.

FEMALE (fig. 24*a*).—Shape a broad oval, length 742μ, breadth 490μ. Dorsal shield reticulated, with rather strong marginal hairs; there is a circular prominence not far from its hinder margin. The sternum is very

wide, not quite reaching the middle of the third coxa, outline of the side margins interrupted at the middle, hinder margin notched. Genital plate rather broad, end margin lying a little beyond the extremities of the pedal plates; ventro-anal shield semicircular, smaller than in *P. italicus*, and further removed from the genital plate, lying between the two, are three pairs of very small chitinous plates. Pedal plates large, just beyond the last acetabula they turn inwards, forming a truncated posterior margin. The peritreme is very wide, sinuate, with a post-stigmal continuation reaching the end margin of the pedal plates. Tritosternum (fig. 24*b*) with a long fused basal part, filaments short and distinctly spinous. Chelicerae moderately long and slender, free chela with two very feeble teeth close to the apex, fixed chela without distinct teeth (fig. 24*c*). Maxillary plate with four pairs of hairs, lobes straight and slender. Legs very long, the respective length about 737μ, 561μ, 550μ, and 780μ, tarsi of last pair much attenuated. Ambulacra very like those of *P. italicus*.

Locality.—One example found amongst moss on a stone in a mountain stream at Glencree, Co. Dublin, May.

Family CELAENOPSIDAE.

Celaenopsis cuspidata (Kram.).

Last September I found a single example of this remarkable species under decayed bark at Finglas, in County Dublin.

Family ZERCONIDAE.

Zercon triangularis C. L. Koch.

Common amongst moss from Knappagh Wood, near Westport; Croaghmore, Clare Island; and on Achill Island.

The Irish specimens are a little more ovate than those figured by Berlese, resembling in this respect a Scandinavian form recently described by Dr. Trägardh under the name *Z. curiosus*, of which he remarks: "Ahnlich wie *Z. triangularis* K. geformt, aber verhaltnismassig breiter mit mehr abgerundeten hinter Ecken" (**88**, p. 441). Some of the specimens have the two median hairs on the hinder margin of the last dorsal plate longer and stouter than in the ordinary form, approaching the variety *caudatus* Berlese, described by him as of frequent occurrence in moss on high mountains (**15**, p. 246).

Distribution.—Recorded from Germany and Italy, and doubtless a common species in western Europe, though it does not figure in Oudeman's Dutch list.

Zercon trigonus Berlese (Pl. VI, fig. 25).

A single example of this beautifully formed mite occurred amongst moss sent from Birr, in King's County, during November. It may be distinguished from the preceding species by the circular pits on the dorsum, and by the crenulate hinder margin of the body. Berlese found it amongst mosses in Italy (**6**). A sketch of the dorsal surface is given in the present paper.

Epicrius geometricus Can. et Fanzago.

Found amongst moss from Knappagh Wood, near Westport, in August.

Distribution.—A widespread European species, has been recorded from Germany, Holland, Italy, and Britain (Lincolnshire, Dr. George).

Asca affinis Oudemans.

Nymphae, apparently referable to this form occurred abundantly in a sand-pit used for macerating bones, Dublin.

Family THINOZERCONIDAE, *n. fam.*

On the coasts of Mayo and Dublin I have found between tide-marks both sexes of an acarid, which does not appear to have been previously observed. This interesting form clearly belongs to the Gamasoidea; yet its structural characters are such that it is not possible to refer it to any one of the described genera, and I believe it should also be regarded as the type of a new family allied to the Uropodidae and the Zerconidae. Affinities with the last-named family are apparent in the arrangement of the sternal and ventro-anal shields in the male, in the position of the male genital foramen it resembles both of these families.

The presence of two paired, sternal shields in the female is possibly the most remarkable characteristic of the present genus. Berlese has described an exotic form, Heterozercon, in the female of which there are two small sternal plates, however, the two forms are otherwise quite distinct. The dorsal position of the peritreme is also very remarkable. As a matter of fact there is scarcely room for the peritreme on the ventral surface of the body owing to the wide sternal area, the unusually large size of the acetabula, and the presence of outer pedal plates. The spine armature of the legs is remarkably varied.

In order to indicate the position of the family Thinozerconidae I have prepared a synoptical table of the known European families which is necessarily based on Berlese's "Conspectus familiarum" (**2**, p. 15) in which he recognizes two main divisions of the Gamasoidea differing in the position of the male genital foramen.

Dr. Oudemans has described two additional European families, the

Metaparasitidae and the very interesting Rhodacaridae[1] in which the male genital foramen is placed in the sternal shield at a little distance from its anterior margin, thus forming a link between Berlese's two main groups of the Gamasoidea. There would appear, however, to be some doubt that this is true of the first-mentioned family, as Berlese considers Metaparasitus to be identical with Gamasolaelaps, and the male foramen is in the usual frontal position in that genus. On this account, the family Metaparasitidae is omitted from the following table, which now numbers ten families :—

1. Male genital foramen placed in the sternal shield, . . . 2
— Male genital foramen on the anterior margin of the sternal shield . 5
2. Female genital foramen large, protected by a chitinous plate enclosed in the sternal shield.[2] Leg pits (*fossulae pedales*) present in many genera, ... *Uropodidae.*
— Female genital foramen a transverse incision between the sternal and genital plates. Leg pits absent. Parasitic on arthropods. *Antennophoridae.*
3. Sternal shield entire, two dorsal plates present in both sexes, peritreme ventral, ... *Zerconidae.*
— Female with two, paired, sternal shields (fused in male), and three dorsal plates, peritreme dorsal, *Thinozerconidae* n. fam.
4. "Body divided into two distinct regions: a true thorax and a true abdomen" (Oudemans), male genital foramen in the sternal shield near its anterior margin, ... *Rhodacaridae.*
5. Female genital shield entire (*Laelaps*), or, only partly divided in the middle line (*Gamasus*) 6
— Female *area genitalis* formed of two hinged lateral plates, . . 10
6. Male with second legs much thicker than in the female; femur, patella, and tibia more or less armed with processes, *Gamasidae.*
— Second leg not, or but little, thickened in the male, . . . 7
7. Adults well chitinized and free living (a few species of *Laelaps* are parasitic on rats, mice, and voles), . . . *Laelaptidae.*
— Adults less chitinized, entirely parasitic on vertebrates, . . 8
8. Stigma dorsal, ... *Pteroptidae.*
9. Stigma ventral, ... *Dermanyssidae.*
10. A post-anal plate is present, ... *Celaenopsidae.*

[1] The type species, *Rhodacarus roseus* Oudemans, occurs in Ireland. I have found the adult female under stones, amongst dead leaves, in the Tolka Valley, near Dublin, during the month of February. As far as I am aware this is the first record of its occurrence since Oudemans described it from the Netherlands (**74**, p. 42).

[2] In a few forms of the Uropodidae belonging to the genera Uroseius, Trachytes, Celeano, and Polyaspis the female genital foramen is not enclosed in the sternal shield.

Thinozercon n. gen.

The dorsum is protected by three dorsal plates (more or less fused in the male). There are two, paired, sternal plates in the female (fused in male), a fused ventro-anal shield and two inguinal plates. Pedal plates well developed, uniting behind the fourth acetabula. Peritreme placed on the dorsal margin of the body. Epistome unispinous, with strong lateral teeth. Legs incrassate, ambulacra present on all pairs. Male genital foramen in the centre of the sternal shield, the latter is entire, not joined to the ventro-anal plate, which is large, and includes the fused inguinal shields. Second legs of male without special armature. Type species *Thinozercon Michaeli* sp. nov.

Thinozercon Michaeli sp. nov. (Pl. VII, fig. 26*a–m.*)

Male (fig. 26*a*).—Length 1075μ, breadth 568μ; colour, golden-brown; shape, long oval, sinuate in front of the shoulders; the latter are low and rounded, anterior extremity produced in a small prominence, carrying two broad serrated bristles. Dorsal surface protected by one fused shield, in which can be traced the outlines of three plates which are separate in the female; moderately convex, with three pairs of circular pits. The dorsal plate folds over and protects the anterior ventral margin. Epidermis finely punctured, and closely areolated. There is a double row of short spines in the middle line, and a row of sub-marginal spines, end of the body set with adpressed bristles, some are feathered. Sternal plate large, fused with the first and second endopodial plates, front margin wide, undulate; the side margins send sharp processes between the last three pairs of legs; the end of the sternum tapers to an obtuse extremity between the fourth acetabula. There are five pairs of very short hairs on the sternum. The pedal plates form a continuous line on the outer side of the leg bases, curving inwards behind the last acetabula, where they form a pair of plate-like expansions fused with the last pair of inner pedal plates. A large ventro-anal shield occupies the hinder part of the body, leaving a very narrow margin between it and the dorsal shield, surface punctured and reticulated. The anal aperture is on a raised cribrum. The peritreme is of remarkable structure, originating on the front of the body, it follows the upper margin to a point opposite the interval between the third and fourth legs, it then curves round on itself, so that the stigmal extremity resembles an inverted interrogation mark. Base of tritosternum wide, stem stout, dividing to form a pair of long pectinated filaments. On the inner side of these, at the base, there is a short pointed process. The genital foramen is a small circular aperture between the third

legs; it is protected by two minute semicircular plates with thickened outer margins; the first of these carries a pair of stout bristles (fig. 26*b*).

Capitulum transverse; maxillary plate with three pairs of long bristles; close to the base is a series of raised semicircular ridges, armed with minute denticles running obliquely from the middle line of the plate; maxillary lobes of the usual triangular shape; on the inner side of these there are two long bristle-like processes, and between these is a pair of long maxillary processes which are spinous at their extremities. The epistome (fig. 26*c*) ends in a stout central spine, with a few lateral teeth, the side margins also carry strong spines. Chelicerae (fig. 26*d*), fingers comparatively straight, fixed chela with three teeth, one peg-like, free chela with two or three, more or less, obsolete teeth and a minute *pilus dentarius*. Palps stout and of average length; ventral face of first segment, with a distal prominence, carrying a stout spine, and near the base a bristle, both minutely pectinated; second segment, three dorsal hairs, a long inner spine, and a ventral bristle; third segment, three or four dorsal hairs, and two stout inner bristles; fourth segment, six or seven dorsal hairs, and there is a distal row of long ventral hairs; fifth segment, numerous bristles, a double claw-like spine.

Legs comparatively long; last three pairs incrassate, armed with simple and modified hairs; these consist of adpressed hairs, broad spines, with toothed extremities, and stout peg-like teeth, the last two kinds often arising from distinct peduncles (fig. 26*e–h*).

The ends of the tarsi (except first pair) carry three pairs of long pectinated hairs. The peduncle of the ambulacrum (fig. 26*i*) is broad, and opens out, dorsally, into a pair of sharply pointed flaps. On the ventral extremity are two lanceolate bristles which project beyond the two upper membranous lobes; the latter vary *inter se* in breadth and in the depth of the median incission. The ambulacra of the first pair of legs resemble those of the other pairs, except that they are reduced in size, especially the peduncle, and the pectinated tarsal hairs are absent.

Female (fig. 26*g*).—Larger than the male; length, 1280μ to 1332μ; breadth 768μ. Shape and sculpturing as in male; there are three separate dorsal shields. The large central shield covers most of the dorsum; it is separated from the narrow anterior marginal plate by a fissure of thiner chitin which runs obliquely on each side of the body to a point just beyond the stigma. Immediately behind the large dorsal shield is a small crescentic plate, on the posterior margin of which are three pairs of pectinated bristles springing from tubercles. Ventral surface, sternal area (fig. 26*k*), with two paired plates, slightly separated, in the middle line of the body, each narrowing into a bluntly pointed extremity which does not reach the hinder

margin of the second coxae. The thickened front margin of each of these plates is very wide, and carries a single hair. The pedal shields are fused *inter se*, enclosing the three last pairs of legs. The *area genitalis* is trapezoidal, and lies opposite the third and fourth coxae. The anterior margin is rounded, anterior part protected by a triangular shield, the pointed apex of which reaches to about the middle of the genital area; the side margins are strengthened by narrow plates, hinder margin not chitinized. Ventro-anal plate much smaller than in the male, long oval, narrowed in front, densely areolated and punctured, armed with about four pairs of small bristles, and there are two pairs of strong pectinated hairs on the hinder margin. On each side of the ventro-anal shield is an oval inguinal shield. Peritreme (fig. 26*l*) as in male, tritosternum with a hatchet-shaped base, much larger than in the male, filaments long and finely pectinated.

Capitulum cup-shaped, maxillary plate with three pairs of long, widely separated hairs. Epistome, palps, and mandibles closely resembling those of the male. The legs are longer and less incrassate, their respective lengths are 814μ, 748μ, 737μ, and 902μ.

Nymph (fig. 26*m*).—An immature example, representing an early nymphal stage, of the female was found at Westport in July. It measures 998μ in length, by 614μ in breadth. The general structure greatly resembles that of the adult, except in the plate armature of the body.

The dorsal surface is protected by *five* plates arranged as follows:—two narrow marginal plates running from the chitinized frontal extremity to the point where the peritreme turns inwards on the dorsum; a large anterior shield, which is somewhat cone-shaped, containing the first two pairs of dorsal pits; at a little distance from this is a smaller semicircular plate, emarginate in front, enclosing the third pair of dorsal pits, and immediately behind this a small terminal plate similar to that of the adult. There are indications that in the still younger nymph there may possibly be three pairs of these central shields. Two sternal plates are present; they seem, however, to be fused on a chitinous base which reaches beyond them, and is deeply excavated on its hinder margin, so that the nymph differs in this respect from the adult female. There is a long ventro-anal shield, and on each side of this two circular inguinal shields. The legs and ambulacra are like those of the adult.

Localities.—Found in some numbers under stones on the sea-shore at Westport, County Mayo, in July (♂, ♀, and nymph). I have also found both sexes in a similar habitat, between tide-marks on the south shore of Howth, County Dublin, in the month of April.

Family UROPODIDAE.

Cilliba cassidea (Herm.).

Clare Island, in moss, March; Achill Island ♂ and ♀ in moss and under bark, September and November; Westport district, adults and nymphs in August.

Berlese describes two forms of this species which he separates as follows:—

"Dorsum glaberrimum, scutum genitale foeminae, nitidum 750μ. long... *Discopoma cassidea* G. et R. Can. (Herm.).

"Dorsum setosum, scutum genitale foeminae punctulatum. Ad 460μ. long. *D. cassidea* var. *minor* Berl." (2)

An examination of numerous Irish specimens shows the presence of hairs on the dorsum, and the female genital shield is distinctly punctulate. In the matter of size, however, they agree with the typical form, measuring from 744μ to 921μ in length. Both sexes vary equally in size. Possibly these specimens may be referable to a large form of the species.

A few of the *nymphae homeomorphae* were also found. In these the broad marginal part of the body is imperfectly chitinized on the ventral side, forming three pairs of plates. The second segment of the first pair of legs is without the distal spur which is always present in the adult.

Distribution.—Germany (Koch); Italy (Berlese); Holland (Oudemans, who records both the type form and the variety *minor* Berl.).

There is a difference of opinion amongst acarologists concerning the use of the generic names Cilliba, von Heyden and Discopoma, Canestrini for the preceding species (*cassidea* Herm.), a question concerning the validity of von Heyden's genera. Mr. Michael has dealt with the subject at length (**49**, p. 295) giving his reasons for the revival of certain of von Heyden's genera including Cilliba. Until the appearance of his valuable paper "Acari Mirmecofili," Berlese had consistently used Discopoma to include *cassidea* Herm. In that paper, however, he states that there is sufficient reason for the revival of Cilliba, with *cassidea* as the type, as indicated by von Heyden, thus agreeing with Michael's use of this name, while Kramer's "*Uropoda splendida*" is selected as the type of Discopoma. Berlese remarks "il genere Discopoma di G. et R. Canestrini, sembra avere realmente per tipo la *D. splendida*, almeno questa è la prima specie (sotto il nome *D. clypeata*), che i detti Autori illustrano." It is fortunate if, for this reason, both of these generic names can be preserved.

Cilliba vegetans (Duges).

Westport, found attached to a large Dor Beetle (*Geotrupes stercorarius*) in July.

This specimen is in the *nympha homeomorpha* stage, and agrees closely with the figure given by Oudemans of this form (**73**, pl. viii, fig. 35).

Distribution.—A widespread European species.

Discopoma integra Berl.

Clare Island, ♀ and *nympha homeomorpha* in sphagnum, July; Achill Island, females under bark, in decayed wood and in moss, September.

Not uncommon in these localities. The *nympha homeomorpha* is smaller (length 407μ, breadth 330μ) and less elliptical in shape than the adult female, an Irish example of which measures 440μ by 340μ. I have also found the female on decayed wood at Glendalough, Co. Wicklow. The male is unknown.

There is an error in the original description of this species (**15**, p. 244) which should be corrected. Berlese refers to the marginal plates of the dorsum as follows:—"Scutum dorsi marginale integrum, totum aeque chitineum, transverse striatulum." An examination of the Irish specimens shows that the marginal plates are not entire, and indeed Berlese's excellent figures of the species, published subsequently (**11**, pl. ii, fig. 18), make this point quite clear. These plates taper to a point a short distance from each other, leaving uncovered a small part of the posterior end of the body.

Distribution.—Italy (in moss at Vallombrosa, Palermo, Roma. Berlese).

Discopoma pulcherrima Berlese.

A single specimen of this handsome species occurred in a nest of the ant *Formica fusca* in a decayed birch stump at Glendalough, Co. Wicklow, last September, in company with *Uroobovella notabilis* Berl. It does not seem to have been recorded from the British Isles. Berlese found it in rotten wood, and also in ants' nests, though he does not mention the species of ant (**5**, p. 247).

Phaulocylliba Berlesii sp. nov. (Pl. VII, fig. 27*a–d*)

This genus was described by Berlese from Norwegian and Italian specimens in 1903 (**6**, p. 270), and *P. ventricosa* was indicated as the type species. The genus is briefly characterized as follows:—"Characteres generis *Discopoma*, sed scutum marginale dorsi omnino nullum. Scutum dorsuale medium ovale, sat a marginibus discretum. Metapodia ut in Uropodis. Fossulae pedales subevanidae."

The most interesting feature about this genus is the absence of marginal plates. On the Dublin coast I have found an undoubted species of Phaulocylliba, which from its much smaller size and peculiar habitat evidently represents an undescribed species.

Male (fig. 27*a*).—A small yellowish brown, oval-shaped species; the measurements are—length about 670μ, breadth 486μ. The dorsal shield is large, very finely punctured, and also with larger punctures. There is a double row of short adpressed hairs on the middle of the dorsum, and a few scattered hairs towards the sides. Marginal plates absent, so that the body margin from behind the shoulders is unprotected (fig. 27*b*) with seven or eight pairs of short spines, two pairs of these, at the end of the body, are longer than the others.

The ventral plate is large, and leaves uncovered a narrow body margin behind the last pair of legs. The *fossulae pedales* of the fourth legs are not strongly marked; their outlines run obliquely from the last acetabula and curve round to within a short distance of the body margin, remaining *fossulae* evanescent.

The peritreme starts a little in front of the second legs; curving outwards it lies along the margin of the body, and thence turns obliquely inwards reaching a point near the acetabula of the third legs. Genital foramen (fig. 27*c*) between the fourth acetabula, oblong, slightly flattened at each end; a pair of strong hairs spring from near its hinder margin. Camerostoma small. Base of tritosternum semicircular, end of filament three-branched.

Capitulum nearly square, maxillary plate with three pairs of short hairs along the middle line, and a pair of very long hairs on its front margin; outer lobes small. The under side of the first palp segment is swollen into a large rounded prominence which carries at its apex a two segmented process; the end segment is bilobed, and its inner lobe terminates in four or five curved bristles (fig. 27*d*), otherwise the palps are of normal structure. The chelicerae are withdrawn into the body cavity. Armature of legs much as in *Cilliba*; there is a small branched hair on the underside of the patella and tibia of the last three pairs of legs.

Locality.—Found under stones between tide-marks in Howth Harbour, Co. Dublin, towards the end of November.

Haluropoda n. gen.

In salt marshes both on the east and west coasts of Ireland there occur two species of the Uropodidae which would appear to be referable to an undescribed genus, intermediate in character between the genera

Discopoma and Uropoda, Auct. The generic characters are briefly as follows :—

Dorsal plates consisting of the usual large shield and two marginal plates which do not cover the posterior margin of the body, resembling the genus Discopoma in this respect. Ambulacra present on all legs, those of the first pair obvious, though smaller than the others. The *fossulae pedales* are sufficiently well developed, last pair without a separate groove for the reception of the tarsal segments (such as is found in Urodiscella and other genera). Metapodial line present, evanescent towards the middle of the body. Type species, *Haluropoda interrupta* sp. nov.

In order to indicate the position of this new genus I have prepared a table based on the characters of the dorsal plates and on the presence, or otherwise, of ambulacra on the first pair of legs. Mr. Michael has published a synoptical table of the then known genera in his "Notes on the Uropodinae" (**49**, p. 298), and more recently Berlese compiled a very useful table of the uropodid genera (**12**, p. 324). With regard to the ambulacra, Michael does not agree that their presence on, or absence from, the first pair of legs is a good method of dividing these genera, though "it may be preserved to differentiate smaller groups," yet it is undoubtedly a useful character, and cannot, in my opinion, be overlooked in the grouping of the genera.

First pair of legs without ambulacra—

Marginal shield entire, fused with the central dorsal shield, . . *Cilliba* (*Cillibano*) von Heyd.
Marginal shield interrupted, not covering the end of the dorsum . . *Discopoma* G. et R. Canestrini.
Marginal shields absent, *Phaulocylliba* Berl.

First pair of legs furnished with ambulacra—

Marginal shield interrupted, . . *Haluropoda* n. gen.
Marginal shield entire, . . [1]*Uropoda* Auct.

Haluropoda interrupta sp. nov. (Pl. VII, fig. 28*a–c*.)

Male (fig. 28*a*).—Length 866μ to 921μ, breadth 716μ. Colour light chestnut, shape sub-discoidal, produced to form the narrow anterior margin. Dorsal shield large, very finely punctured with small scattered hairs. The marginal plates are indistinctly punctured, and taper to a point at a little beyond the

[1] For the distinctive characters of the genera allied to the Uropoda of Auct., see Berlese's table (12 p. 325). They are Uroplitella *Berl.*, Urodiscella *Berl.*, Uroobovella *Berl.*, Urodinychus *Berl.*, and the myrmecophilous genera, Urotrachytes *Berl.*, and Trachyuropoda *Berl.*

third quarter of the body; in the cuticle of the uncovered part of the dorsum are about six pairs of hair-bearing pores; there are also a few fine hairs on the posterior margin. Ventral surface (fig. 28*b*) highly chitinized; in the epigastric region the metapodial line runs inwards from the margin of the body, immediately behind the last pair of leg pits, becoming evanescent towards the anal region. Leg pits well developed, consisting of single depressions in the integument The genital foramen lies between the coxae of the third legs, oval, occupied by two small crescentic plates, aperture pear-shaped. In the sternal plate on each side are three hair-bearing pores. Peritreme short, rising on the side margin of the body it runs along the mesopleural ridge, it then turns downwards for a short distance into the leg pit of the third leg. Tritosternum hidden by the first coxae, basal piece rudimentary, stem with a small branch on each side beyond the middle, apex very finely branched. Legs, first pair unarmed, coxae with inner basal prominence and outer incised lamellar plates. Femur of second pair carrying the usual spur, as in Uropoda, and also a smaller spine beyond the middle, the patella has a small distal spine, and the tibia is unarmed. Femora of the third and fourth legs with the pointed lamellae usual in the Uropodidae. Ambulacra of first pair of legs reduced, thin at the base, strongly thickened at the apex, in which the small, stout claws are deeply imbedded, ambulacra of the three posterior pairs, much as in Cilliba (fig. 28*c*).

The capitulum is broad and strongly convex below; maxillary plate, one pair of long bristles in front and three pairs of short ones in the middle. Maxillary lobes small; central processes consisting of two adjacent rods, bifurcated at their extremities. Epistome long and narrow, base with a few strong spines, densely pectinate at the middle, and the apex appears to be forked. Chelicerae drawn deeply into the body cavity, small; fixed chela with rounded terminal hood, there is a small prominence on the middle of the blade; free chela much shorter with a tooth-like process half way between the middle and the terminal tooth, or there may be scarcely any trace of armature.

Female.—Length 896μ. Apart from the genitalia, the armature of the second legs, and a few other points the female strongly resembles the male. The genital plate is large (176μ × 132μ), widely rounded in front and truncated at its hinder margin, coarsely granulated in front, and near the hinder margin there is a pair of minute hairs. The tritosternum differs from that of the male in having a large crown-shaped basal piece with strong lateral angles and a bluntly pointed central process. The ventral shield of the capitulum is less convex, with a pair of long hairs near the base of the maxillary lobes and three pairs of short hairs, arranged more or less in a line, behind these.

Localities.—Occurs commonly under stones on the sea-shore at and a little below high-tide mark, and also in salt-marshes. Westport, ♂, and ♀ with eggs July; Mulranny, ♂ ♀ and nymphs, September. I have found it in county Dublin at Howth and at Dollymount salt-marsh in November.

Haluropoda minor sp. nov. (Pl. VII, fig. 29*a–d*.)

Male (fig. 29*a*).—Length 614μ, breadth 460μ. Colour reddish-brown, shape oval. Dorsal armature consisting of a long oval central plate, and two marginal plates, which leave a small part of the end of the body uncovered. Central plate with exceedingly fine punctures and also with very coarse punctures; there are at least three double rows of piliferous pores as well as some scattered hairs. Marginal plates long, coarsely granulated, tapering to obtuse extremities which almost reach the end of the central shield, on the outer margin there is a row of hairs. Uncovered end of the body with a few hair-bearing pores. Imbedded in the side margins of the body are a number of modified hairs very similar to the T-shaped hairs found in the genus Trachyuropoda.

All the ventral plates are fused. Peritreme and leg pits very similar to those of the preceding species, hinder margin of last pair widely rounded. Genital area opposite the coxae of the third pair of legs, ovate, narrowed, and somewhat truncated in front (fig. 29*b*). Coxae of first pair of legs rather short, and strongly angled on the inner side, femur armed with a papilla, placed distally. The femur of the second pair carries a curved spur and in front of it two small round lamellae; there is a smaller spur on the patella. The third and fourth pairs, and the ambulacra, are of the usual uropodid type. Tritosternum, base small, main stem with a distinct branch near the middle on each side, extremity also branched.

Capitulum short and very broad, there are three pairs of small spines on the ventral surface, the middle pair, placed slightly in front of the palp acetabula, are stout and spur-like, and two very long bristles stand close to the bases of the maxillary lobes. Epistome and chelicerae similar to those of the preceding species. Palps short and stout, ventral surface of first segment with a distal prominence and two bristles, one long and extremely finely spinous; second segment with about four stout spines; the third segment (fig. 29*c*) is armed on its inner surface with a sharply pointed spur, and behind this spur there is a long sabre-like bristle, dorsal surface with two long spines. On the fourth segment there are six or seven dorsal spines, two of these spring from large pores, and on the ventral surface one very long bristle.

Female (fig. 29*d*).—Length 627μ, breadth 462μ, closely resembling the

male in general structure. Genital plate very large, of a regular oval shape, except at the truncated hinder margin, surface coarsely punctured. Tritosternum with crown-shaped basal piece, stem with a branch on each side, close to the base, extremity branched. The hairs of the maxillary plate are more slender. Palps as in the male except for the absence of the peculiar armature on the inner side of the third segment, in place of which there is a single small spine.

The chief points in which the present species differs from the preceding, apart from size, are the longer marginal plates, the coarse puncturing of the epidermis, the presence of modified hairs on the side margins of the body, and, especially in the male armature of the third palp segment.

Localities.—Westport, under stones on the sea-shore, nymphs and adults in July, and in a similar habitat at Mulranny, Co. Mayo, in September. Nymphs and adult males were also obtained from debris collected from old nests of Black-backed Gulls, and Puffins, on The Bills Rocks in June. I have also found it in company with the preceding species on the coast of county Dublin at Dollymount and Howth.

Uropoda obscura (C. L. Koch) Berl.

I have found the immature (nymphal) stage of this mite amongst moss at Tibradden, Dublin mountains, in the month of June.

Uropoda tecta Kramer.

Occurs in fungi in woods at Glendalough, county Wicklow, September.

Uroobovella notabilis Berl.

Found commonly in a nest of the ant *Formica fusca* in a decayed birch log at Glendalough in September; also at the Scalp and Powerscourt in county Wicklow.

The specimens are a little shorter and broader than those described by Berlese (**12**, p. 338), the largest measures about 717μ in length, by 588μ in breadth. This species does not appear in Mr. Donisthorpe's records of British myrmecophilous mites.

Urodinychus ovalis (C. L. Koch), var. **Thorianus** Berl.

Adult males and females of this fine species were found under bark in the Westport demesne in July. They are of a reddish-brown colour; one of the examples measures 896μ in length, therefore a shade smaller than the type. It is possible that the large specimens (950μ), recorded from Holland by Oudemans (**74**, p. 46), may be referable to this variety.

Distribution.—Described by Berlese (**6**, p. 271) from specimens collected in Norway by Dr. Thor,

Urodinychus punctatissimus sp. nov. (Pl. VII, fig. 30*a–b*.)

This species is allied to *Urodinychus ovalis* (Koch) with which it agrees closely in form, size, and in general structure.

Female (fig. 30*a*) Length 614μ, breadth 486μ, shape oval, dorsum slightly convex. The entire surface of the body is exceedingly closely and minutely punctured, so that a fairly high magnification is necessary in order to make clear the individual punctures, and without a trace of the stronger puncturation present in *U. ovalis*. The dorsal shield is crowded with short hairs. Marginal shield very narrow, entire, with a row of widely separated hairs, inner edge weakly crenulate, there are no cross striations.

Camerostoma small. Genital area (fig. 30*b*) as in *U. ovalis*, pointed in front, surface of plate very minutely punctured. Ventro-anal plates completely fused, studded with hairs, but not so thickly as the upper surface of the body. *Fossulae pedales* and metapodia like those of *U. ovalis*, as figured by Berlese (**1**, Fasc. xli, No. 9). Peritreme with two loops, stigmal extremity directed inwards, with a post-stigmal continuation in the fossulae of the third legs.

Locality.—Achill Island, a single specimen in moss, November.

Urodinychus campomolendina Berl.

Under bark in the Westport district, July.

I have found this species commonly under bark of decayed tree trunks in the Dublin and Wicklow districts.

Distribution.—A widespread European species.

Urodiscella philoctena (Trouess.).

1902. *Uropoda philoctena* Trouessart **96**, p. 36. 1904. Berlese **12**, p. 342.

A single male example occurred in a nest of the small yellow ant *Lasius flavus*, in company with the following species, at Westport, Co. Mayo.

M. Janet was the first to use the specific name "*philoctena*," accompanying his reference to the mite is a sketch of a male Urodiscella attached to the strigil of an ant (*Lasius mixtus*). However, as he gave no description of the animal, the name remained a *nomen nudum* until Trouessart subsequently described the species. Janet's figure gives a very good idea of the under side of the male, except that the peritreme is not included.

I have also found the male and female of this species in nests of *Lasius flavus* at Glendalough, and can state that the peritreme is similar in both sexes. It is shaped almost exactly like a note of interrogation, differing, in

this respect, from the figure of the female in Berlese's "Acari Mirmecofili" (**12**, pl. viii, f. 20). The measurements of the male are $495\mu \times 407\mu$, and of the female $517\mu \times 429\mu$.

Distribution.—Italy (Portici, Silvestri); France (Beauvais, Janet, in nest of *Lasius mixtus*); England (Weybridge, in nests of *Lasius umbratus*, Donisthorpe).

Urotrachytes formicarius (Lubbock).

This beautiful species is the only one of the large, red, ants' nest mites found in the district. It is common both on Clare Island and at Westport in nests of the yellow ant *Lasius flavus*.

The male occurred in some of the nests. It is slightly smaller than the female, the length varying from 844μ to 947μ. The circular genital aperture is situated, in most specimens, opposite the third and fourth coxae, in others it is exactly opposite the third pair. Each chela of the mandibles is armed with a single strong tooth. Immature examples in the second nymphal stage were also found. This stage measures 768μ in length, and very closely resembles that of *Trachyuropoda laminosa*, figured by Berlese (**12**, pl. xi, fig. 63), with a raised central ridge and three pairs of large depressions on the dorsum. The ventral surface is also very similar in the two species.

Distribution.—France (Luxemburg, Wasmann); England (Cornwall, Michael; Isle of Wight, Boxhill, Bradgate Park, Forth Bridge, and other localities, Donisthorpe in "Entom. Record," xxii, xxiii). Berlese remarks that he has not found this species in Italy.

Trachyuropoda coccinea (Michael).

This species occurs commonly in nests of the ant *Formica fusca* in the eastern parts of Ireland, as at Scalp, Powerscourt, Glendalough, and Howth, yet I could find no trace of it in the Clare Island district.

The variety *sinuata* Berlese, lives in nest of the same ant at Glendalough, and no doubt in many other localities.

Trachyuropoda lamellosa (Can. et Berl.).

1877. *Trachynotus troguloides* Can. et Fanzago **25**, p. 62. 1884. *Uropoda laminosa* Can. et Berl. "Atti. Soc. Ven. Trent," ix, p. 6. 1884. *Uropoda lamellosa* Berl. **1**, Fasc. xiii, n. 1. 1894. *Glyphopsis lamellosa* Michael **49**, p. 309. 1904. *T. laminosa* Berl. **12**, p. 360. *T. celtica* Halbt. **31**.

Tallaght, County Dublin, many females and a few males found in nest of the ant *Lasius niger* on the bank of the Dodder in April; has also occurred with *Lasius flavus*, on Lambay Island.

The ants' nest mite, described and figured as this species by Canestrini and Berlese in the references 1, 12, 25, does not altogether agree in the sculpturing of the dorsum with the mite recorded from the above-mentioned localities. However, Mr. Michael has taken a similar species in England, and he informs me that his specimens were referred to the present species by Canestrini, so that we must accept this identification of the British form, unless the latter represents a local variety of the species.

Has been found in Luxemburg, France, Bohemia, Italy and Britain.

Dinychus tetraphyllus Berl.

A single specimen occurred amongst moss in the Westport district in July.

Quite a short description of this curiously formed mite was published by Berlese (5, p. 247). More recently Trägardh has given a very full account of the species with some good drawings of the nymph, male, and female (88, p. 450); it is a rich brown oval-shaped creature, and may be recognized by the four blade-like hairs placed on a narrow transverse plate close to the hinder margin of the body, a little in front of these is another row of four longer and more slender spines.

Distribution.—Sweden (Sarekgebirge, Trägardh); Italy (under rotten wood and also, though more rarely, in moss, Berlese).

Family LABIDOSTOMMATIDAE.

Labidostomma cornuta (Can. et Fanzago).

1877. *Nicoletia cornuta.* Canestrini et Fanzago 25.

Achill and Westport districts, not uncommon in moss on trees, and under bark, during September. I have also found it in pine woods in counties Dublin and Wicklow where it was noticeable enough on account of its bright orange colour.

There are two recorded European species of this curious genus which, as regards its systematic position, has long been a trouble to acarologists. Descriptions and figures of both of these species may be found in Berlese's work on Italian Mites (1). *L. cornuta* is said to differ from *L. lutea*, Kramer, in being larger, and the front corners of the fore body are produced into sharp points. Canestrini and Fanzago's figure of *L. cornuta* (Tav. III, fig. 2) shows these very clearly. The Irish specimens that I have seen agree well with *L. cornuta* except in the matter of size, the length being about 700μ. In the original description the length is given as 1000μ, and according to

Berlese it may reach a length of 1200μ. *L. lutea* has been recorded as a British species (**47A** and **28C**), but the figures accompanying the records resemble the present form.

Distribution.—Probably widespread in Europe (Germany; Hungary, **33**; Italy; Britain).

Sub-Order **IXODOIDEA.**

Family IXODIDAE.

Ixodes ricinus (Linn.).

The common tick is abundant throughout the district, especially so amongst grass and heather in wooded districts. One example occurred on a young rat. I have noticed that in the south and west of Ireland this species is more abundant and is much more liable to attack man than it is in the eastern parts of the country.

Distribution.—Europe; Asia; N. Africa; N. America; &c. (Neuman **54**).

Eschatocephalus vespertilionis (C. L. Koch).

A female of this species found on a bat in the Edenvale Caves in County Clare has been identified by Professor Nuttall. I am informed by Dr. Scharff that the host was the Lesser Horse-Shoe Bat (*Rhinolophus hipposideros*), a local species of which a number were found hanging from the roof of one of the inner caves during the month of April.

Argas vespertilionis (Latr.).

I have seen specimens of this tick obtained off the Pipestrelle Bat in County Longford, and it has also occurred at Blarney in County Cork.

Sub-Order **ORIBATOIDEA.**

Family ORIBATIDAE.

Pelops acromias (Herm.).

Clare Island, Achill and Westport district. Not uncommon in moss and rotten wood, also swept off furze bushes and pine trees.

Distribution.—Throughout Europe.

Pelops fuliginosus C. L. Koch (*P. laevigatus* Nicolet).

Delphi in moss; the Bill Rocks off Clare Island in debris from nests of sea birds; June.

Distribution.—A widespread European species.

Pelops phaenotus C. L. Koch.

Slopes of Croaghpatrick in sphagnum, October.
Distribution.—Germany; England; Italy.

Oribata sphagni Michael.

Local. Croaghpatrick, amongst moss on stones in a small stream on the lower slopes of the mountain, July; also a few specimens amongst wet sphagnum, at about 600 feet, in the same locality in October.

The Croaghpatrick specimens measure about 330μ in average length. Mr. Michael points out that the pseudostigmatic organs are hidden in this species occasionally, however, these organs are extended. They are small with a very slender stalk and large globular head. There are two fine, widely separated, interlamellar hairs. On the abdomen there is a marginal row of fine hairs and a few pairs are present on the dorsum of the animal.

Distribution.—Germany (Sellnick); England (on sphagnum, Michael); Scotland (Evans).

Oribata gracilis Michael (var. **major** Berlese).

The Bill Rocks, in debris from old nests of gulls and puffins, June; Achill, under bark, September; Delphi, in moss; Mulranny, on the sea-shore, in September.

Berlese has described and figured, from Irish specimens, a variety of this species (var. *major*) which is larger than the typical form measuring 520μ–640μ in length, and the pseudostigmatic organ is "longe fusiformibus, subplumosus" (7, p. 29). The above recorded specimens are possibly to be referred to this variety. They measure from about 520μ to 539μ in the length of the body, the pseudostigmatic organs are long and fusiform, somewhat bent at the base and their extremities are finely spinous.

Distribution.—Italy; Holland (in decaying leaves, Oudemans); England (in moss on trees, Michael); Scotland (Evans).

Oribata mollicoma C. L. Koch.

A few specimens found in moss on Croaghmore mountain, Clare Island, also on Achill Island, and in the Westport district (Croaghpatrick, &c., in sphagnum).

Distribution.—Finland (Nordenskiöld); Swedish Lapland (Sarekgebirge, Trägardh); Germany; England; Scotland.

Oribata alpina sp. nov. (Pl. VIII, fig. 32*a*, *b*).

The following short description refers to an apparently undescribed species of Oribata which is common enough in the mountain districts of the County Mayo. It is unknown to Mr. Michael, to whom specimens were sent, and it does not appear to agree with any of the European species of this genus described since the publication of the "Tierreich" volume treating of the Oribatidae.

The species may be compared with *Oribata mollicoma* C. L. Koch, to which it is allied in general structure. It is, however, much larger and of more robust build and the hairs of the notogaster are shorter, other differences are also noticeable.

The measurements are: length 716μ, breadth 512μ. Colour pitchy black with a lighter patch on the front of the body. The texture of the epidermis is dull, due to the extremely fine and close punctuation of the surface of the body. Cephalothorax rather narrow, rounded at the extremity. Lamellae a pair of broad blades ending in stout bluntly pointed cusps, which are bent downwards, and are separated by a cup-shaped hollow. The translamella is a narrow band. As in the case of *O. mollicoma* the end of the lamellar region reaches far forwards so that the frons is very short. The prostigmatic organ is moderately long with a stout stem and weakly clavate extremity, directed upwards. Interlamellar hairs widely separated, long, and finely setose. Notogaster globular with a double row of marginal hairs and there are also three or four pairs on the back of the animal, these hairs are rather stout, finely setose, and are much shorter than in *O. mollicoma*. Front margin of the progaster gently rounded, sloping backwards towards the side margins. Pteromorphae normal, not produced in front. Legs long and rather stout. Mouth parts of the usual type.

This species may be easily separated from *Oribata Edwardsi* by the much greater length of the lamellae.

Localities.—Clare Island, in moss on Croaghmore mountain, August; Lough Fenagh, in sphagnum, October; Delphi, in moss, August.

Oribata Edwardsi Nicolet.

Clare Island, Achill, and the Westport district. Rather a common species in moss and under bark from March to October, and doubtless throughout the year. Also on the Dublin mountains and apparently widespread in Ireland.

Distribution. — Finland; Sweden; Germany; France; Italy; and Britain.

Oribata lapidaria H. Lucas.

Westport, common under stones on the shore of Clew Bay, and swept off plants; Castlebar under stones on the lake-shore.

Distribution.—Finland to Africa (Algeria).

Oribata globula Nicolet.

Not uncommon. Clare Island, in moss; Achill, in rotten wood and on decayed fir cones; Mulranny, under stones on the sea-shore.

Distribution.—A widespread species ranging from Finland to Algeria.

Oribata orbicularis C. L. Koch.

A few specimens of an Oribata apparently referable to this species, or perhaps to a variety of it, were found under stones on the sea-shore at Mulranny, County Mayo.

The shape is broader and stouter than in typical *O. orbicularis*. In this respect it agrees very closely with a mite described from Swedish Lapland under the name of *O. monticola* (88). In that species, however, the lamellar and interlamellar bristles have very distinct secondary hairs, while in the Mulranny form these are minutely setose. As the species is a somewhat critical one it seems best to record these specimens as above.

Distribution.—Finland to Italy.

Oribata piriformis Nicolet.

A few specimens in moss from Knappagh Wood near Westport, August.

Distribution.—Europe.

Oribata fuscipes C. L. Koch.

Westport, one specimen in sphagnum at Coolbareen Lough, July; and a few under stones on the shore of Clew Bay.

Distribution.—Finland (Nordenskiöld); Germany; ?North America (Michael); England (Epping Forest, Michael); Scotland (Forth Area, Evans).

Oribata setosa C. L. Koch.

Achill Island, swept off conifers; Mulranny sandhills; Westport, common on furze, and in sphagnum.

The Irish specimens vary considerably in size and in the shape of the lamellae. The cusps of the latter are produced at the outer angle, but not so markedly as in the form figured in "British Oribatidae" (plate vii, fig 3), which doubtless represents an extreme form of the species. The prostigmatic organs vary in structure, in a number of specimens, obtained off furze,

they are shorter with compactly clubbed extremities, in other specimens these organs are more drawn out. In addition to the marginal hairs there are five or six pairs of hairs on the dorsum of the animal.

Distribution.—A widespread European species ranging into the Arctic Circle (Franze-Joseph Archipelago, Spitzbergen, Michael).

Oribata quadricornuta Michael.

Evidently a local species in the district. Westport, on furze, July; Mulranny, under stones on the sea-shore in September.

Distribution.—Finland; Germany; Holland; Algeria; Britain.

Oribata ovalis C. L. Koch.

Abundant in moss. Clare Island, Achill, and Westport district.

Distribution.—Common and widely distributed in Europe.

Oribata dorsalis (C. L. Koch).

Mulranny, under stones on the sea-shore, and on the banks of stream flowing from the Curraun lakes, September; var. *longiplumus* Berlese, common under bark in the Westport demesne, July.

The specimens are referable to two recognizable forms. In one of these the pseudostigmatic organs are shorter, closely resembling *O. alata* var. *integer* Berlese in this respect. I cannot say, however, that the specimens are identical with this variety as they do not seem to agree in the other characters mentioned by Berlese. The second form is a little larger, and the pseudostigmatic organs are very long and strongly recurved, hair-like and exceedingly finely setose at their extremities. This form is probably the same as Berlese's *O. eliminatus* var. *longiplumus*, which is described and figured in the same paper (**7**, p. 30, pl. 1, figs. 21, 22). In none of the Irish specimens that I have seen are the pseudostigmatic organs sufficiently short and clavate to enable one to refer them to typical *O. alata* (Herm.) as this is figured by Berlese (**1**, Fasc. lxxviii, N. 9) and other acarologists.[1]

Distribution.—This species has an extremely wide European range.

[1] Since these notes were written I have received from Dr. Berlese a paper dealing with the *alata* group of the genus Oribata. (Acari Nuovi, Manipulus ix, Redia, x, 1914.) A re-examination of the Mayo specimens confirms me in the belief that the form with long recurved, pseudostigmatic organs is *O. longiplumus*, now established as a species by Berlese. The only difference is that the transverse line dividing the cephalothorax from the abdomen is wanting in the Irish specimens, but Berlese figures a variety (*myrmophilus*) of this species in which this line is evanescent. The form with shorter and more clavate pseudostigmatic organs is not *integer* but *O. nervosus*, Berl. recorded from Norway, North America, and South Africa. Specimens of this form, found on the sea-shore at Mulranny, measure about 653 μ in length by 486 μ in breadth.

Oribata cuspidata Michael.

Clare Island, Achill, and the Westport district. This small and variable species is abundant in the district especially amongst sphagnum on the mountains (Croaghmore and Croaghpatrick). On Achill Island it was found amongst fallen pine needles in September.

Distribution.—Finland; Germany; Sweden; Italy.

Oribata Lucasi Nicolet.

Achill, one specimen found under bark of a fir tree, September.

This specimen is very small measuring only 374 μ in length. Michael gives the average length of this species as 600 μ. A second Irish example which I found on Lambay measures 550 μ.

Distribution.—Finland (Nordenskiöld); Germany (Sellnick); Holland, (Oudemans); France; Algeria; Britain.

Oribata fusigera Michael.

Achill, on furze, September; Croaghpatrick, on sphagnum, October; Westport, at Coolbareen Lough, on sphagnum.

Distribution.—England (in moss, Michael. Common amongst sphagnum at Gibside, Hull); Scotland (Evans). There is an unrecorded example of this species in the museum collection found some years ago on Lambay off the Dublin coast.

Oribata parmeliae Michael.

Common under lichens growing on granite rocks on the sea-shore at Howth, county Dublin. Recorded by Michael from an exactly similar habitat in Cornwall.

Scutovertex sculptus Michael.

The Bill Rocks, 9 miles off Clare Island, in old nests of gulls and puffins, June; Mulranny, abundant under stones on the sandhills in September.

Distribution.—Germany (Sellnick); England and Algeria (Michael); Scotland (Evans).

Scutovertex bilineatus Michael.

Westport, under stones on the sea-shore a little above high-water mark in July.

Distribution.—Russia ("in subsaline algae," Oudemans); England ("aquatic, on fresh-water algae," Michael).

Scutovertex corrugatus Michael.

Mulranny, common under stones on the sea-shore at high-water mark in September.

Distribution.—According to Trägardh this interesting species is identical with *Eremaeus lineatus* Thorell (83). It has therefore an extremely wide range in north-western Europe i.e. Siberia, Novaya Zemlya, Spitzbergen, Bären Insel, Sweden, and Sellnick records it from the Faröes. In Britain it was first discovered by Mr. Bostock at Puffin Island, North Wales, "crawling on fresh-water algae (*Prasiola stipitata* and *Cladophora fracta*), where the fresh water was dripping over the rocks close to the sea, but not where the sea would come" (48). At Mulranny it was most abundant under stones where a small stream flows into the sea at the head of Ballacragher Bay, but it was by no means confined to the fresh water.

Scutovertex maculatus Michael.

Has been found on the shore of Lambay off the Dublin coast (31).

Cepheus bifidus Nicolet.

Westport district, a few specimens found amongst moss at Knappagh Wood in August.

Distribution.—Finland (Helsingfors, in damp pine forests, Nordenskiöld); Holland, in decaying leaves (Oudemans); France; Britain.

Cepheus tegeocranus (Herm.).

Clare Island, Achill, and Westport district, in moss.

Distribution.—Finland to Algeria.

Tegeocranus latus (C. L. Koch).

Achill Island, abundant under bark of decayed fir trees in company with its curiously formed nymph, September.

Distribution.—Similar to that of the last species.

Carabodes elongatus (Michael).

Clare Island, Achill, and Westport district. Frequent in moss.

Distribution.—There are few records of this species, it is widespread, however, having been recorded from Italy, Algeria and Britain. Trägardh has described a variety, *subarctica*, from Swedish Lapland (88).

Tegeocranus marginatus Michael.

Abundant amongst lichens on the Portmarnock sandhills. January.

Tegeocranus labyrinthicus Michael.

Under lichens growing on rocks by the sea-shore at Howth, Co. Dublin. This species must be recorded with reserve as the specimens found in this locality are not quite typical.

Liacarus coracinus (C. L. Koch).

Clare Island, in moss, March. Has also been found under bark at Bray Head, Co. Wicklow, in May.

Distribution.—Finland to Algeria.

Liacarus ovatus (C. L. Koch).

Clare Island, Achill, and Westport district.

The Achill specimens occurred in rotten wood and amongst pine needles, September.

Distribution.—Germany; Holland; France; Italy; Britain.

Notaspis bipilis Herm.

Clare Island, Achill, and Westport district.

Distribution.—A common and widely distributed species ranging from Novaya Zemlya to the extreme south of Europe; Siberia.

Notaspis exilis Michael.

Clare Island, Achill, and Westport district.

Distribution.—Probably equally widely distributed as the preceding species.

Notaspis venustus (Berlese). (Pl. VIII, fig. 33 *a–b*.)

There is little doubt that a Notaspis found commonly on the sea-coast at Mulranny is to be referred to this species, originally described from Norway by Dr. Berlese under the name of *Oribatula venusta*. The extremely short description is as follows:—"Testacea. Facies *O. calypterae* Berl., sed multo maior abdomineque magis rotundato. Organa pseudostigm. bene clavata. Pteromorpharum rudimenta ut in *O. calyptera*. Ad 600 μ long.; 400 μ lat." (**14**, p 8). A figure of the dorsal aspect of the animal appears in a subsequent paper (**10**, p. 229, Taf, xx, fig. 70). The species differs from allied forms in the shape of the body, the lamellae, and the pseudostigmatic organs.

The Irish examples vary but little in size and shape (fig. 33*a*), the length is about 539 μ, and the breadth 341 μ, therefore slightly smaller than the Norwegian specimens. The form is broadly ovate, shoulder flaps very pronounced, a little more so than in *N. similis*, the end of the body is slightly

pointed in most specimens, and there are four pairs of small markings, rather like gland openings, near the margin of the abdomen. Hair armature short and sparse.

Cephalothorax broad and bluntly pointed, lamellae long and rather broad, widest at the distal extremity, their hairs are strong and finely spinous, and spring from the outer angle of the lamellae; translamella absent, or extremely faintly marked; interlamellar hairs widely separated. The prostigmatic organs are rather short, with distinctly clubbed, and finely setose, extremities (fig. 33*b*). Front tibia armed with a prominence and tactile hair.

Locality.—Mulranny, common on the sandhills and under stones on the sea-shore near high-water mark in September.

Notaspis similis Michael.

Clare Island, The Bill Rocks, Achill, Delphi and the Westport district, common in moss.

Distribution.—Finland; Holland; Britain.

Notaspis lucorum (C. L. Koch).

Common in moss. Clare Island, Achill, and Westport district.

Distribution.—Spitzbergen to Italy.

Notaspis oblonga (C. L. Koch).

Achill Island, in moss and amongst fallen pine-needles, September; Westport (Knappagh Wood, in moss).

Distribution.—A widespread species, Finland to Italy.

Notaspis lacustris Michael.

Mulranny, in sphagnum pools, September; Delphi; Croaghpatrick at about 600 feet, in sphagnum, October.

Distribution.—Finland; Germany; Holland; Italy; Britain.

Dameosoma lanceolata (Michael).

Clare Island; Achill; Westport (Croaghpatrick, 600 feet, in sphagnum, October).

Distribution.—Holland (Oudemans); England (in moss, Michael); Scotland (Forth area, Evans). I have also found this species in Dollymount saltmarsh, Co. Dublin, in October.

Dameosoma splendens (C. L. Koch).

Achill, several specimens in moss, September.

Distribution.—Scandinavia (Trägardh) to Italy.

Dameosoma clavipectinata (Michael).

Achill Island, in moss, September.

Distribution.—Not known. Finland (Nordenskiöld); Lapland (Trägardh); England (Michael); Scotland (Evans).

Suctobelba trigona (Michael).

Westport (Croaghpatrick, 600 feet, in sphagnum, October).

Distribution.—Italy (frequent in moss, Paoli, 76); England (Michael); Scotland (Evans).

Damaeus clavipes (Herm.).

Clare Island, Achill, and Westport district.

Evidently a fairly common mite in moss throughout the district, which seems poor in the species of this genus.

Distribution.—Finland to North Africa (Algeria).

Damaeus geniculatus (L.) C. L. Koch.

This common species occurs at Lambay and other localities in the Dublin and Wicklow districts.

Damaeus vertilicipes Nicolet.

Westport (Knappagh Wood, several in moss, August).

Distribution.—Finland; Germany; Holland; France; Britain.

Hermannia convexa (C. L. Koch).

Clare Island, Achill and Westport district. Common in moss and under bark.

Distribution.—Sweden; Germany; Holland; France; Britain.

Hermannia scabra (L. Koch). (*H. nodosa* Michael.)

The Bills Rocks, in old nests of sea-birds, June; Mulranny, abundant under stones on the sea-shore just above high-water mark, September; Westport, on shore, July.

Distribution. — Finland (under wood on the sea-shore, Nordenskiold); Siberia and Novaya Zemlya (L. Koch); Germany (Sellnick); Sweden; England (Michael); Scotland (Evans).

Hermannia reticulata Thor.

Clare Island, Achill, and Westport district.

Distribution.—Evidently a widespread species in northern latitudes, Novaya Zemlya; Spitzbergen; Baring Island; East Greenland; Holland; Britain.

Hermannia bistriata (Nicolet).

Clare Island, Achill, and Westport district. Common in moss.

Distribution.—A widespread European species. The specimens recorded as *H. carinata* Kramer, from Lambay (**31**) are to be referred here.

Hermannia nanus (Nicolet).

Clare Island, Achill, and Westport district.

The commonest species of the genus, occurring in moss in all parts of the district.

Distribution.—Finland to Italy.

Nothrus sylvestris Nicolet.

Clare Island, Achill, and Westport district.

Distribution.—Finland (Nordenskiold) to Algeria (Michael).

Nothrus palustris C. L. Koch.

Clare Island, in moss, October; Achill, adults in moss and nymph under bark, September; Westport (Knappagh Wood, a few in moss, August).

Distribution.—Widespread. Finland to Italy.

Nothrus spinifer C. L. Koch.

Clare Island, a few specimens in moss gathered on Croaghmore mountain, July. I have also found this species on Lambay and under bark of decayed fir trees at Glendalough, Co. Wicklow.

Distribution.—Germany; France; Italy; Algeria; Britain.

Nothrus bicarinatus C. L. Koch.

Achill Island, under bark and amongst fallen pine needles, September.

Distribution.—Germany; Holland; France; Italy; Britain.

Nothrus segnis (Herm.).

Clare Island, in moss, adult in March, nymph in July; Achill, in moss; Mulranny, in moss, and off conifers, September.

Distribution.—Widespread. Finland to Italy.

Nothrus invenustus Michael.

Not uncommon under lichens growing on large boulders on the south shore of Howth, near the Baily lighthouse, county Dublin.

Nothrus horridus (Herm.).

The nymphal form has been found on Lambay, county Dublin.

Nothrus teleproctus (Herm.).

Abundant under stones amongst heather on Lambay and also at Howth, county Dublin.

Malaconothrus glaber (Michael).

Westport, common on the slopes of Croaghpatrick in wet sphagnum, October.

The statement that the cuticle of this species is "smooth, but not shining, without any reticulations" (**48**, p. 525) must be understood in a comparative sense. In a note received from Mr. Michael he remarks "the word smooth in my description (British Oribatidae) must be taken only as compared with reticulated. I give 'not reticulated' in a bracket as the equivalent and explanation of 'smooth.' When there is an entire absence of all punctures and granulations I use the word 'polished.'" It seems worth emphasizing this point as in one or two recent descriptions of allied continental species it seems to have been misunderstood. As a matter of fact in the present species both the cephalothorax and the abdomen are exceedingly finely punctured, and there are also numerous light-refracting punctures.

Malaconothrus was introduced as a new sub-genus by Berlese with *M. egregia* as the type species, it would really seem to be worthy of generic rank on account of the structure of the legs, and also of the pseudostigmatic area. Berlese gives a very short diagnosis which is as follows "Organa pseudostigmatica setula nulla vel inconspicua aucta. Pedes curti, crassiusculi, tarsis apice spinis validis armatis" (**7**).

Distribution.—England (amphibious, in moss and sphagnum, Michael); Scotland (Evans). An allied species *M. sphagnicola*, Trägardh, has been recorded from Swedish Lapland (**88**).

Malaconothrus tardus (Michael).

Clare Island (Croaghmore), and on Croaghpatrick. Evidently rather a common species in sphagnum in both of these localities.

In these specimens the anterior side corners of the abdomen are almost square and do not form rounded projections. This refers, however, to dead specimens, and Mr. Michael remarks *in lit.* that in these the appearance of

projecting rounded anterior corners to the abdomen is lost. The notogaster of this species is finely punctured and interspersed with larger punctures, and there is a marginal row of six hairs.

Distribution.—England (Cornwall, on lichen growing on granite rocks, Michael).

Malaconothrus monodactylus (Michael).

Clare Island in sphagnum, August; Westport, common amongst sphagnum on Croaghpatrick, October.

The cephalothorax of this curious species is distinctly granular, and the abdomen is finely punctured with numerous larger punctures. The hinder margin is rather more acuminate than it is figured in "British Oribatidae" (**48**).

Distribution.—England (on moss and sphagnum, Michael); Scotland (Evans). An allied, if not identical, species *M. globiger* Trägardh has been described from Swedish Lapland (**88**).

Lohmannia insignis Berl.

Found associated with Springtails (*Lipura ambulans*) attacking the roots of Kidney Beans in a Dublin garden during the month of June (Carpenter **27**).

Hypocthonius rufulus C. L. Koch.

Common in moss on Clare Island and Achill, and in the Westport district.

Distribution.—Finland to Italy.

Brachychthonius brevis (Michael).

A few examples of this minute species were found amongst sphagnum moss on the slopes of Croaghpatrick in October.

This genus was recently described (**10**, p. 219) by Berlese with *Hypocthonius brevis* as the type. In the same reference three new varieties of the species are briefly described. The Croaghpatrick specimens agree with the typical form as described by Michael (**48**, p. 539). The pseudostigmatic organs have the extremities strongly fusiform and setose. In addition to the rostral hairs there are two other pairs of hairs on the cephalothorax of this species. An anterior pair in a position which corresponds to that of the lamellar hairs of the typical oribatid and the other pairs springs from a prominence immediately in front of the pseudostigmata. The Irish specimens measure from about 200μ to 210μ in length, by 135μ in breadth.

Distribution —Italy (Berlese); England (Michael); Scotland (Evans); Lapland (Sarekgebirge, var. *lapponica* Trägardh).

Hoploderma magnum (Nicolet).

Clare Island, Achill, and Westport district. Abundant in moss, amongst fallen pine needles, and under bark.

Distribution.—Germany; Holland; France; Britain.

Hoploderma dasypus (Ant. Duges).

Clare Island, Achill, and Westport district. Common

Distribution.—Finland to North Africa (Algeria).

Phthiracarus arduus (C. L. Koch).

Clare Island, in sphagnum and under bark.

Distribution.—Finland; Germany; Holland; Britain.

Sub-order **SARCOPTOIDEA.**

Family HYADESIDAE.

Hyadesia fusca (Lohm.).

1894. *Lentungula fusca* Lohmann **43**, p. 86. 1899. *L. fusca* Canestrini and Kramer **26**, p. 136. 1901. *L. fusca* Michael **51**, p. 196 (reference). 1907. *H. fusca* Lohmann **45**, p. 368.

A number of specimens were found amongst coralline seaweeds in rock-pools on the coast of Clare Island in July, with sea mites of the genus Rhombognathus.

This would appear to be the first recorded occurrence of this marine species on the coasts of Britain. It is closely allied to *H. algivorans*, described by Michael (**51**) from brackish water on the coast of Cornwall. Lohmann separates the two northern[1] species as follows:—

Stalked claw of the first leg very small, much shorter than the strong end claw of the fifth leg segment; claw of the first pair of legs much shorter than that of the second pair; claw of the last pair of legs without adjacent tooth at the base. Length of female 380μ, . . *H. algivorans* (Mich.).

Stalked claw of the front legs only a little shorter than the strong end claw of the fifth leg segment; claw of the first two pairs of legs of about equal length. Length of female 530μ, . . . *H. fusca* Lohm.

Apart from its larger size *H. fusca* may also be known by the presence of a narrow chitinous plate on the front margin of the body, and the palpus has only two free segments. The Clare Island specimens agree in every respect with *H. fusca* except that they are a shade smaller.

[1] Two other species are found in the southern ocean, i.e., *H. uncinifer* Mégnin at Tierra del Fuego (**47**), and *H. kerguelensis* Lohmann amongst algae on the coast of Kerguelen (**45**).

There seems to be no doubt that the genus Lentungula is synonymous with the previously described genus Hyadesia notwithstanding the fact that the latter was described from an immature form. The general structure, and especially of the peculiar claw armature, puts this fact beyond doubt. Consequently as *H. uncinifer* Mégnin is the type species the name of the family (or sub-family if preferred) must be changed accordingly.

Distribution.—*H. fusca* has been recorded from the coasts of the North Sea (Heligoland), and the Baltic (Rügen, Kiel).

Family TYROGLYPHIDAE.

Glycyphagus domesticus de Geer.

Tyroglyphus siro (Linn) Gervais.

Tyroglyphus longior Gervais.

Specimens of these three common and widely distributed species were found in the Westport district.

Tyroglyphus Wasmanni Moniez.

A few specimens, in the hypopial nymph stage, were found on ants in a nest of *Formica fusca* at Mulranny, Co. Mayo, in the month of September.

As far as I can ascertain this is the first definite record of this ants' nest mite from the British Isles. The specimens agree closely with Mr. Michael's excellent description and figures of the hypopus of this species, except that the shape is more regularly oval and the end of the body is not truncated; however, the slightest pressure would cause a change in the shape of this delicately organized creature. There is also a pair of small suckers on the first pair of epimera.

With regard to the occurrence of this interesting species in Britain Mr. Michael remarks: "I am not quite sure that it is found in Britain—I have a strong impression that it is so" (**51**). As long ago as 1881 Mr. Parfit found the early stages of an acarus on the abdomen and antennae of ants in a nest near Exeter, in all probability this was referable to the present species, which was not described until 1892 (Entom. Mo. Mag. xviii, p. 43).

Distribution.—In natural nests of *Lasius fuliginosus* in Holland, and in artificial nests at Prague (Wasmann).

Four additional species of Tyroglyphidae have been found in Ireland. They are—

Histiostoma rostro-serratum Mégnin. A few specimens found in company with other tyroglyphid mites attacking decayed bulbs, Dublin, January.

Histiogaster corticalis (Michael), in a bulb of Hippeastrum (Carpenter, Inj. Insects, Econ. Proc. R. Dublin Soc. i, p. 603).

Carpoglyphus anonymus (Haller). Specimens of this mite were found feeding on jam, Dublin, June.

Rhizoglyphus echinopus (Fumouze et Robin), a common and destructive species, occurring in various kinds of bulbs, and in decayed potatoes.

Sub-Order **THROMBIDOIDEA**.

Family EUPODIDAE.

Eupodes variegatus C. L. Koch.

The Bills Rocks off Clare Island, in refuse from old nesting sites of sea-birds, June.

Distribution.—Germany; Italy; and Britain.

Rhagidia terricola (C. L. Koch).

Common under stones on the Mulranny sand-hills in September.

Distribution.—Europe (Berlese).

Rhagidia halophila (Lab.).

There is referred to this species a rather large Rhagidia, which was found under stones partly embedded in sandy mud, &c., and also running with great speed on rocks, between tide-marks, on the shore at Mulranny in September.

It was recorded by Moniez in his paper on marine mites and insects under the name of *Norneria halophila* Lab. His remarks concerning its habits apply excellently to its occurrence on the Irish coast, and are worth repeating: "Nous avons assez souvent trouvé sous les fucus ou sur les pierres que recouvre la marée, un Acarien d'un beau rouge que nous avons aussi rencontré hors de la portée des eaux de la mer, sur la falaise, ou même à l'intérieur des terres, dans des stations variées, toujours un peu humides. Il est remarquable par son extraordinaire agilité et par les mouvements circulaires qu'il décrit volontiers; il est de nature fort délicate et on l'endommage facilement en le voulant prendre" (**52**).

As the species has not been satisfactorily described the following notes on its structure may prove useful. The Irish specimens (female) measure as much as 1280μ in length; breadth 640μ. Colour during life, orange. The length of the mandible from its base to the tip of the fixed chela is about 352μ,

breadth 154μ; length of free chela 143μ. Body of the mandible with an evenly rounded base, not truncated; both chelae are without teeth, but under a high magnification the edge of the free chela is seen to be very minutely serrated. Palps rather large, length about 363μ; dorsal surface of the segments armed with long bristles as follows:—Second segment, two widely separated bristles; third, three bristles, middle one the longest; fourth, with nine long setose bristles.

Distribution.—Coast of France (Moniez).

Penthaleus ovatus C. L. Koch.

Mulranny under stones on the sea-shore, September.

Identified from a single specimen of which the colour during life was not noted. It agrees, however, with Berlese's description and figures of this mite (**1**, Fasc. lx, n. 2), except in size. The Italian specimens are recorded as measuring 400μ, while the Mulranny example is 640μ in length, not including the rostrum.

Distribution.—Germany; Italy; Britain.

Halotydeus hydrodromus (Berl. et Trouess.) var. **albolineatus** nov.

The genus Halotydeus was founded by Berlese in his work on Italian mites (**1**, Fasc. lx, n. 10). The type species is *H. hydrodromus*, one of the littoral mites discovered by Trouessart on the coast of France and recorded in a joint paper with Berlese in 1889 (**17**). The genus may be readily distinguished from Notophallus by the six segmented legs, and the terminal position of the anal foramen.

The form here recorded is in all probability a variety of the type species from which it differs noticeably in colour.

Berlese describes, and figures, the colouring of *H. hydrodromus* as follows:—"Color corporis nigro olivaceus, macula dorsi media rufescenti, pedibus rostroque cinnabarino roseis. Oculi albo micantes." In the Irish specimens the ground-colour of the body is black with a *longitudinal white stripe* along the middle of the back, this line widens out a little at each end and extends on to the cephalothorax. The legs and mouth organs are bright red. The following is a short description of this variety:—

Length about 800μ; shape and general structure as in the type. Cephalothorax with three pairs of hairs. There is a shoulder bristle, a double row of a few hairs on the dorsum, and there are about five pairs of hairs grouped on the posterior third of the animal; all of these hairs are straight and finely spinous. Second palp segment stout, very strongly

arched, with two spinous hairs; third segment much smaller with three stout bristles; end segment short and conical with a terminal row of bristles consisting of a stout, strongly pectinated hair and immediately over this a row of four shorter flexed spines, which are pectinated only at their bases. Palps as figured for *H. hydrodromus* (1, Fasc. lx, n. 10) except that the movable claw is more strongly bent. Berlese figures three pairs of hairs on the lower face of the capitulum though he remarks: "Capitulum setis duabus simplicibus auctum." In the present form there are two, strongly pectinated, hairs in this position.

Localities.—Under stones between tide-marks on the sea-shore at Mulranny, Co. Mayo. On more than one occasion large colonies of adults and young forms were found under stones partly embedded in mud well below high-water mark. I have also observed this species running about on rocks exposed by the tide at Malahide on the Dublin coast in company with other littoral mites.

Family BDELLIDAE.

Bdella capillata Kramer.

1881. Kramer **37**, p. 446. 1891. Berlese **1**, Fasc. lix, n. 6 (var. *Berlesei* Trägardh). 1902. Trägardh **85**, p. 17.

Clare Island in rock-crevices between tide-marks on the sea-shore; Mweelaun (a wave-swept rock); Louisburgh and Westport districts.

An interesting point concerning this species is whether the ordinary form found under stones, &c., is identical with the form occurring between tide-marks on the sea-shore. In his paper on the littoral species of Bdella, Trägardh describes two shore-frequenting varieties of this species, *i.e.*, var. *pallipes* and var. *pallipediformis*. I have found examples of *B. capillata* in both habitats, and cannot say that they differ in any respect, although it is not unlikely that one or other of these littoral varieties may occur on the Irish coast. The following is a short description of the essential characters of the form here recorded; it applies equally to specimens found inland and on the sea-shore.

Length, including rostrum, from 2 to 2·50 mm. The measurements of the last four palp segments are about 473μ, 99μ, 187μ, 473μ. Grouped towards the end of the second palp segment are five bristles, four of these are arranged in pairs, the proximal half is without bristles, ventral side with only one bristle, which is placed near the base; third segment, one bristle; fourth with four bristles. In dorsal view the fifth palp segment carries about twelve bristles, and there is a group of three others on its extremity; they

are arranged much as in Trägardh's figure of *B. littoralis* (**85**, pl. i, fig. 1). As Kramer points out in his description of *B. capillata*, the central one of these terminal hairs about equals half the length of the segment, and is a little longer than the others. Upper side of mandible with eleven or twelve pairs of hairs, and on the ventral side of rostrum there are four pairs.

Distribution.—Scandinavia ; Germany ; Italy ; Britain.

Bdella longirostris (Herm.) Lam.

Mulranny, Westport, Castlebar, and probably throughout the district.

This brightly coloured yellow, black, and red mite is well figured by Berlese (**1**, Fasc. xlv, n. 6). It was found commonly in a variety of situations, on sand-hills, under stones on the banks of mountain streams and on more than one occasion in sphagnum pools.

Distribution.—Germany ; France ; Italy ; Britain.

Bdella vulgaris (Herm.) Koch.

Common. Clare Island, in moss from Croaghmore ; Mulranny ; Croagh-patrick amongst sphagnum, October.

Distribution.—Scandinavia ; Germany ; France ; Italy ; Britain.

Bdella decipiens Thorell.

1871. *B. decipiens* Thorell **81**, p. 699. 1890. *B. vulgaris* var. *littoralis.* Moniez **52**, p. 196. 1902. *B. decipiens* Trägardh **85**, p. 21.

Clare Island, in rock crevices between tide-marks ; Mulranny, abundant under stones between tide-marks at Bellacragher Bay in September.

As a result of a careful comparison of the shore-frequenting Bdellas Dr. Trägardh gives his reasons for believing that they are all to be referred to two species, of which one is the present species, and that it is probably a variety of *Bdella vulgaris* (**85**, p. 23).

Distribution.—Has been found on the Siberian coast ; also in Sweden and Spitzbergen.

Cyta latirostris C. L. Koch.

Mulranny, a few specimens found under stones on the sand-hills ; The Bill Rocks, in sea-birds' nests ; Westport district.

Distribution.—Apparently a common European species ranging from Finland to Italy.

Family RAPHIGNATHIDAE.

Cryptognathus lagena Kramer.

1879. Kramer, "Arch. f. Naturgesch." Jahrg., xlv, p. 156. 1882. Haller **30**, p. 313. 1885. Berlese **1**, Fasc. xxii, n. 9.

Westport, a single specimen found amongst moss from Knappagh Wood in July.

This is a beautiful and easily recognized species. It is a bright scarlet mite of long oval form, with a transparent chitinous collar which projects from the anterior end of the body and partly encloses the capitulum. The skin is finely punctured and is also distinctly reticulated. An excellent figure of the species is given by Berlese in the above reference.

Distribution.—Germany (Kramer and Haller); Italy (Florence and the Apennines, Berlese).

Bryobia praetiosa C. L. Koch.

Abundant under stones on the Mulranny sand-hills, and under refuse on the shore near Westport.

Distribution.—A common European species.

Tetranychus telarius (L.) Duges.

The common "red spider" is an abundant species in gardens in Dublin and elsewhere in Ireland. I have noticed it in swarms on violets during the month of October.

Family ERYTHRAEIDAE.

Actineda vitis (Schrank) Berlese.

Clare Island and the Westport district; a common species on plants in woodland localities.

Distribution.—Widespread in Europe, also found in South America (Berlese).

Family RHYNCHOLOPHIDAE.

Rhyncholophus regalis C. L. Koch.

Clare Island, under stones on hills, July; Westport district.

Distribution.—Widespread in Europe.

Rhyncholophus nemorum C. L. Koch.

Westport district; Mweelrea mountains, June to September.

Distribution.—Germany; Italy; Britain; &c.

Rhyncholophus rubripes Trouessart.

1889. R. *mineatus* var. *rubripes* Berl. et Trouessart **17**; see also Trouessart **90**, p. 754. 1889. Moniez **52**, p. 196.

Westport and Mulranny, locally common on the sea-shore, July and September.

This brightly coloured mite is a denizen of the sea-shore where it may be found under stones and running actively on rocks exposed by the receding tides below high-water mark.

During life the body is red with darker markings on the back, the legs and mouth parts are of a bright red. The length of the Irish specimens ranges from about 1024μ to 1434μ, and the breadth is 870μ. The shape varies, as a rule the shoulders are well marked, and the end of the body is more or less truncated. The abdomen is set with a comparatively dense covering of rod-like hairs, those of the fore-body are shorter and somewhat adpressed. The cephalothorax is bluntly pointed in front; form of the crista as is usual in the genus, median rod rather broad, frontal sensory area with eight or nine stout bristles (average length 50μ) in front of the two long sensory hairs. Palps long and very stout, last segment with a stout, club-shaped appendage which extends a little beyond the tip of the terminal claw, apex covered with strong curved bristles. The legs are long and robust, tarsus of the first pair not very strongly arched, its length is about 175μ, breadth 90μ.

Distribution.—Coasts of France and the British Isles. The mite described from the Scotch coast under the name of *Ritteria hirsutus* George ("The Naturalist," 1910, p. 182), is to be referred to the present species. At Malahide on the Dublin coast I have found it abundantly, in company with *Hydrogamasus Giardi*, on rocks studded with the small acorn-shell *Balanus balanoides* well below high-water mark. Trouessart observed it under similar conditions on the French coast, and remarks of the former species: "Ce Gamase vit en commensal sur *Balanus balanoïdes*."

Rhyncholophus mineatus (Herm.), Berl.

Found in the Westport district.

Distribution.—Widespread in Europe.

Rhyncholophus norvegicus Sig. Thor.

1900. *Ritteria norvegiea* Sig. Thor., Norges Rhyncholophidae, Christiania Vid.-Selsk. Forhandl. No. 3.

I am inclined to refer to this species a Rhyncholophus which was found not uncommonly in the Westport district during April and May. It does not seem to agree with any one of the species described from Germany or Italy by acarologists.

It is a robustly built species ranging from 2,200μ to 2,380μ in length, and the breadth is about 1,300μ. The cephalothorax is sharply pointed in front and, in most specimens, there is but little demarcation from the abdomen. Thor describes the crista as follows:—"The crista lies in the centre of an oblong, thinnish, chitinized plate (something as in the case of *R. vertex* Kramer). The actual linear-shaped crista widens posteriorly in a diamond or circular shape with two hair pores and extends anteriorly into the prominent chitinized edge where there are from 7 to 9 smaller hairs and behind these at the edge of the crista the usual two large hair pores."

Rhyncholophus tardus sp. nov. (Pl. VIII, fig. 34*a–d*).

The following is a short description of a slender-legged Rhyncholophus which was found under stones on the sea-shore at the head of Bellacragher Bay, near Mulranny, in September. It does not appear to have been previously described.

The shape of this mite (fig. 34*a*) is long oval, rounded at both extremities; the length, including apex of crista, is about 1,638μ, breadth 844μ. Colour orange red. There is only a sparse covering of hairs; on the anterior parts of the body these are short and curved, on the posterior margin they are more closely set, longer, and all are minutely spinous (fig. 34*b*). The cephalothorax is indistinctly marked off from the abdomen by a slightly convex groove. Eyes minute, consisting of a single lens on each side. The crista (fig. 34*c*) is a slender rod in the centre of a very thin chitinous plate; distal sensory area of the usual triangular shape, sharply pointed, with two long sensory hairs, and immediately in front of these is a *single*, forwardly directed hair which reaches a little beyond the anterior end of the body. Proximal sensory area as usual in the genus. The legs are slender and rather weakly developed; the first pair are considerably shorter than the body, with elongate tarsi (length 195μ, breadth 65μ), which are but little swollen on their dorsal margin somewhat resembling Thrombidium in that respect; the lengths of the four pairs are approximately as follows:—1078μ, 594μ, 650μ, 891μ. The shape of the rostrum and palps is shown in dorsal view (fig. 34*d*).

Rhyncholophus sabulosus sp. nov. (Pl. VIII, fig. 35*a*, *b*.)

The following are some comparative notes on a small species of Rhyncholophus which was found not uncommonly on the Mulranny sandhills, County Mayo, during the month of September. It is a noticeable species during life on account of its bright red colour.

The general structure closely resembles that of the preceding species (*R. tardus*). Shape oval, rather elongate (fig. 35*a*). Size smaller. Length,

including the apex of the crista, about 960μ, breadth 506μ. Hair armature sparse and slightly more setose than in *R. tardus*. The crista is of an exactly similar type, with only one hair in the front of the anterior sensory area, the latter is less acuminate, and the rod of the crista is decidedly shorter.

The leg measurements are approximately as follows :—605μ, 385μ, 407μ, and 594μ ; they are comparatively shorter and more robust than in *R. tardus*, and the tarsi (length 140μ, breadth 65μ) of the first pair of legs are noticeably less elongate (fig. 35*b*).

Smaris expalpis (Herm.) Koch.

S. impressa Koch, **34**, Fasc. xv, fig. 1. 1882. *S. impressa* Haller **30**, p. 314. 1887. *S. expalpis* Berlese **1**, Fasc. xxxix, n. 2.

Clare Island (Creggan Lough, June); Mulranny, September; Westport district (Belclare, June).

This interesting mite is of decidedly aquatic habits and seems to be especially fond of sphagnum pools, at least this is so in the Clare Island district. A few fully grown specimens were found during the month of June, and immature examples were met with in September. I have also collected this species from a pond on the bank of the River Corrib near Galway, as well as in other parts of Ireland.

Distribution.—Scandinavia; Germany; France; Italy; Britain (Dr. George records it from Lincolnshire, **28B**).

Family THROMBIDIDAE.

Eothrombium siculum Berl.

A single specimen occurred amongst moss near Lough Fenagh in October.

The measurements of this specimen are smaller than those recorded for the species by Berlese (**16**, p. 40). The length of the body is about 742μ; length of tarsus 165μ by 66μ (dorsal view) ; length of tibia 110μ. There is a rather sparse covering of somewhat adpressed spines ranging in length from about 45μ to 60μ.

Berlese separates this species from the allied *E. echinatum* chiefly on account of its smaller size and more slender legs. In all probability the Lough Fenagh specimen is an immature example of the present species.

Distribution.—Sicily (Palermo, in moss, Berlese).

Podothrombium bicolor (Herm.).

A single specimen found in the Westport district in April.

Smaller than the type form as described by Berlese (**13**, p. 68), and possibly to be referred to a variety of the present species. The measurements are length of body 1690μ, breadth, 972μ ; length of tarsus 385μ,

breadth of same 132μ, length of tibia 330μ. In the leg measurements it approaches nearer to Berlese's variety *cisalpinum*, but the tarsi are longer.

Distribution.—Central Europe (Berlese **16**).

Podothrombium filipes (Koch).

Mulranny, under stone on the sea-shore, September.

In all probability the single specimen found in the above locality is to be referred to a variety of the present species, though the record must be made with reserve until more specimens are found. According to Berlese's table of the species of Podothrombium it would appear to belong to the *macrocarpum* group, but the great length of the legs inclines me to believe that the specimen may be a variety of *P. filipes*. The size of the creature and the structure of the palps, &c., also agree with that species. The measurements are as follows :—length of the body about 1460μ; the length of the first pair of legs is about 2048μ; length of tarsus 506μ, breadth 110μ; length of tibia 516μ.

Distribution.—Norway and Germany (Berlese **16**).

Microthrombidium valgum George. (Pl. VIII, fig. 36.)

Slopes of Croaghpatrick in wet sphagnum, also in sphagnum pools at Mulranny and Louisburgh, July to October.

This species is allied to *M. pusillum* Herm., it was described under the name of *Ottonia valga* a few years ago by Dr. George ("The Naturalist," 1909, p. 423) from a specimen found by Mr. Evans at Aberfoyle. The following is a short description of the Irish specimens :—

The length varies from 717μ to 947μ. The colour is red. Shoulders prominent, front margin concave, and the body is strongly narrowed posteriorly. Cephalothorax very small; crista a thick chitinous rod, widened in front to form a lobe-like extremity which projects slightly beyond the front margin of the animal. The eyes are placed immediately in front of the proximal sensory area and *quite close to the crista*. Hair vestiture rather dense, consisting of moderately long (25μ to 30μ) bristles, these are thickened at the middle, and sharply pointed, with strong secondary hairs. Palps stout, appendage of fourth segment short and very broad, rounded at its extremity with a number of long bristles, all of which are spinous, with the exception of one terminal hair; external spine absent; dorsal comb distinct, consisting of about eight bristles. Legs shorter than the body, tarsus of first pair, in side view, of an oblong shape, a little more than twice as long as broad (155μ by 70μ); length of tibia about 90μ.

I am indebted to Dr. George, and also to Mr. Sheppard of the Hull Museum, for a loan of the type specimens of this and the following species.

Microthrombidium ramosum (George) var. **similis** nov. (Pl. VIII fig. 37*a*.)

This well-marked form is allied to *M. sucidum* (C. L. Koch), but differs from it in the shape of the body papillae. A description, with figures, was published by Dr. George in "The Naturalist" for the year 1909.

Apparently the Irish form, of which a single specimen was found amongst moss on Clare Island (June), differs from the type in the shape of the body hairs, and in other details.

The measurements of this variety are as follows:—length of the body, including cephalothorax, 1126μ, and the breadth is about 640μ. General structure as in Microthrombidium. Crista normal. Eyes placed on the lateral outline of the cephalothorax. The hair armature is very peculiar. The shape of these hairs varies in different parts of the body, on the cephalothorax, and the humeral regions—they are, mostly, pointed bristles all very strongly spinous. Elsewhere on the animal the hairs have thickened extremities, reaching their greatest development, in this respect, on the hinder region of the body, where they are distinctly clavate with four, five, or six pointed lobes or teeth at their extremities. The average length of these hairs, especially on the hinder margin, is about 40μ. The palps are short, length about 300μ; fourth segment wide at the base, and its appendage is large (45μ by 25μ), near its base is a strong "inferior spine." The legs are robust: length of first pair about 716μ; tarsus sub-cylindrical widest near base, length 250μ, breadth (on side view) 90μ, length of tibia 125μ.

In this variety the tessellated hairs are less closely set than in the type; they are not quite so clavate, and the extremities are less deeply branched. The appendage of the last palp segment is shorter (in *M. ramosum* it measures 60μ by 25μ).

Microthrombidium spinosum (Can.).

A specimen of this distinct species was found amongst moss on the north-east cliffs of Clare Island in September.

All the measurements of this specimen are a little smaller than those recorded by Berlese (**16**, p. 157), there is no doubt, however, that it is to be referred here. There are two kinds of body spines, one kind having distinct secondary hairs, and the other is plain and sword-like.

Distribution.—Norway; Italy; Britain.

Microthrombidium simulans Berl.

Found in the Westport district in April.

This species may be recognized by the strongly fusiform body hairs. There is only one stout external spine near the appendage of the last palp segment. Here again the Irish specimens are smaller than the Italian.

Distribution.—Norway, and a variety (*trispinum* Berl.) has been described from Germany (**16**).

Microthrombidium calycigerum Berl.

Found in the same locality as the preceding species.

This species is remarkable for the peculiarly modified body hairs. These are very strongly clavate and finely setose, with a septate extremity, and though of similar type throughout, they vary considerably in length in different parts of the body. All of these hairs spring from beautifully formed stellate bases.

The form of the body of this species is rather elongate, the Irish specimens varying in length from 1433μ to about 1800μ, breadth about 1000μ. The length of the first tarsus is 330μ, breadth, 115μ, thus agreeing closely with the measurement given for this species by Dr. Berlese. On the last palp segment there are five stout spines arranged along the outer side close to the appendage.

Distribution.—Norway.

Microthrombidium subrasum Berl.

Clare Island, a single fully grown specimen found in June.

A species having an extremely dense covering of almost globular, papilla-like hairs. The measurements differ only slightly from those of the type form.

Distribution.—Germany; Italy; Britain.

Sericothrombium holosericeum (Linn.).

Clare Island, Achill Island, and the Westport district.

Distribution.—Found throughout Europe.

[*Thrombidium* (?) *fucicolum* Brady.

Under this name Brady has described an acarid which was "washed from among the roots of Algae gathered between tide-marks in Roundstone Bay" (**19**). In a later reference (**20**) he changes the name to *Thrombidium fuscum*, and remarks that it was subsequently found in fresh water. The Irish localities mentioned are "Bog-pools near Clifden (Connemara), ditches (slightly brackish) near Newport (Mayo), Kinny Lough (Donegal)." The description of this acarid is unsatisfactory and leaves many points in doubt so that the true identity of the creature does not appear to have been settled. The rough figure accompanying the original description somewhat suggests one of the sub-aquatic oribatid mites. It certainly does not belong to the genus Thrombidium.]

Family HALACARIDAE.

Rhombognathus setosus (Lohm.).

Clare Island, one specimen found amongst coralline seaweeds in July.

Distribution.—Recorded by Lohmann from the Baltic (strand and littoral regions to a depth of 19 mètres, **44**).

Rhombognathus notops (Gosse).

Clare Island, a few examples amongst coralline seaweeds, July.

Distribution.—Atlantic (ranging as far north as Greenland, **44**). Baltic.

Rhombognathus pascens (Lohm.).

Clare Island, common in coralline seaweeds and in Lithothamnion, July; Blacksod Bay, on shore during March (Irish Fisheries Station W. 189). Elsewhere on the Irish coast at counties Dublin and Cork.

Distribution.—Atlantic, North Sea, and Baltic. Littoral regions down to 46 mètres (**44**).

Rhombognathus Seahami (Hodge).

Clare Island, in coralline seaweeds and in Lithothamnion, July; Blacksod Bay, in Lithothamnion (Irish Fisheries Station W. 235). Has also been found on the east coast at Howth and Sandycove in February and March.

Distribution.—Similar to that of the preceding species.

With regard to the relative numbers in which the species of this genus occur I may mention that of 80 specimens obtained from a small quantity of coralline seaweeds, 66 are referable to *R. paseens*, 10 to *R. Seahami*, 3 to *R. notops*, and 1 to *R. setosus*.

Halacarus (Halacarus) actenus Trouess.

Clew Bay, nymph dredged in 24 fathoms in May (Irish Fisheries Station W. 84); Blacksod Bay, adult male in March, and nymphs in weed from the shore, September (Irish Fisheries Station W. 234). Has also occurred adult on a Holothurian at Portmarnock, on the Dublin coast, in February.

Distribution.—Atlantic, evidently a widespread species in both the northern and southern oceans, occurring as far south as Kerguelen. Littoral region down to 500 mètres.

Halacarus (H.) ctenopus Gosse.

Recorded as occurring on weeds between tide-marks at "Westport and Birterbury Bays" and at the "Isles of Aran (Galway Bay)." (Brady **19.**)

Distribution.—Littoral region of north-western Europe down to 64 mètres (**44**), and as far west as the Bermudas (**45**).

Halacarus (H.) Basteri (Johnst.).

H. spinifer Lohmann **40.**

Clare Island, nymph amongst weed on the coast in August (Irish Fisheries Station W. 281); Blacksod Bay, female, with eggs, in March, and nymphs in September. Has also been found at Ardfry on the Galway coast in May (nymph), and on our eastern coast at Howth and Sandycove.

Distribution.—A widespread species, occurring in the Baltic, North Sea, English Channel, and the Atlantic, with a variety (*affinis*, Trouess.) in the Mediterranean.

Halacarus (H.) Southerni sp. nov. (Pl. VIII, figs. 38*a*, *b*).

This species belongs to the *balticus* group of Halacarus, and in some respects resembles *H. floridearum* Lohmann. It differs from the allied species in the small size, in the form of the body, the armature of the first pair of legs, &c. The inner spur of the third palp segment is very small.

Female (fig. 38*a*).—Length about 385μ, breadth 240μ. Hyaline, with the eyes and a median spot, black. Form very broad, sub-ovate, fore-body produced in a broadly rounded extremity covering most of the capitulum. Side margins indented only at the origin of the third pair of legs, with one shoulder bristle. Dorsal plates rather weakly chitinized and finely punctured. Frontal plate rounded posteriorly; eye-plate oblong and bluntly pointed; hinder dorsal plate long and tongue-shaped; its front margin is truncated, and lies quite close to the frontal shield.

Capitulum (length, including rostrum, 165μ, breadth 75μ), with the hinder margin somewhat truncated, and the sides are rounded; rostrum of a rather broad, triangular form, its apex does not reach the end of the second palp segment. The third palp segment is armed with a minute inner spur.

Legs moderately long and robust, first and second pairs of very similar structure. The length of the first leg (fig. 38*b*) is about 350μ, dorsal surface of third segment strongly humped before middle, with a pair of distal hairs; fourth segment with one ventral and three dorsal hairs, and near the former is a strong spine; fifth segment with two long hairs in addition to the

terminal pair, ventral side armed with three pairs of hairs, of which the first is much shorter than the others; end segment stout, with a dorsal hair, two terminal hairs, and a short ventral spine.

Locality.—Two specimens were dredged in Clew Bay at a depth of 24 fathoms on a bottom of gravel and shelly sand, 25th May, 1909 (Irish Fisheries Station W. 84).

Halacarus (H.) areolatus sp. nov. (Pl. VIII, fig. 39*a*, *b*).

The present species is evidently allied to *H. floridearum* much more so than the preceding form. The much broader frontal plate and the differently sculptured genital area may be noted. The type specimen was unfortunately injured during preparation, so that I am unable to give exact measurements.

Male.—A small species, shape rather long and narrow, and with a weakly chitinized armature. Front margin of the body broad and truncated. There is only one shoulder bristle. First dorsal shield very broad, rounded posteriorly, though in an immature specimen, which possibly belongs to this species, the hinder margin is slightly emarginate. Second dorsal shield tongue-shaped, with a broadly truncated front margin, separated from the first shield by a very narrow space, in which lie two small hair-bearing plates. The eye-plates are rather small and of an oblong shape.

Genito-anal plate large, its front margin reaches well in front of the last pair of leg acetabula; *area genitalis* semi-circular, with numerous hair pores, which are rather widely separated; at the sides of the porous area there is present a group of from twenty to twenty-four distinct areolations in the epidermis (fig. 39*a*).

Capitulum large, basal part very broad and finely punctured; rostrum moderately long, apex not quite reaching the end of the second palp segment. Third palp segment with a strong inner spine. Legs long and slender, and of fairly uniform thickness; the following hair armature applies to the first pair:—third segment, 2 dorsal and 3 ventral hairs; fourth segment, 2 dorsal and 2 ventral hairs; fifth segment, 6 ventral hairs, of which the proximal pair are spur-like, and 4 dorsal hairs; end segment, 1 dorsal and 1 ventral hair, the latter is short and spine-like (fig. 39*b*).

Locality.—Found amongst seaweeds on the shore of Blacksod Bay in September (Irish Fisheries Station W. 234).

Halacarus (Copidognathus) gracilipes Trouess.

Blacksod Bay, ♀ slightly immature, March; in the same locality both adults and nymphs were found in weed on the shore (Irish Fisheries Station

W. 233), and adults were dredged in four fathoms during the month of September (Irish Fisheries Station W. 232).

This beautifully sculptured species is evidently not uncommon in Blacksod Bay, the only Irish locality in which it has been found. Two varieties have been described by Trouessart; apparently the Irish specimens belong to the typical form.

Distribution.—Littoral and abysmal regions, to a depth of 1410 mètres, Trouessart (**95**). North Sea (**44**) Atlantic; Mediterranean (**92**). Trouessart has recorded it from the English coast. "Côtes d'Angleterre, îles Silly (sur une préparation communiquée par M. Brady, confondue avec *Halacarus ctenopus*)" (**91**).

Halacarus (C.) gibbus Trouess.

Clew Bay, adults dredged in 24 fathoms on gravel and shelly sand, May (Irish Fisheries Station W. 84).

A variable species, of which no fewer than five distinct forms have been described by Trouessart (**92**, &c.). The Irish specimens were all dredged in the one locality, and in spite of their small size they appear to me to belong to the type form. At least they possess the *sharp* frontal process of the dorsal shield, the longer legs, strong lamellae, and the capitulum is distinctly swollen at the sides. The measurements are about 400μ in length, by 242μ in breadth.

Distribution.—Has been recorded from the North Atlantic (French coast, and the Azores **91**, **44**), with varieties in the English Channel, Mediterranean, South Pacific, and in the Indian Ocean (**45**).

Halacarus (C.) oculatus Hodge.

Blacksod Bay, dredged in four fathoms, September (Irish Fisheries Station W. 232). Has also been found in Malahide Inlet on the Dublin coast, July, and in Kinsale Harbour in from two to five fathoms, May (Irish Fisheries Station R. 45).

Distribution.—Apparently a widespread species. Baltic; North Sea; Atlantic (coasts of Britain, and as far south as Kerguelen in the South Atlantic, Lohmann, **45**). Trouessart records it from a depth of 1410 mètres (**95**).

Halacarus (C.) rhodostigma Gosse.

Blacksod Bay, adult dredged in three fathoms, March (Irish Fisheries Station W. 181). Additional localities on the Irish coast are—Valencia

Harbour in from seven to nine fathoms, August (Irish Fisheries Station W. 196), and Kinsale Harbour, two to five fathoms, in weeds during May (Irish Fisheries Station R. 45).

Distribution.—North Sea; English Channel; Atlantic. Littoral region down to 58 mètres (**44**).

Halacarus (*C.*) *tabellio* Trouess.

Has been found in rock-pools at Malahide and Howth on the Dublin coast.

Halacarus (**C.**) **lamellosus** var. **septentrionalis** nov. (Pl. VIII, figs. 40*a*, *b*).

There seems no doubt that two examples of a Halacarus dredged in Clew Bay are to be referred to a variety of *H. lamellosus*, Lohmann, and in all probability represent a northern form of this species.

Male (fig. 40*a*). Compared with the typical form as described and figured by Lohmann (**41**) the present variety is much larger (length 396μ–410μ, breadth about 242μ). The marginal lamellae of the third segment of the first pair of legs are greatly reduced, or are absent. This segment is also relatively longer, about equalling the fifth segment in length. There is only a faint trace of a lamella on the corresponding segment of the second pair of legs. The lateral extremities of the leg segments are strongly produced, as in the type form. Length of first leg (fig. 40*b*) about 330μ; there are two short spines and a fine hair on the under surface of the fifth segment.

The extremity of the last palp segment is about on a level with the end of the fourth segment of the first pair of legs, in the typical form it evidently overreaches it considerably. The second dorsal shield is narrower and of more uniform breadth throughout; it is very long, truncated in front, and almost touches the posterior margin of the first dorsal shield.

Locality.—Clew Bay, County Mayo, dredged in 24 fathoms on a bottom of gravel and shelly sand, 25th May, 1909 (Irish Fisheries Station W. 84).

H. lamellosus has been recorded by Lohmann (**44**) from the Atlantic littoral (Bermudas, mouth of the Amazons), and from the Pacific Ocean (Sydney). Trouessart has also recorded it as having been dredged on *Lithothamnion coralloides* in the English Channel (Saint-Vaast-la-Hougue). The specimens from the last-mentioned locality are without leg lamellae and possibly belong to the present variety (**94**).

Halacarus (**C.**) **Fabricii** (Lohm.)

Blacksod Bay, the nymph and adults were found amongst weeds on the shore during September (Irish Fisheries Station W. 234). Elsewhere on the

Irish coast it has occurred at Ardfry in Co. Galway, in from one to three fathoms during May (Irish Fisheries Station A. 134); and also at Malahide and Howth on the Dublin coast in February and June.

Distribution.—Littoral region down to 318 mètres (**44**). Atlantic (widespread); Baltic.

Scaptognathus Trouessarti sp. nov. (Pl. VIII, fig. 41*a*, *b*.)

For the single example of this interesting species I am indebted to Mr. R. Southern, who found it amongst material dredged in from 19 to 20 fathoms in Dingle Bay on a bottom of fine gravel during the month of August (Irish Fisheries Station W. 260). The habitat probably corresponds with the very similar ground in Clew Bay (gravel and shelly sand, 24 fathoms) where *H. actenus*, *H. Southerni*, *H. gibbus*, and *H. lamellosus* were found. The species is undescribed, and I have much pleasure in naming it in honour of Dr. Trouessart who has kindly compared my drawings of the creature with his types of *S. tridens* and *S. Hallezi*. It is evidently intermediate between these two species, the only hitherto known representatives of this peculiar genus.

The following characters will serve to distinguish the three species of Scaptognathus.

Size larger, total length exceeding 700 μ.

Capitulum very large, more than half the breadth of the body; end of the second palp segment terminating on its under side in a long, slender spine,[1] which is bent sharply downwards; the extremities of the two strong apical teeth are widely separated. Total length of the animal 750μ . . . *S. tridens* Trouess.

Capitulum much smaller, slightly less than half the breadth of the body; apex of the second palp segment (in dorsal view) ending in a small bluntly pointed lobe, armed with a long fine hair; a long setiform bristle springs from the underside of the segment; both of these hairs are directed inwards; the extremities of the strong apical teeth lie almost in the same plane. Total length about 716μ. . . . *S. Trouessarti* sp. nov.

Size smaller, total length 450μ.

Capitulum much as in *S. Trouessarti*, but its sides are more evenly rounded; end of the second palp segment without a long inwardly directed hair, instead of which there is a short hair on its outer extremity; ends of the two strong teeth separated. *S. Hallezi* Trouess.

[1] Corresponding with the "apophyse olécranienne" of Dr. Trouessart's paper on this genus (**92**).

Apart from the smaller size of the capitulum the present species is apparently more closely allied to *S. tridens* than to *S. Hallezi.* It resembles the former species in size, and in the sculpturing of the dorsal and ventral plates, especially of the first and second epimera. The front margin of the body is very distinctly truncated, and the genito-anal plate is vase-shaped, with pronounced anterior corners; in the latter character it would appear to differ from both of these species.

In the size and shape of the capitulum (length 286μ, breadth 138μ), it closely resembles *S. Hallezi,* but the side margins are rather distinctly angled immediately in front of the basal constriction. The second palp segment is armed as indicated in the preceding table, but there is also on its underside, close to the apex, a stout ventrally directed process, which is not visible when the animal is seen from above.

Trouessartiella falcata (Hodge).

Blacksod Bay, nymph and adult in September.

Distribution.—Littoral and abysmal regions (**44**), Baltic, North Sea, and Atlantic, ranging into the Antarctic Ocean (to a depth of 385 mètres, **45**).

Simognathus sculptus (Brady).

Clare Island, the larva, nymph, and adult occurred commonly on *Lithophyllum incrustans* on the shore during the month of July. The adult has also been found in rock pools at Portstewart in October.

The six-legged larval form of this remarkable species measures about 330μ in length, including the capitulum and rostrum. It has a comparatively large frontal shield shaped much as in the adult, and there is a small oval plate at the end of the body. Apparently the frontal plate does not alter much during the development of the creature, as the plate armature of the first nymphal stage (length 614μ, breadth 307μ) is practically the same as in the larva.

Note.—The type specimens of the new species and varieties described in this paper are preserved in the National Museum, Dublin.

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Index to Genera and Subgenera.

INDEX TO GENERA AND SUBGENERA—*continued.*

DESCRIPTION OF PLATES.

PLATE IV.

Fig.

1 *Gamasus* (*Pergamasus*) *runcatellus* Berl. Male. Armature of second leg.

2 *Gamasus* (*Pergamasus*) *runciger* Berl. Male. *a*, Armature of second leg, type form. *b* and *c*, Ventral view of femoral process. Var. *armatus* nov. Male. *d*, Ventral view of femoral process. *e*, Armature of second leg. *f*, Trochanter of fourth leg. *g*, Chelicerae.

3 *Gamasus* (*Pergamasus*) *diversus* sp. nov. Male. *a*, Armature of second leg. *b*, Trochanter of fourth leg. *c*, Outer maxillary lobe. *d*, Chelicerae. *e*, Epistome.

4 *Gamasus* (*Pergamasus*) *processiferus* sp. nov. Female. *a*, Armature of trochanter. *b*, Area genitalis. *c*, Chelicerae.

Fig.

5 *Gamasus* (*Pergamasus*) *crassipes* L. Male. *a*, Armature of second leg, Irish form. *b*, Ventral view of tibia. *c*, Ventral view of tibia of var. *longicornis* Berl.

6 *Gamasoides bispinosus* sp. nov. Male. *a*, Second leg of male. *b*, Chelicerae.

7 *Halolaelaps celtieus* sp. nov. *a*, Ventral view of male. *b*, Same of female. *c*, Male chelicerae. *d*, Ambulacrum. *e*, Epistome.

PLATE V.

8 *Cyrthydrolaelaps hirtus* Berl. *a*, Male. Ventral view. *b*, Male Chelicerae. *c*, Second leg of male. *d*, Ambulacrum. *e*, Female area genitalis, nymph. *f*, Epistome of female. *g*, Ambulacrum of nymph. *h*, Ventral view of immature male. *i*, Epistome of male (nymph). *j*, Chelicerae of male (nymph).

9 *Cyrtolaelaps transisalae* Oudms. Epistome.

10 *Cyrtolaelaps Kochi* Träg. Epistome.

11 *Pachylaelaps littoralis* sp. nov. Male. *a*, Ventral view. *b*, Second leg. *c*, Epistome. *d*, Chela.

12 *Pachylaelaps longisetus* sp. nov. Female. *a*, Ventral view. *b*, Epistome. *c*, Chelicerae. *d*, Second leg.

13 *Holostaspis terreus* (Can. et Fanzago). Epistome.

14 *Holostaspis marginatus* var. *littoralis* nov. *a*, Ventral view of male. *b*, Capitulum and palp. *c*, Epistome. *d*, Fourth leg of immature male. *e*, Female.

PLATE VI.

15 *Dendrolaelaps Oudemansi* sp. nov. Male. *a*, Ventral view. *b*, Chelicerae. *c*, Tarsus of second leg. *d*, Female, believed to be of this species.

16 *Laelaps* (*Hypoaspis*) *oblongus* sp. nov. Female.

17 *Laelaps* (*Hypoaspis*) *ovatulus* sp. nov. Female. *a*, Under side. *b*, Chelicerae.

18 *Laelaps* (*Hypoaspis*) *longipes* sp. nov. Male. *a*, Under side. *b*, Chelicerae.

19 *Laelaps* (*Cosmolaelaps*) *stylifcrus* sp. nov. Male. *a*, Trochanter. *b*, Second leg. *c*, Chelicerae.

20 *Seiulus remiger* (Kramer). Dorsal view.

21 *Seiulus laevis* Oudms. Female. Under side.

22 *Paraseius italicus* (Berl.) Female. *a*, Under side. *b*, Ambulacrum.

23 *Paraseius serratus* sp. nov. Female. *a*, Under side. *b*, Part of dorsal shield. *c*, Ambulacrum. *d*, Epistome.

24 *Paraseius tenuipes* sp. nov. Female. *a*, Under side. *b*, Tritosternum. *c*, Chelicerae.

25 *Zereon trigonus* Berl. Dorsal view.

Plate VII.

Fig.

26 *Thinozercon Michaeli* sp. nov. *a*, Ventral view of male. *b*, Male genital foramen. *c*, Epistome. *d*, Male chelicerae. *e–h*, Leg spines. *i*, Ambulacrum. *j*, Dorsal view of female. *k*, Sternal area of female. *l*, Side view of peritreme. *m*, Dorsal view of nymph.

27 *Phauloeylliba Berlesii* sp. nov. Male. *a*, Under side. *b*, Part of body margin. *c*, Genital foramen. *d*, Armature of first palp segment.

28 *Haluropoda interrupta* sp. nov. *a*, Dorsal view. *b*, Under side of male. *c*, Ambulacrum.

29 *Haluropoda minor* sp. nov. *a*, Dorsal view. *b*, Male genital foramen. *c*, Third segment of male palp. *d*, Ventral view of female.

30 *Urodinychus punctatissimus* sp. nov. Female. *a*, Under side. *b*, *area genitalis*.

Plate VIII.

31 *Seiulus minutus* sp. nov. Dorsal view of body.

32 *Oribata alpina* sp. nov. *a*, Dorsal view. *b*, Pseudostigmatic organ.

33 *Notaspis venustus* Berl. *a*, Cephalothorax. *b*, Pseudostigmatic organ.

34 *Rhyncholophus tardus* sp. nov. *a*, Dorsal view. *b*, Body hair. *c*, Crista. *d*, Rostrum and palps.

35 *Rhyncholophus sabulosus* sp. nov. *a*, Dorsal view. *b*, Tarsus of first leg.

36 *Thrombidium valgum* George. Crista and eyes.

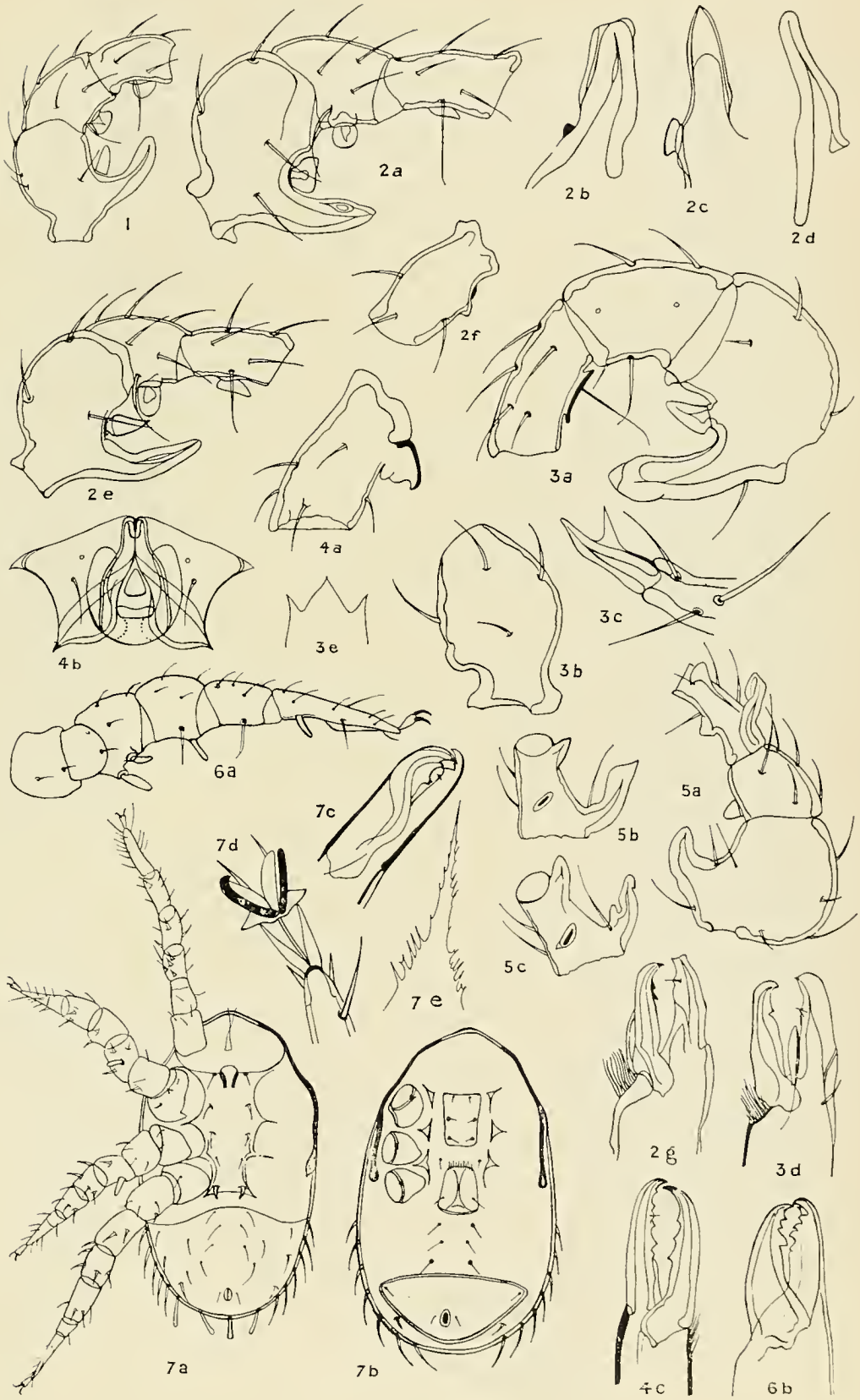
37 *Thrombidium ramosum* George. var. *similis* nov. *a*, Body hair. *b*, Body hair of typical form.

38 *Halacarus Southerni* sp. nov. *a*, Dorsal view of body. *b*, First leg.

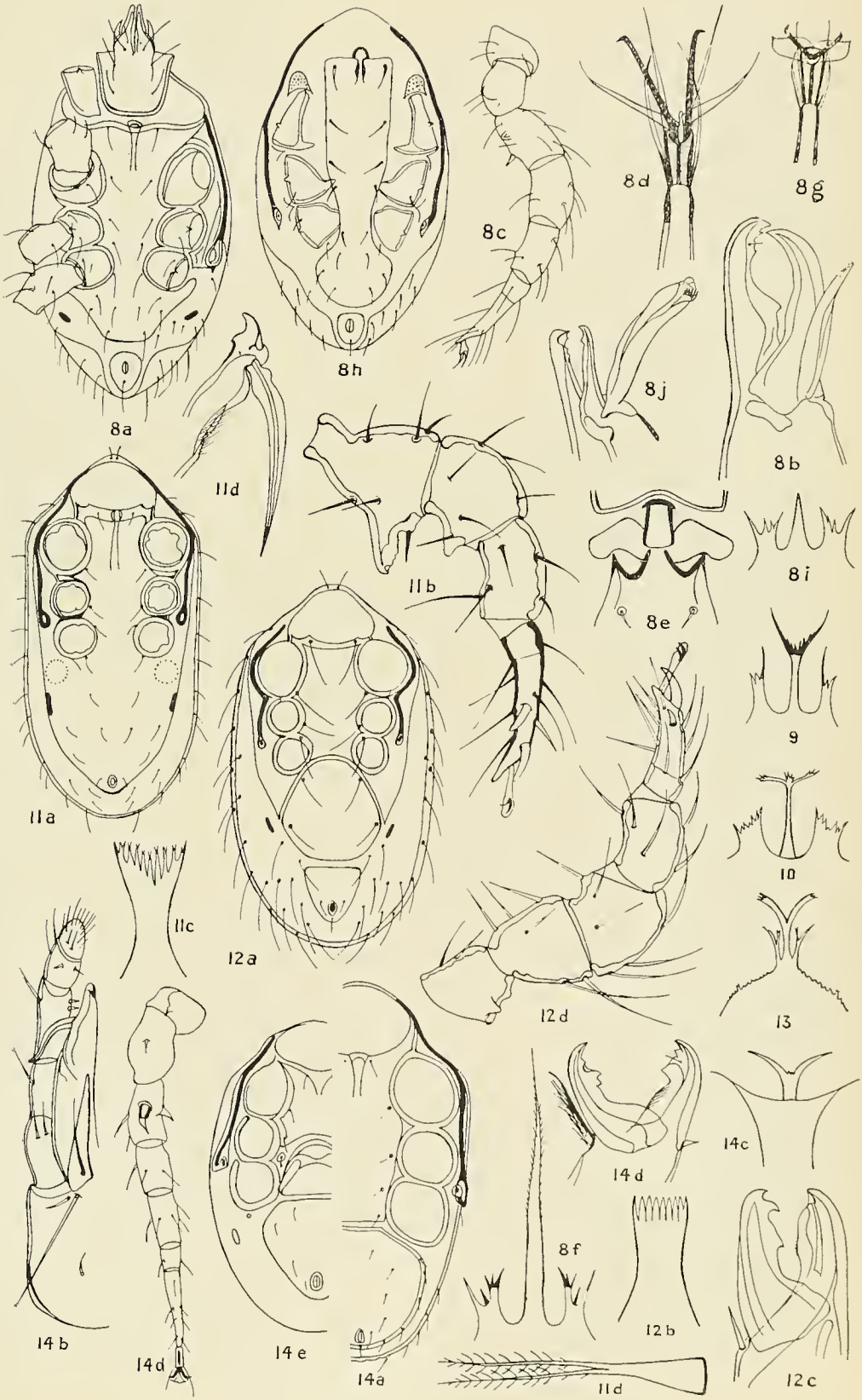
39 *H. areolatus* sp. nov. *a*, Side margin of *arca genitalis*. *b*, End segments of first leg.

40 *H. lamellosus* Lohmann var. *septentrionalis* nov. *a*, Dorsal view. *b*, Ventral view of first leg.

41 *Scaptognathus Trouessarti* sp. nov. *a*, Dorsal view, *b*, Extremity of palp.



CLARE ISLAND SURVEY.—HALBERT: ACARINIDA.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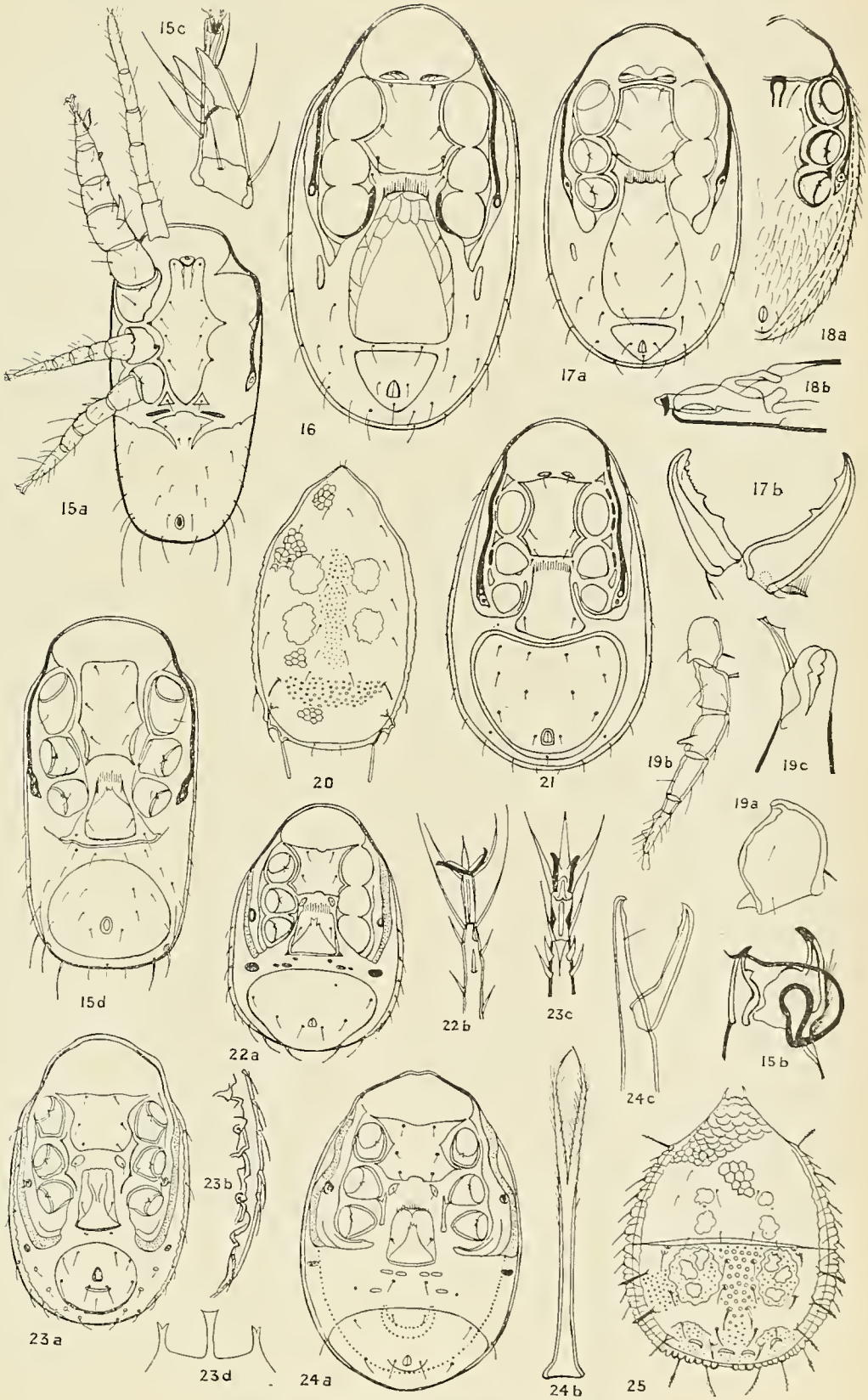
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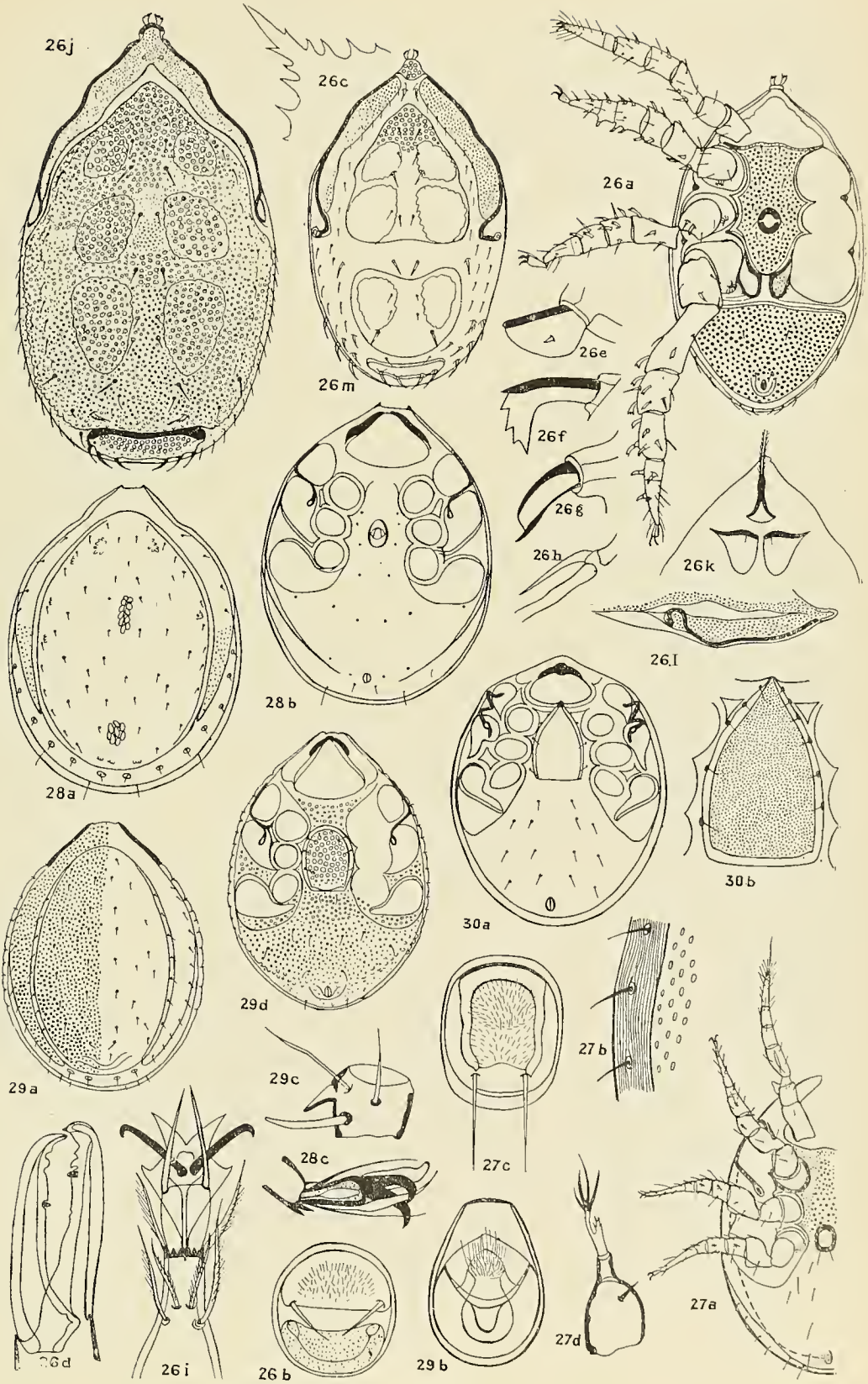
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CLARE ISLAND SURVEY.—HALBERT: ACARINIDA.