

ses observations soient exactes, le moins qu'on puisse dire, c'est qu'il a eu tort de tirer de l'observation d'une ou même de quelques espèces, une conclusion générale s'appliquant à toutes les Anthophores indistinctement.

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Über die Fauna der Mussolini - Höhle im Bükkgebirge.

(Mit 7 Figuren).

Von

Dr. **Maria Mottl.**

Die Mussolini-Höhle (im Volksmund Subalyuk, Oberungarn, Kom. Borsod) wurde durch ihre *Homo primigenius*-Funde berühmt, die im Jahre 1932 aus dem Spätmousterien Horizont der Ausfüllung zum Vorschein kamen. Die Steingerätkultur der Mussolini-Höhle ist ein klassisches Mousterien, das in den pleistozänen Ablagerungen der Höhle in zwei gut auseinanderhaltbaren Etagen (in der unteren Schichtengruppe das prächtige Hochmousterien, in der oberen das Spätmousterien) vorkommt.

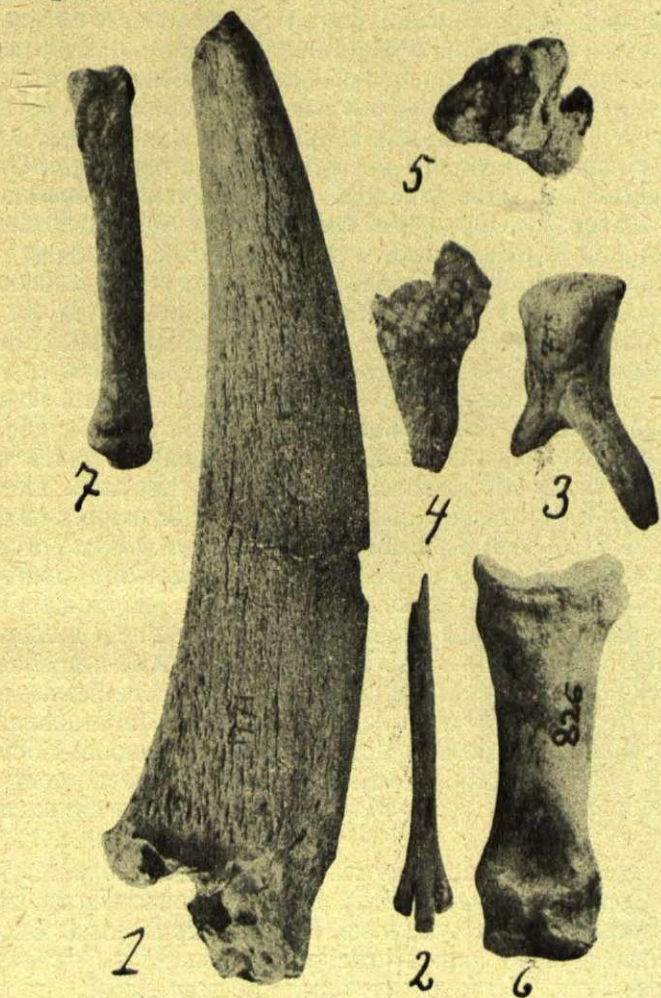
Als ich im Auftrage der Direktion der Kgl. Ung. Geol. Anstalt die Bearbeitung der Fauna der Mussolini-Höhle begann, betrachtete man diese Fauna allgemein als eine ganz gewöhnliche eiszeitliche Tiergesellschaft, die eine eingehendere Untersuchung nicht lohnte. Da ich aber den Ausgrabungen persönlich beiwohnte und zum grössten Teile auch die Inventarisierung des Materials an Ort und Stelle besorgt hatte, nahm ich von vornherein einen ganz ab-

weichenden Standpunkt ein, weshalb ich mich zu einer ganz eingehenden Untersuchung der Tiergemeinschaft veranlasst sah.

Mein Streben wurde durch interessante Ergebnisse belohnt. Es zeigte sich, dass die aus 2387 Stücken bestehende, scheinbar bedeutungslose Fauna in Wirklichkeit eine unserer reichsten Eiszeitfaunen darstellt, da sie aus 42 Säugetierarten zusammengesetzt ist und da es mir gelang, darin das Vorkommen solcher Arten nachzuweisen, welche im vaterländischen Pleistozän bisher entweder gar nicht bekannt waren, oder als sehr selten betrachtet wurden. Schon zu Beginn der Grabungen fiel mir auf, dass einzelne Schichtengrenzen nicht nur petrographische, sondern auch paläobiologische Grenzen bedeuten. Petrographisch liessen sich die Sedimente der Mussolini-Höhle in drei Gruppen einteilen: 1. rötliche, 2. grünlich-graue und 3. lichtbraune Schichten. Die prächtigen Kulturreste des Hochmousterien gehören den lateritischen roten Sedimenten der Basis an. In der Fauna dieser Schichten herrscht eine sehr interessante Steinbockart vor, die ich auf Grund meiner Untersuchungen in den Capra Sewertzowi-ibex Formenkreis einreichte. Sämtliche gleichartigen Skeletteile sind an der gleichen Stelle aufgebrochen, was darauf hindeutet, dass dieses Tier vom Urmenschen der Mussolini-Höhle als Beute besonders geschätzt war. Hierauf folgte nach oben eine dunkelbraune Feuerstätte als Grenzschicht. Im mittleren grünlich gefärbten Schichtenkomplex diente die Höhle fast ausschliesslich als Zufluchtsstätte des Höhlenbären. Die in der oberen lichtbraunen Schicht gefundene Kultur entspricht dem Spätmousterien, mit einer spärlichen aber artreichen Fauna, in welcher schon extreme Steppenelemente enthalten sind. Die Kultur- und Knochenreste dieser Schicht fanden sich grösstenteils nur im vorderen Teile der Höhle, woraus, sowie aus anderen stratigraphischen Tatsachen wir darauf folgern konnten, dass der Einsturz des Höhlenschlotes zu dieser Zeit erfolgte.

Die Fauna der oberen Schichtengruppe (Spätmousterien) enthielt folgende Arten: I. Charaktertier: *Ursus spelaeus* Rosenm., II. Begleitfauna: *Ursus arctos* L. var. foss., *Canis lupus* L. foss., *Thos* sp., *Vulpes vulpes vulpes* L. foss., *Meles meles* L. foss., *Lutra* sp., *Martes martes* L. foss., *Mustela erminea* L. foss., *Mustela Eversmanni* Soergeli Éhik (*Lutreola*?), *Felis spelaea* Goldf., *Felis pardus* L. foss., *Hyaena spelaea* Goldf., *Lepus (europaeus)* Pall., *Ochotona pusillus* Pall., *Cricetus cricetus* L. foss., *Sciurus vulgaris* L. foss., *Citellus citellus* L. foss., *Mus* sp., *Microtus arvalis-agrestis* Formenkreis, *Arvicola schermer* Schaw, *Spalax (hungaricus)* Nehr., *Alactaga saliens* Gmel. foss., *Sus scrofa* L. foss., *Rangifer tarandus* L. foss., *Cervus* sp., *Cervus elaphus* L. foss., *Megaceros giganteus* Blmb., *Bos primigenius* Boj., *Bison priscus* Boj., *Rupicapra rupicapra* L. foss., *Capra Sewertzowi-ibex* Formenkreis, *Ovis* sp., *Equus Abeli-mosbachensis*-

Gruppe, *Equus hemionus* Pall., *Rhinoceros antiquitatis* Blmb., *Elephas primigenius* Blmb.



Figurenerklärung.

Fig. 1. *Capra Sewertzowi* - *ibex* Formenkreis. Hornzapfen. Seitenansicht. $\frac{1}{3}$ der natürlichen Grösse. Hochmousterien. — Fig. 2. *Alactaga saliens* Gmel. foss. Metatarsalknochen. Nat. Grösse. Spätmousterien. — Fig. 3. *Elephas primigenius* Blumenb. Milchmolar. Natürliche Grösse. Spätmousterien. — Fig. 4. *Cuon alpinus* Pall. foss. P^4 dext. Fragment. Natürl. Grösse. Hochmousterien. — Fig. 5. *Cuon alpinus* Pall. foss. M^1 dext. Natürl. Grösse. Hochmousterien. — Fig. 6. *Ursus (arctos) arctos* sp. Phalang. I. anter. dext. Natürl. Grösse. Spätmousterien. — Fig. 7. *Thos* sp. Metacarpale II. sin. Natürl. Grösse. Spätmousterien. — (Fig. 5 hätte senkrecht stehen sollen!).

Alles aus der Mussolini-Höhle.

Als wichtigere Resultate seien erwähnt, dass der Braumbär einer grossen Rasse angehört, deren Reste in Ungarn bis zum Solutréen anzutreffen sind. Vom Schakal waren bisher nur Reste aus oberpliozänen resp. präglazialen Ablagerungen bekannt; das ist der erste Fall, das wir seine Reste auch in pleistozänen Sedimenten antrafen. Der Fuchs entspricht der skandinavischen Stammform. Das Hermelin und das Wiesel, die in unserem Spätglazial dominieren, sind hier nur durch je einen Unterkiefer vertreten. Meine bisherigen Untersuchungen zeigten, dass die von Th. Kormos als «*Mustela robusta*» beschriebene Art, die später von J. Éhik *Mustela Eversmanni* Soergeli genannt wurde und zu welcher auch die iltisartigen Reste der Mussolini-Höhle gehören, keinesfalls mit der Newton'schen Form identisch ist. Da aber manche Merkmale, so besonders die Kürze der Extremitätenknochen und die schwache postfrontale Einschnürung, auch gegen die Zugehörigkeit zum Steppeniltis sprechen, so glaube ich vielmehr, dass diese ungarische Art als eine ausgestorbene, grosse *Lutreola*-Form angesehen werden muss. Die *Arvicola*-Reste sind kleiner, wie die der *Arv. amphibius-terrestris* Gruppe und passen in die Variationsbreite der *Arv. scherman*. Der Steppenspringer war in unseren eiszeitlichen Faunen bisher nur durch einen einzigen Zahn vertreten, umso erfreulicher ist das Vorkommen seines Metatarsalknochens im Spätmousterien der Mussolini-Höhle. Interessant ist das Vorhandensein einer grossen elaphoiden Hirschart, von welcher leider nur Phalangen zum Vorschein kamen. Das Pferd erwies sich als ein Repräsentant der *Abeli-mosbachensis* Gruppe, welches deswegen nicht kurz als *Equus Abeli* genannt werden kann, weil P_2 und M_3 auch Anklänge an *Equus mosbachensis* zeigen. Sehr wichtig ist, dass in der Fauna der Mussolini-Höhle auch Skelettreste vom *Dsiggetai* bestätigt werden konnten, denn dieses Steppentier fehlte bisher aus den vaterländischen Faunen vollständig.

Die Säugetierarten der unteren Schichtengruppe sind: I. Charaktertier: *Capra Sewertzowi*-ibex, II. Begleitfauna: *Ursus spelaeus* Rosenm., *Ursus arctos* L. var. foss., *Canis lupus* L. foss., *Cuon alpinus* Pall. foss., *Vulpes vulpes crucigera* Bechst. foss., *Felis spelaea* Gold., *Felis lynx* L. foss., *Hyaena spelaea* Goldf., *Lepus* sp., *Cervus elaphus* L. foss., *Bos primigenius* Boj., *Rupicapra rupicapra* L. foss., *Equus Abeli-mosbachensis*, *Rhinoceros* (antiquatis?). Mikrofauna fehlt!

Cuon alpinus repräsentiert wieder eine Art, die im vaterländischen Pleistozän bisher garnicht bekannt war. Die Zahnreste stimmen sehr gut mit den Exemplaren von Bonaria überein. Die Fuchsart der unteren Schichtengruppe ist mit der schlankeren *V. v. crucigera* identisch. Da vom Nashorn nur einige Handwurzelknochen und Extremitätenbruchstücke vorhanden sind, konnte leider nicht mit

Sicherheit festgestellt werden, ob sie vollkommen dem schlichthaarigen Nashorn angehören.

Die Zusammensetzung der oberen und unteren Fauna ist verschieden. Die untere Tiergesellschaft setzt sich aus solchen Formen zusammen, die auf ein gemässigttes, mildes Klima hindeuten und stimmt als solche mit den europäischen sog. «warmen Mousterien-Faunen» (La Micoque, Wildkirchli, Krapina, Mentone, Ilskaja, Riss-Würm Interglacial) überein. Die obere Fauna hat demgegenüber schon einen gewissen Steppencharakter, da in ihr auch extreme Steppenformen, wie *Alactaga* und der Kulan auftreten. Da aber in dieser Fauna die Lemminge, die Schneehühner, das Tundrarentier, der Vielfrass, der Polarfuchs, der Moschusochs, das Murmeltier, ferner der in dem Spätglazial Ungarns vorherrschende Zwerghamster (= *Cricetiscus songarus*), *Citellus citelloides* und auch die nordische Wühlmaus fehlen, dagegen mehrere Waldelemente darin vertreten sind, kann sie mit unseren typischen glazialen Faunen und mit dem europäischen «Kalt-Mousterien» (Würm) nicht verglichen werden, — und muss daher in der Chronologie der polyglazialistischen Auffassung an das Ende des Riss-Würm Interglazials, in der der monoglazialistischen an das Ende des Frühglazials gestellt werden. Die Fauna des Spätmousteriens zeigt, dass in der zweiten Hälfte des Mousteriens das Klima kälter und trockener wurde.

Zu sehr interessanten Analogien führte mich der Vergleich meiner Resultate mit den Untersuchungen von F. Hollendorfer und E. Scherf. Professor Hollendorfer untersuchte die Holzkohlenreste, die wir in der Höhle aus 5 besonderen Schichten sammelten. Die Resultate seiner Studien waren, dass während in den Schichten der Basis noch Laubbäume vorherrschen, überwiegen in den mittleren schon Kiefer und Lärche und in den hangenden Schichten erscheint die Zirbelkiefer. E. Scherf stellte im Donau-Theiss Zwischengebiet und allgemein in der Grossen Ungarischen Tiefebene den oberpleistozänen blauen Ton und seine sandigen Abänderungen, sowie die darauf befindliche Schichte mit Pflanzenresten mit der grössten Wahrscheinlichkeit in das Riss-Würm Interglazial, in welchem er eine interessante Klimaänderung beobachtete. Auf Grund der phytopalaeontologischen Bestimmung von J. Tuzson und F. Hollendorfer und seiner eigenen geologischen Beobachtungen nimmt er nämlich an, dass in dem erwähnten Gebiet zum Anfang des Interglazials noch ein gemässigttes Klima beanspruchende Laubbäume (*Salix*, *Betula*) wuchsen, welche dann beim Sinken der Temperatur von der Lärche und Zirbelkiefer als vorherrschende Baumgattungen abgelöst wurden. Nach Scherf veränderte sich dieses kalt-humide subglaziale Klima des Spätinterglazials erst zur Würm-Eiszeit in ein kalt-arides. Wir wissen aber aus den Untersuchungen von Zeuner auch sehr gut, dass ein ei-

gentliches Tundrenklima Köppen's (Juli-Mittel nahe zu 0^0) in Ungarn nur auf den Hochrücken der Karpathen einsetzte.

Wir sahen, dass die Hochmousterien-Fauna der Mussolini-Höhle einem gemässigten Waldklima entspricht, das die vorherrschenden Baumgattungen gleichfalls Laubbäume (*Cornus*, *Continus*, *Carpinus*) waren, die im milden Klima leben und dass es als «warmes Mousterien» in das Riss-Würm Interglazial zu stellen ist. Es ist also sehr gut mit den blauen Tonen und Sanden bzw. mit dem unteren Horizont der Pflanzenschichte der grossen Ungarischen Tiefebene zu parallelisieren. Dagegen wäre das Spätmousterien der Mussolini-Höhle mit seinem Steppencharakter, ferner die Lärchen- und Zirbelkiefer-Vegetation mit der subglazialen Zeit der Einteilung von Scherf zu vergleichen.

Scherf meint, dass im Untergrunde der Grossen Ungarischen Tiefebene wahrscheinlich mehrere solche Ablagerungszyklen, bzw. Interglazialperioden nachweisbar sein werden. Sollte sich dies zur Gänze beweisen lassen, so würde dies auch die monoglaziale Auffassung der bisherigen ungarischen palaeontologischen Forschung stürzen. Hiezu wäre aber in erster Reihe der Nachweis eines Acheuléen mit «kalter» Fauna notwendig, da diese Kultur in die Riss-Eiszeit eingereiht worden ist. Leider ist das Acheuléen bei uns bislang nur mit ein-zwei Klingenfunden auf sekundärer Lagerstätte vertreten. Sollten die Funde von Süttö tatsächlich in das Acheuléen gehören, so wäre dies wiederum ein Beweis für die Richtigkeit der monoglazialistischen Auffassung, da die Fauna von Süttö auf ein mildes Klima hindeutet.

Im Sinne der monoglazialistischen Auffassung gibt die Fauna der Mussolini-Höhle ein glänzendes Beispiel für den allmählichen Übergang ab, mit welchem sich unsere präglaziale Tiergemeinschaft des warmen Klimas stufenweise zur typisch hochglazialen Fauna des kalt-ariden Klimas veränderte.

Es ist charakteristisch, dass auch unsere sonstigen Mousterien-Faunen, wie z. B. die aus dem Bordu Mare bei Ohabapanor, aus der siebenbürgischen Igric-Höhle und von Tata ebenfalls auf ein gemässigt Waldklima hinweisen, oder zumindest indifferent sind.

Unter den Ergebnissen der eingehenden Untersuchung der Faunenreste der Mussolini-Höhle ist jedenfalls eine der interessantesten, dass es der erste Fall wäre, in dem Ablagerungen von Höhlenausfüllung mit grosser Wahrscheinlichkeit mit Sedimenten des offenen Vorlandes parallelisiert werden könnten.

The Comparative Morphology of the Secondary Sexual Organs of Linyphia and Some Related Genera, Including a Revision of the Group.

(Plates VI—XXIII) *)

By

Helen Hayden Blauvelt

Dedication.

It is a great pleasure to dedicate this paper to Professor Doctor **Emrik Strand** whose distinguished career has been an inspiration to two generations of arachnologists. His many excellent contributions to the taxonomy of Arthropods include studies in all the major groups of Araneida. The spider fauna of numerous remote parts of the world is known to us through the scholarly works of this eminent arachnologist. It is, indeed, a great privilege to contribute to this timely enterprise honoring Professor Doctor **Strand** whose great fame is so richly deserved.

The genus *Linyphia* and closely related genera include a very close series of species, so that all the sclerites of the complex secondary sexual organs may be accurately homologized. The few aberrant species provide examples of specialization of the general type.

These genera form one of the largest groups of the subfamily Linyphiinae. Many of the species are rather large, conspicuously marked, and generally well known. The webs of the family Linyphiidae are formed of irregular threads usually containing one or more horizontal sheets of silk. The species of *Linyphia* build webs unique in structure, the webs of closely related species frequently being similar.

A considerable number of taxonomic characters were found useful in the revision of this group. The most significant character is undoubtedly the external reproductive organs: the palpal bulb of

*) In the text the plates have been numbered I—XVIII. On the plates both numerations are given.

the male and the epigynum of the female. The size and spacing of the eyes, the relative length of the legs, various patellar and tibial processes of the male palpus, the presence of a dorsal cheliceral tooth in the male and a long dorsomesal cheliceral bristle in the female are other characters which show consistent similarity in closely related species.

A complete description is only given of those species which occur in North America. Exclusive of palpus and epigynum, there are numerous adequate descriptions of European species.

Acknowledgements.

I am greatly indebted to Professor C. R. Crosby whose encouragement and criticism have made this study possible.

Most of the material used in this revision was obtained from the rich collection of Cornell University. Through the courtesy of L. Berland and L. Fage of Paris, and Nathan Banks and Miss Bryant of Harvard, valuable specimens were loaned me from the fine collections of the Muséum National d'Histoire Naturel at Paris and the Museum of Comparative Zoology at Cambridge. Interesting material was also received through the kindness of S. C. Bishop of the University of Rochester and J. Mc. Dunnough of the Canadian Department of Agriculture and R. V. Chamberlin.

The Palpal Organ of Linyphia

The subtegulum of Linyphia is a small bowl-shaped piece (Pl. I, fig. 2, A). It presents no characteristic of taxonomic interest. The tegulum (Pl. I, fig. 2, B) is a band which forms a sheath for the duct. It makes a spiral with slightly less than one and a half turns. In the unexpanded bulb the distal part of the tegulum wholly or partially covers the proximal part where the turns overlap. The distal half-turn forms a heavy, wide tegular plate (Pl. I, fig. 7, J) which lies on the exposed lateral surface of the unexpanded bulb. The anterior margin of the wider part of this plate is the bezel of Crosby and Bishop. Within the tegular plate, the duct varies its spiral with one or more irregular curves. The surface of the tegular plate is usually modified to correspond to the course of the duct. The margin of the tegular plate nearest the subtegulum is raised to form a narrow, heavy ridge, the tegular ridge (Pl. I, fig. 7, a). A depression in front of this ridge, the tegular groove (Pl. I, fig. 7, b), widens ventrally. In some species of Linyphia, the turns of the tegulum are closely fused where they overlap so that the tegular ridge appears as a narrow ridge along a common sclerite covering both turns of the duct. This occurs in *L. clathrata*. In the tegulum of *L. marginata*, the parts may be seen more distinctly.

Distally the tegulum is produced into an apophysis, the median apophysis of the tegulum (Pl. I, fig. 4, C). At the base of this piece, the duct, surrounded by a narrow, membranous sheath, passes to the embolic division. The base of the median apophysis is widened toward the tegular plate in a spoon-shaped articular knob (Pl. I, fig. 4, c). The depression in this knob is the articular depression which holds the base of the radix during copulation. The median apophysis is flat and ribbon like, and extends across the tegulum towards the opposite end of the tegular plate. It is composed of two parts. The first is a heavy triangular piece which forms the proximal part of the median apophysis and extends along the lateral side of the distal part. This piece is the lateral support (Pl. I, fig. 4, d). The remainder of the apophysis is attached along the mesal margin of the lateral support. The tip is forked, ending in a flattened, curved apical tooth (Pl. I, fig. 4, e) and a membranous apical lobe (Pl. I, fig. 4, f).

The lamella of the embolic division (Pl. I, fig. 1, 3, 5, D) is a heavy triangular plate, widest in front, and slightly curved around the more delicate parts which it protects in the unexpanded bulb. The anterior margin is folded in toward the bulb and forms the folded edge (Pl. I, fig. 1, g), which is frequently grooved. The anterior part of the lamella is extended on each side into a process. The mesal process (Pl. I, fig. 6, h) lies nearest the cymbium and is continuous with the hind margin of the folded edge. It is usually a slender rod which curves forward to support the terminal apophysis of the embolic division, then back, to end near the tip of the radix to which it is fastened by membrane. Behind the mesal process, the lamella bears a short tooth, the spur (Pl. I, fig. 1, k). The large lateral process (Pl. I, fig. 1, 5, i) is continuous with the anterior margin of the lamella. It usually curves slightly around other parts of the embolic division. The base of the concave side of the lateral process serves as attachment area for a membrane from the lamellar arm of the radix, the tether membrane (Pl. I, fig. 3, p). In *Linyphia clathrata* the wall of the major process is thickened at the point of attachment of this membrane. This inner thickening extends slightly in toward the bulb. In some species of *Linyphia* the inner thickening is very large and extends along the side of the lateral process nearest the bulb. It may have an independent anterior margin, similar and adjacent to that of the lateral process (Pl. II, fig. 14, j), the two margins fusing before the tip. When this occurs the furrow between the two margins is the process furrow.

The radix (Pl. I, fig. 1, 3, E) is an elongate flattened piece, slightly twisted in the direction of the bulb spiral, its concave surface nearest that of lamella. The anterior end or tip is usually flat-

tened, more or less tapered, and supports the terminal apophysis of the embolic division. The posterior end or base is flattened or bluntly rounded behind, and may be separated from the rest of the radix by a depression on the convex surface. Its base rests in the articular depression of the tegulum during copulation. On each side near its base, the radix bears a forward directed process. They are the lamellar arm (Pl. I, fig. 1, o), short, and attached to the lateral process of the lamella by the stout tether membrane (Pl. I, fig. 3, p) and the embolic arm (Pl. I, fig. 1, m) which is usually longer and supports the embolus on its tip. In most of the species of *Linyphia* the base end of the radix is nearest the lamella.

The radix is securely fastened to the lamella by three means: the tether membrane; the mesal process of the lamella; and a wide band of membrane (Pl. I, fig. 6) which stretches from the lamella, between its processes, to the concave surface of the radix.

The membrane between the lamellar processes may bear a heavy plate, the transverse sclerite, as in *L. maculata* (Pl. III, fig. 18, l).

The terminal apophysis (Pl. I, fig. 1—3, F) is so modified in individual species that a general description can include only a few common characteristics. This apophysis is usually a narrow band coiled in the direction of the bulb spiral. The base is blunt and heavy. The spiral terminates in a flat, curved, plate in the center of the distal turn. The terminal apophysis is attached to the tip of the radix and is sometimes supported by the mesal process of the lamella and the transverse sclerite. It may be membranous or thickened and is variously ornamented with grooving, spines, serrate margins, fine striations and other devices. Very complex in many species, it may be reduced to a small twisted membrane. The terminal apophysis of *L. maculata* is formed by two interlocking spirals (Pl. III, fig. 19, 20, F).

The embolus (Pl. I, fig. 1, 3, H) is long and slender, tapered toward the tip, curved in the direction of the bulb spiral, and attached at the base to the embolic arm of the radix. In most of this group it is shorter than the lamella, and is composed of a membrane, the pars pendula (Pl. I, fig. 1, r), which holds the duct and is supported along its length by two heavy rods, the truncus and the apical sclerite. The truncus (Pl. I, fig. 1, s) is flattened, tapered at each end and rests behind on the embolic arm of the radix: the much smaller apical sclerite (Pl. I, fig. 1, t) protects the tip of the duct. The pars pendula is extended beyond or behind the end of the duct in a distal lobe (Pl. I, fig. 1, u). In *L. clathrata*, the opposing ends of truncus and apical sclerite lie close together.

The long membranous conductor (Pl. I, fig. 1, 3, G) is attached to the bulb side of the lamella behind the mesal process. It extends forward outside the mesal process, then curves toward the tip of the embolus. In most species of Linyphia it narrows gradually in front of the attachment point, then widens in a long terminal lobe (Pl. I, fig. 1, y) equipped with minute villi, especially conspicuous on the fringed margins. This lobe covers the distal tip of the embolus in the unexpanded bulb.

In *L. marginata* (Pl. IV, figs. 26, 31, H) and closely related species, all parts of the embolus form one heavy, tapered sheath for the duct, the apical sclerite represented by the heavier chitin of the distal margin of the embolus. The distal lobe of the pars pendula is lacking and the tip of the embolus is much wider than the duct.

In *L. cayuga* and *L. pusilla*, the lamella is somewhat modified. The margin next the cymbium is curved to form a shallow gutter on the convex side of the lamella. This is the marginal groove (Pl. X, fig. 73, 1). Only a small part of the anterior margin forms a folded edge. The lateral process extends forward, with a long inner thickening (Pl. X, figs. 71, 73, i). On the concave surface, immediately behind the anterior margin, there arises a long, semimembranous, flattened, tapered process curving forward and down to end near the tip of the lateral process. This membranous process (Pl. X, fig. 73, n) is possibly homologous with the mesal process or conductor or both in the more typical species of Linyphia. The spur is large and blunt, and lies on the concave side of the lamella behind the membranous process (Pl. X, fig. 71, k).

In *L. pusilla* and the species most resembling it, the radix is reduced; the base flattened and fanshaped, the anterior part greatly narrowed, the embolic arm long and the heaviest part of the radix. The anterior end of the radix is nearest the lamella (Pl. X, fig. 71, E). In these species the embolus is longer than the lamella and is supported along its length by one flattened, tapered, heavy piece, with the pars pendula attached along its flattened surface. The distal lobe of the pars pendula is lacking and the posterior tip of the truncus turns sharply to form an elongate basal piece (Pl. IX, fig. 67, v). The embolus curves back from the embolic arm of the radix, then forward, tapering distally till not perceptibly wider than the duct. In *L. cayuga* and *L. pusilla* the embolus bears two appendages. Near the basal piece, the side of the embolus nearest the grooved margin bears a short basal appendage (Pl. X, fig. 71, w) curved toward the basal piece. In these two species, before the embolus passes the major and membranous processes in its first curve, it bears a short appendage, the embolic torque (Pl. X, fig. 71, x), twisted in an opposite direction to the bulb spiral. It is formed of two parts. The first part is rodlike,

held in the pars pendula, one end attached to or near the flattened surface of the truncus. The second part is free of the pars pendula and soon flattens and widens to form a terminal lobe with gently rounded margins. As it emerges from the pars pendula, the torque is enlarged by material rising from the membrane. The torque is directed back and toward the lateral process.

In species closely related to *L. cayuga* and *L. pusilla*, the conductor is tapered to a sharp tip without terminal lobe or villi. (Pl. IX, fig. 67, G).

The palpal Organ of other Genera included in this Study

The subtegulum and the tegulum are very similar in all the groups studied except in the nature of the median apophysis of the tegulum and the presence, in *Helophora* and *Stemonyphantes*, of a conspicuous bezel. The median apophysis of the tegulum is particularly interesting. This process is always a continuation of the posterior margin of the tegular wall. The median apophysis of *Helophora* is a simple heavy piece (Pl. XV, fig. 106, C). It is a continuation of the posterior margin of the tegular wall and has no other connection with the tegulum. *Estrandia* presents an intermediate condition between *Helophora* and *Linyphia*. The median apophysis of *Estrandia* (Pl. XVIII, fig. 130, C) is similar in position to that of *Helophora*. An independent accessory process (Pl. XVIII, fig. 130, q) rises from the mesal side of the opening through which the duct passes from tegulum to embolic division. This process bears an apical tooth and lobe, and occupies the position of the median apophysis of *Linyphia* (Pl. I, fig. 4, C).

In *Linyphia*, the pieces, which are homologous with the median apophysis and accessory process of *Estrandia*, are fused to form one process. The lateral support of the median apophysis of *Linyphia* (Pl. I, fig. 4, d) is homologous with the median apophysis of *Estrandia* and *Helophora*. The remainder of the median apophysis of *Linyphia* is homologous with the accessory process of *Estrandia*.

In the apical division of the male palpal organ, only two sclerites appear in all species: an embolus which carries the duct, and a protective plate. When only two sclerites are present, the embolus lies nearest the tegulum. Except in *Stemonyphantes*, at least one membranous process, which protects the tip of the embolus is present. In those genera (*Helophora*, *Estrandia*, *Stemonyphantes*) where only a few sclerites form the embolic division, the median apophysis of the tegulum is intimately associated with the parts of the embolic division (Pl. XVIII, fig. 128, C).

The lamella of the embolic division is without a mesal process in *Pityohphantes* and *Frontinella*; in *Helophora*, it is long and slender, without any processes. The radix is reduced in *Pity-*

ophantes, and so completely fused to the embolus in *Frontinella* that its identity is lost. It is lacking in *Helophora* and fragmentary in *Estrandia*. The embolus is one heavy tapered sclerite containing the duct, except in *Estrandia*, where a *pars pendula* is present. The terminal apophysis, so highly developed in *Linyphia*, is greatly reduced in these closely related genera. In *Pityohphantes phrygiana* it is membranous, except the heavy tip; in *P. limatanea* it is a small twisted membrane. In *Frontinella coccinea* it is barely perceptible, and it is lacking in *F. communis* and *Helophora*.

Pityohphantes phrygiana shows a simple form of the *Linyphia* type of palpus (Pl. XII, fig. 83). All the sclerites of the embolic division of *Linyphia* are present, but the *radix* is partially fused to the embolus. *Frontinella coccinea* shows a still simpler condition where the *radix* is not distinct from the embolus and is also fused to the lamella. The terminal apophysis is a very slight membrane (Pl. XIV, fig. 97). In *Helophora* the *radix* is not discernible, the embolus is fused to the lamella and the terminal apophysis is not present (Pl. XV, fig. 107).

The parts of the embolic division of *Stemonyphantes* are difficult to homologize with those of the preceding genera. The duct leaves the tegulum to enter a plate of heavy membrane which bears a large, distal sclerite in front and the embolus behind (Pl. XVII, fig. 121).

Literature

The palpal organ of the *Linyphia* type has been described in considerable detail by many authors. The nomenclature of oldest authors has been retained when feasible. The most important morphological contributions are by Comstock on *Pityohphantes phrygiana* (Ann. Ent. Soc. Am. 3(3): 170-173, figs. 10, 11, 1910) and Osterloh on *Linyphia triangularis* (Zs. wiss. Zool. 119: 326-418, text figs. 1922). Comstock's term, lateral subterminal apophysis, was reluctantly discarded as too long to be practical in taxonomic description. Comstock's statement that the conductor of the apical division of the bulb rises from the tegulum is incorrect. Comstock believed that two sclerites occurred between the tegulum and the embolus. The palpus of *P. phrygiana*, when treated for study with caustic potash, gives this appearance. Careful examination of an untreated specimen, and the comparative study of *Linyphia* palpi make certain that these two pieces are parts of a single sclerite.

Osterloh's Chitinspangen of the tegulum are rather difficult to interpret. In fig. 1, p. 331 of Osterloh's paper, the unforked length of this ridge lies in the position of the raised anterior margin of the tegular groove. In fig. 2, p. 332, this same piece lies farther back

and is undoubtedly the tegular ridge. The tegular groove widens ventrally and its margins are distinctly visible as the tegulum turns toward the median apophysis. I believe that the two forks or Chitinspangen of Osterloh represent the two margins of the tegular groove at this point. Osterloh's statement (p. 340) that both Chitinspangen extend into the lateral support of the median apophysis, while not strictly true, would tend to strengthen this view. Osterloh's Sattelplatte is the proximal turn of the tegulum, which is closely fused with the distal turn in *L. triangularis*.

The Epigynum

The epigynum is the female copulatory organ. It receives the embolus of the male palpus and, sometimes, other parts of the palpus which aid in copulation. It includes parts for the reception and storing of the semen, and its passage to the vagina. The epigynum may also have accessory parts which are protective or aid in copulation.

Morphology of the Epigynum of *Linyphia*

The two internal divisions of the epigynum of *Linyphia* typically open into a common chamber or atrium. The atrium opens to the exterior by a single opening immediately in front of the opening of the vagina. The epigynum communicates with the vagina only through the fertilization canal.

Seen from below, a large, heavy plate, the atriolum (Pl. III, fig. 16, a) lies in front of the external opening of the epigynum. The atrium and other internal parts of the epigynum are covered ventrally by the atriolum.

In the genera included in this study, the integument around the openings of the two divisions of the internal epigynum is especially modified. It is smooth, hairless and always easily distinguishable from the ordinary integument of the abdomen. This modified integument occurs around and between the openings of the internal epigynum, and between these openings and the ventral wall of the vagina. When the openings are internal, as in *Linyphia*, this specialized integument occurs in the atrium. It is most conspicuous on the dorsal wall of the atrium, which is usually visible in a ventral view of the external epigynum (Pl. III, fig. 16, b).

On the anterior part of the dorsal wall of the atrium there is a depression on each side of the median line (Pl. II, fig. 8, l), which marks the presence, above, of a small gland-like structure (Pl. VII, fig. 49, m). In most species, the dorsal wall of the atrium is produced into a very short posterior median apophysis, the parmula (Pl. III, fig. 16, c). The parmula is always covered by the modified integument associated with the openings of the internal epigynum. The dorsal wall of the atrium bears a median depression, the cochlear depression (Pl. III, fig. 16, d) which widens behind

Comparative Table of Part Names for the Palpal Organ

	Comstock (1910)	Osterloh (1922).
subtegulum	subtegulum	Patina basalis (Basalschale)
tegulum	tegulum	Spermakanalkapsel
median apophysis of the tegulum	median apophysis of the tegulum	Retinaculum
articular depression		Gelenkgrube
apical tooth		Haken
duct	duct	Samenkanal
embolic division	apical division (embolic division + conductor)	Stema, Überträger
lamella	lateral subterminal apophysis	Deckplatte
mesal process		Conductorfortsatz der Deckplatte
lateral process		Plättchen (distal wide- ning of process)
radix	radix and stipes	Stützapparat
base of radix		Gelenkspange
anterior tip of radix		Schraubenspange
lamellar arm of radix		Plättchenspange
embolic arm of radix		Embolusspange
terminal apophysis	terminal apophysis	Stemartinaculum
embolus	embolus	Embolus
pars pendula	pars pendula	
truncus	truncus	
apical sclerite	apical sclerite	
conductor	conductor	Conductor

to end in a small pit. When the parmula is present, the cochlear depression extends to the tip.

In front, on each side, the atrium opens into a bursa copulatrix. The bursae (Pl. VI, fig. 45, e) are usually cone-shaped and diverge anteriorly. The wall of the bursa bears a spiral, gutterlike depression, the spiral groove (Pl. VI, fig. 45, f). The spiral groove opens into a short duct near the apex of the bursa. In some species the anterior part of the spiral groove forms a closed tube and thus becomes a part of the duct. The duct (Pl. VI, fig. 45, i) is usually about twice the length of the seminal receptacle. It turns sharply, about midway in its length, to form a loop. The looped duct is characteristic of *Linyphia* and some closely related genera. The distal end of the duct opens into the seminal receptacle. Since the two sides of the loop are usually very close together, the opening of the duct into the seminal receptacle lies very near the union of the duct and the spiral groove. The seminal receptacle (Pl. VI, fig. 45, j) is characteristically elongate and surrounded by high glandular cells. In *Linyphia*, the looped duct and the seminal receptacle curve in different directions.

The fertilization canal (Pl. VI, fig. 45, g) rises at the base of the seminal receptacle. The canal usually forms a spiral around the cavity of the bursa, passing between the turns of the spiral groove. At the lateral margin of the dorsal wall of the atrium, the canal turns dorsad toward the vagina. The distal part of the canal lies on the ventral wall of the vagina and opens in a short gutter-like piece (Pl. IX, fig. 69, h) near the opening of the vagina.

A very simple variation of this type of epigynum is that of *L. strandia* (Pl. V, fig. 33). The canal and spiral groove form only one half a spiral turn around the bursa.

In *L. pusilla* (Pl. XI, fig. 77) and *L. cayuga* (Pl. X, fig. 72), the bursa is very small. The greatest part of the fertilization canal extends directly toward the seminal receptacle as a small, tightly twisted tube (Pl. XI, fig. 77, g). The spiral groove (Pl. XI, fig. 77, f) makes a spiral similar to that in the more typical species of *Linyphia*. The canal forms the axis of the spiral groove. The wall of the bursa which ordinarily fills in between the turns of the spiral groove is deeply invaginated toward the center of the bursa. This invagination is so deep that it comes in contact with the fertilization canal and obliterates the bursa. *L. hortensis* (Pl. IX, fig. 69) represents an intermediate form in which the posterior half of the internal epigynum is a typical bursa, and the anterior half resembles the epigynum of *L. pusilla*. In many *Linyphiae* the distal part of the spiral groove has one more spiral turn than the fertilization canal.

It seems probable that the terminal apophysis of the male palpus fits into the bursa of the epigynum during copulation. The fertiliz-

ation canal, which stiffens and holds the shape of the bursa, corresponds sufficiently to the terminal apophysis of the male in the number and diameter of its spiral turns. In *L. cayuga* and *L. pusilla*, the terminal apophysis is greatly reduced and probably not functional. It seems likely that merely the embolic torque of these species enters the small bursa of the epigynum.

The Epigynum of Other Genera Included in this Study

The atrium is not conspicuous. In many species it is not differentiated from the ordinary integument of the abdomen. The modified hairless integument lining the atrium of *Linyphia* is present in all the included genera, although the atrium occurs only in *Linyphia*. In the other genera, the openings and the peculiar integument associated with them lie on the surface. This integument is continuous with the ordinary integument of the abdomen, except that part which meets the ventral wall of the vagina. In *Pityohphantes limatanea* and *Frontinella*, this specialized integument forms a ventral wall which bears the openings near its lateral margin and usually covers the internal parts of the epigynum. (Pl. XIII, figs. 88, 93, b). The posterior margin of the ventral wall turns up to meet the ventral wall of the vagina.

The scape is a process which is a continuation of the ventral covering of the epigynum and is covered, at least below, by the typical hirsute integument of the abdomen. In the genus *Helophora*, the entire region of the epigynum serves as the base of the scape, so that the ventral integument is like that of the abdomen proper, and the dorsal surface is the modified cuticula associated with the openings (Pl. XVI, figs. 116, 117). The openings are on the dorsobasal part of the scape.

The bursa copulatrix is smaller than in *Linyphia* or is lacking. The spiral groove is lacking. The fertilization canal does not have a spiral course around the cavity of the bursa. In most genera the fertilization canal passes directly from the seminal receptacle to the lateral margin of smooth specialized integument leading to the vagina. The characteristically curved duct and seminal receptacle, and the looped form of the duct persist in most of the genera included in this study. The seminal receptacles lie in front of the openings except in the genus *Frontinella* where they are placed behind the openings.

Although the epigynum of *Stemonyphantes* (Pl. XVII, fig. 126) resembles that of *Linyphia cayuga* (Pl. X, fig. 72) in general appearance, it is fundamentally different from the *Linyphia* type. The duct of *Stemonyphantes* (Pl. XVII, fig. 126, i) occupies a similar relative position as the spiral groove of *Linyphia cayuga* (Pl. X, fig. 72, f). *Stemonyphantes* lacks the spiral groove and looped duct and the elongate seminal receptacle of *Linyphia*. The seminal

receptacle of *Stemonyphantes* (Pl. XVII, fig. 126 j) is large and rounded with greatly wrinkled walls.

Literature

The nomenclature adopted by different authors for parts of the female copulatory organ is exceedingly varied. The early authors mention the organ but do not describe it with sufficient accuracy to clarify their terminology. Later writers, adopting these terms, have applied them to different parts. Much of the confusion is due to the adoption by subsequent workers of the terminology of Menge (*Preussische Spinnen* 1866). This author has many names for each part and often uses, interchangeably, names originally designating distinct parts. I have adopted only those terms clearly defined by the author or in the subsequent literature. Since most taxonomists have included the epigynum in their descriptions, the literature is too extensive to discuss in detail.

Epigynum has been used as a name for the whole copulatory organ, for the ventral plate covering the internal parts, and for posterior processes which are sometimes present. It seems best to apply this old and generally used term to the organ as a whole.

The use of the word *vulva* in connection with the copulatory organ is undesirable as this term also may be properly used for the opening of the vagina.

The atriolum or ventral plate, which covers the internal parts of the epigynum, was named *sarum*, *claustrum* and *Schloss* by Menge. Mc Cook (*Am. Spid. and their Spinningwork* 3: 126. 1893) called this part *atriolum*, and his term was accepted by Comstock (*Spider Book* p. 132. 1912).

Many names have been given to the posterior processes of the epigynum. Most of them are descriptive adjectives and were not intended by the author as specific terms. Mc Cook (1893) suggested the name *parmula* for an independent process rising from the hind margin of the dorsal wall of the epigynum. Simon (*Hist. Nat.* 1: 40. 1892) used *clavus* for a process which does not rise exclusively from the dorsal wall of the epigynum. This is one of several terms proposed by Menge for this part. Simon designates the base of the clavus as the *scape* (*scapus*). Comstock, whose use of the term I have followed, ignores Menge's term and refers to the entire process as the *scape*.

The two pockets into which the openings of the epigynum lead were described by early authors as seminal receptacles. The true seminal receptacle, when observed, was described as an accessory part. Menge and van Hasselt (*Tidj. Ent.* 35: 90. 1892) considered it glandular in nature.

The internal structure of the epigynum of *Linyphia* has been described and figured by Bertkau (*Archiv. f. Naturg.* 41: 251. Pl. 7,

Fig. 16. 1875), Menge (Preussische Spinnen pp. 100-111. Pl. 17-19. 1866), Engelhardt (Zeit. f. wiss. Zool. 96:57-67. Textfig. 15-20. 1910) and Fedotow (Trav. Station Biol. Borodinskaja de la Soc. Natur. S. Petersb. 3 Jurjew. Pl. 1, figs. 11, 13, 14; pl. 2, figs. 9, 10, 12, 1911).—The nomenclature and descriptions of the earlier authors are incomplete and inaccurate. Englehardt describes the bursae copulatrix as the duct, either ignoring the looped duct or referring to it as an additional seminal receptacle. He describes the fertilization canal as a *Spiralleiste* or spiral rim and does not always trace it to the seminal receptacle. Finding no fertilization canal he suggests that the eggs are fertilized after laying. His conception of the *Spiralleiste* as an invaginated band is exaggerated due to his use of *L. triangularis* as a subject for sectioning. Here spiral groove and *leiste* lie very close together giving the impression of an invaginated rim. Except for a few instances where the spiral groove distinctly stands out from the bursa wall, the fertilization canal is not noticeably an invagination. Englehardt has obviously misidentified the species which he calls *Linyphia hortensis* Sund. His epigynum of *Linyphia pusilla* Sund. is unlike that of any *L. pusilla* I have seen, and does not agree with Fedotow's figure of this species. It is, however, possible that this belongs to the variety (with two external openings) figured by Simon (Arachnides de France 6 (3): 637. fig. 987. 1929). The figures of Fedotow are correct but lack detail.

Key to the Genera. Males.

1. Patella of palpus with dorsolateral spur **Pityohphantes**
Patella of palpus without dorsolateral spur 2
2. Patella of palpus with conspicuous dorsal tooth **Frontinella**
Patella of palpus without dorsal tooth 3
3. Cheliceral tooth present **Linyphia**
Cheliceral tooth lacking 4
4. Tibia with small ventral process supporting paracymbium
Stemonyphantes
Tibia without such a process 5
5. Upper margin of claw furrow of chelicera with a short ridge hiding middle of closed claw **Frontinella**
Upper margin of claw furrow of chelicera with three teeth, the middle tooth largest 6
6. Tibia of palpus with a short lateral process **Helophora**
Tibia of palpus without a lateral process **Estrandia**

Linyphia Latreille

Nouv. Dict. d'hist. Nat. 24:134. 1804.

Type: *Araneus triangularis* Clerck. Designated by Thorell (Nova Act. Reg. Soc. Sci. Upsal. (3) 7:82 1869).

Latreille formed the genus *Linyphia* for "les napiformes de Walckenaer". Walckenaer (Faune Parisienne 2 :213. 1802) includes in that group, *Aranea triangularis* De Geer and *Aranea montana* De Geer. The descriptions of these two species are inadequate and references to synonyms confusing. However, in his Ins. Apt. 2 :233-242. 1837, Walckenaer gives a lengthy description of these species and discussion of their synonymy. This paper establishes the synonymy of *Linyphia montana* Walckenaer with *L. triangularis* Clerck.

The type of the genus *Neriere* Blackwall, *Neriere marginata* Blackwall (London. Edinb. Phil. Mag. (3) 3 :188. 1833), is a synonym of *Linyphia clathrata* Sund.

The abdomen of *Linyphia* bears a dorsomedian folium; the carapace, abdomen and legs are often marked with conspicuous bands or spots. The chelicera of the male bears a dorsal tooth near the clypeus, sometimes thin and inconspicuous. The chelicera of the females have a pair of crossed spines, one on the dorsomesal part of each chelicera nearer clypeus than claw. The stridulating file on the lateral surface of the chelicera is inconspicuous in the males and barely perceptible in the females. The chelicerae and endites of most of the darkly pigmented specimens of any species bear a pattern characteristic in this and some related genera. The lightly pigmented specimens of some species lack it. The dorsal surface of the chelicera bears a large, gray V-shaped area, widest next the clypeus; the endites are suffused with gray except a light area next sternum, one opposite first coxa, and sometimes one near mesal anterior tip.

The patella of the male palpus is longer above than below, arched above, and equipped with a long dorsal hair near the tip. The typical *Linyphia* paracymbium is V-shaped, small and slender; a basal part like the cymbium in texture and sparsely covered with little hairs, narrows toward the slender, membranous, sharply pointed distal part.

Notes on Species

Linyphia Banksi Petrunkevitch (*L. bicolor* Banks, preocc. Ent. Soc. Wash. Proc. 7 :97. 1905) From Olympia, Washington. The types are two males and one female. This species is not a *Linyphia*.

Neriere dogmatica Chamberlin. Canad. Ent. 52 :194. 1920. Mr. Chamberlin kindly sent me specimens of this species. They are *Linyphia digna* Keyserling.

Linyphia hespera Chamberlin. Canad. Ent. 52 :194. 1920. The type is a single male from Bear Lake, Utah. It is *Pityophantes phrygiana* Koch.

Linyphia orinoma Chamberlin. Ent. Soc. Amer. Ann. 12:248. 1919. The type is a female from Millard Co., Utah. It is a specimen of *Helophora reducta* Keyserling.

Linyphia variabilis Banks. Acad. Phil. Proc. p. 42. 1892. The types are numerous immature males and females from Ithaca, N. Y. It is possible that several species are included. Some of these specimens are the young of *Linyphia pusilla* Sund. The color pattern described by Banks agrees with the immature color pattern of *L. pusilla*. *L. pusilla* is common in the type localities mentioned by Banks.

Linyphia Weyeri Emerton. Am. Nat. 9:279. 1875. The types are one male and three females from Weyer's Cave, Va. This is not a *Linyphia*.

Keys to the American Species of *Linyphia*

Key to the Males

1. Dorsal length of chelicerae one half or less length of carapace 2
Dorsal length of chelicerae two thirds or more length of carapace 6
2. Posterior median eyes separated by twice their diameter 3
Posterior median eyes separated by less than one and a half their diameter 5
3. Cheliceral tooth dorsomesal 4
Cheliceral tooth dorsolateral **L. maculata**
4. Spiral process of embolic division with three turns plus a looped piece with the appearance of a fourth anterior turn **L. digna**
Spiral process of embolic division without such a looped piece. **L. clathrata**
5. Carapace darkened except contrasting light lateral margins. **L. marginata**
Carapace not so marked **L. litigiosa**
6. Dorsal length of chelicerae two thirds length of carapace. **L. cayuga**
Dorsal length of chelicerae five sixths length of carapace. **L. pusilla**

Key to the females

1. Viewed from below, opening of epigynum single 2
Viewed from below, opening of epigynum double **L. cayuga**
2. Distance between posterior median eyes greater than between posterior and anterior median on either side 3
Distance between posterior median eyes less than between posterior and anterior median on either side 6
3. Opening of epigynum filled by tip of nexus **L. pusilla**
Opening of epigynum not filled by tip of nexus 4
4. Legs with conspicuous dark bands or spots 5
Legs without conspicuous dark bands or spots **L. maculata**

5. Dorsal folium on abdomen widened from front to back.

L. clathrata

Dorsal folium on abdomen narrowed from front to back.

L. digna

6. Carapace darkened except contrasting light lateral margins.

L. marginata

Carapace not so marked **L. litigiosa**

Linyphia clathrata Sundevall, Pl. I. figs. 1-7; pl. II, figs. 8-10.

Linyphia clathrata Sundevall. Svenska Vet. Ak. Handl. f. 1829 p. 30. 1830.
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Male. Length, 3.6 mm. Considerable variation in length. Cephalothorax brown, reddish brown, or gray suffused with dark gray especially on margins forming a reticulate pattern, along furrows, and a spot on back of head, this spot enclosed by two dark lines extending from median furrow toward posterior lateral eyes. Width somewhat more than three fifths length; head a little more than half length of carapace. Viewed from the side, carapace rises gradually and evenly from behind to eyes, sometimes back of head slightly steeper; only a little higher at eyes than at anterior end of median furrow.

Posterior eyes in a slightly recurved line, the median somewhat larger than the lateral, separated by about twice the diameter and from the lateral by a little more than the diameter. Anterior eyes in a slightly procurved line, the median about three fourths the lateral, separated by five eighths their diameter and from the lateral by somewhat more than twice their diameter.

Chelicerae yellow brown with gray markings enclosing an area lightly and unevenly suffused with gray. Viewed from side, dorso-proximate part slightly convex. Cheliceral teeth stout, sharp, dorsomedian in position. Upper margin of claw furrow with two little teeth, one near tip of closed claw, another slightly nearer claw base. Opposite the latter, a large tooth directly under closed claw slants to point above claw. Lower margin with three little teeth in a row near claw base and one about midway between claw base and closed tip. Sternum and endites like chelicerae in color. Sternum deeply suffused with gray. Labium dark gray. Endites with gray markings, a light line in back of black anterior margin. Relative length of legs; 1, 4, 2, 3. Legs yellow with black or gray markings. In darkly pigmented specimens, coxae black except light area next sternum; front and back of femora with broad black band sometimes meeting above or below, light band around base of femur four; tibiae with a black ventral band, extending on dorsal side of tibiae three and four; metatarsi suffused with gray, three and four darkest. Markings may be lacking, faintly indicated, or like those of female. Metatarsi one to three without posterior spines. Abdomen, viewed from above, oval; from the side, almost straight; in front and behind, a little higher in front. Abdomen may be black, with or without oblique anterior white spot on each side of dorsomedian line. Less heavily pigmented specimens more or less resemble female pattern.

Palpus (Pl. I, fig. 7) like legs in color suffused with gray, darker on coxa and distal segments. Narrow black line below at each end of femur and around anterior margin of patella, femur and around anterior margin of patella, femur sometimes darkened below. Seen from the side, dorsal length of femur a little less than four times that of patella, three times tibia and a little less than cymbium.

Femur cylindrical. Dorsal surface of patella gently arched behind, turned sharply toward tibia in front. From above, length of tibia about three fourths its greatest width. Seen from above, lateral side rounded; seen from behind it appears flattened, with a shallow, longitudinal groove. Lateral side with very long hairs near cymbium, those on dorsolateral part forming a conspicuous brush. Cymbium widened near its base to slightly more than half its length; anterior tip long, bluntly pointed, hairs on anterior part of dorsal margin lengthened and lying over bulb. Anterior margin of tegular plate with a rounded, dorsal swelling bearing a small, bluntly pointed projection on its ventrolateral side. Median apophysis (Pl. I, fig. 4, C) about as long as greatest diameter of tegulum, curved forward at the tip. Distal, membranous portion of median apophysis with longitudinal fold ending between small rounded apical lobe and long, flat apical tooth. Apical tooth (Pl. I, figs. 4, 7 e) curved laterad.

Lamella of embolic division (Pl. I, figs. 1, 3, 5, 6, D) much longer than wide; constricted suddenly behind sharp spur; anterior margin rounded; folded edge with grooving parallel to anterior margin ending in minute teeth on lateral edge. Lateral process long, more than half its length is a wide lateral extension of wall of lamella bearing folded edge; distal tip a sharp, heavy prong turned forward; inner thickening at base of prong. Depression in lamella near base of mesal process. Embolic arm of radix narrowed a little at base, sharp. Terminal apophysis (Pl. I, figs. 1, 3, F) with three and a half turns, distal turn very narrow.

Posterior turn plain; rest of band ornamented with fine longitudinal striations and very coarse transverse grooves, which break anterior portion of band into platelets increasing in height and distinctness distally. Anterior margin serrate. Platelets opposite distal tip extended in front in a series of spines, middle six longest. Depression between platelets and posterior margin narrows and deepens distally; small ridge behind serrate margin widens on distal turn. In front, anterior margin of apophysis ends in a sharp curving tip, posterior part extended to form distal plate inside turn. Truncus and apical sclerite of embolus (Pl. I, figs. 1, 3, H) separate but with opposing ends near together. Apical sclerite slender, rodlike, distal tip curved slightly forward. Pars pendula extended behind tip of duct in a short blunt, distal lobe. Terminal lobe of conductor with villi, deeply fringed margin curved forward.

Female. Length of one specimen 3 mm. Considerable variation in length. Head a little broader than in male, and almost three fifths length of carapace. From the side, carapace rises abruptly to median furrow, then gradually to eyes. Posterior eyes in a straight line and equal, median separated by about three times the diameter. Anterior median separated by a little less than the diameter and from

the lateral by about twice that distance. Clypeus with two light spots between and below lateral and median eyes. Viewed from side, chelicerae narrow evenly toward claw base. Upper margin of claw furrow with a row of three teeth nearer tip of closed claw than its base, smallest nearest claw tip, largest nearest claw base. Lower margin with a row of six small, evenly spaced teeth extending from near claw base to opposite largest tooth of dorsal margin. Femora, tibiae, and metatarsi of legs with central and distal bands of dark gray, sometimes lacking above on femora. Femora one and two suffused with gray in front and behind, with narrow, ventral black bands next coxae. Tarsi tipped with gray.

Abdomen gray or pinkish gray, flecked with white; markings dark gray. Almost entire dorsal surface occupied by folium, which widens slightly from front to back. Light area enclosed by folium, with four dark chevrons pointed forward, anterior chevron frequently indistinct. Sides with uneven black longitudinal band, connected to posterior part of dorsal folium by three oblique black lines; and separated from ventral region by a row of three white spots which may fuse to form one band. Black below, a white spot on each side behind epigastric furrow, and another pair some distance in front of spinnerets.

Epigynum (Pl. II, figs. 8, 9) projects tubercle-like. From below, epigynum wider than long, median length of atriolum about half that of epigynum. Anterior margin of atriolum rounded, posterior margin a semicircle. Opening wider than long. Posterior turns of fertilization canal visible on dorsal wall of atrium. From side, external height about one half length; gently convex posterior margin of dorsal wall of atrium visible. Oval spot on each side of atriolum slightly depressed and semitransparent, a portion of fertilization canal showing through. Length of bursa of internal epigynum (Pl. II, fig. 10) a little less than width; looped duct and seminal receptacle on center of flat anterior tip. Fertilization canal (Pl. II, fig. 10, g) with a little more than three rounded spiral turns, about equal in diameter. Spiral groove (Pl. II, fig. 10, f) narrow, widened on anterior turn. It rises on ventromesal wall of bursa between turns of fertilization canal. Looped duct and seminal receptacle short and stout. Loop formed by duct (Pl. II, fig. 10, i) curved to point mesad. Seminal receptacle (Pl. II, fig. 10, j) above loop, widened distal part curved to point ventrad.

Type locality: Sweden

Maine: Presque Isle, Aug. 26, 1925, 1 female (Crosby); Long Island (Mt. Hunger), May 18, 1904, 3 males, 3 females (Bryant). — **New Hampshire:** Squam Lake, July 1923, 1 female. — **Massachusetts:** Beverly, Nov. 9, 1879, 1 male, 2 females (Emerton); Clarendon Hills, Nov. 3, 1904, 4 females (Bryant); Holliston,

Sept. 2 — Nov. 4, 1923, 2 males, 1 female (Emerton and Banks), Aug. 1, 1928, 1 male (Emerton and Banks), Aug. 6, 1928, 1 male (Emerton and Banks); Petersham, May 27-31, 1913, 2 females (Bryant). — **New York:** Boonville, July 23, 1931, 2 females; Ringwood, Tompkins Co., Oct. 11, 1920, 1 male (Crosby); McLean, Tompkins Co., May 30, 1919, 1 male (C. and B.); Ithaca, May 19, 1906, 1 male (Nelson), May 8, 1915, 1 male (from stomach of *Rana pipiens*), May 1, 1932, 1 female (Hayden), May 20, 1932, 3 males, 7 females (Hayden), May 25, 1932, 1 male, 1 female (Hayden); Ogdensburg, June 4, 1931, 1 male (Bishop); Rochester, March 5, 1931, 1 female (Maynard). — **District of Columbia:** Apr., 4 males (Fox). — **North Carolina:** Black Mt. (N. fork Swannanoa), May 28-30, 3 males, 1 female. — **Ohio:** Sandusky, June 6, 1929, 1 male. — **Ireland:** Co. Carlow, 2 males, 1 female (Pack-Beresford). — **France:** 2 males 2 females (from Menge coll.) — **Sweden:** June 28, 1932, 1 male (Hammerby). — **Russia:** Don, 1 male, 1 female.

Linyphia digna Keyserling

Pl. II, figs. 11-15.

Linyphia digna Keyserling. Spinnen Amerikas 2:68, pl. 13, fig. 169. 1886. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 19:248. 1911.

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Male. Length 4.25 mm. Cephalothorax dark yellow-brown, suffused with gray especially along margin and furrows and on back of head. Width about five sevenths length; head about three fifths length of carapace. From the side, carapace almost straight from behind to eyes, slope a little steeper behind. Height at anterior end of median furrow about three fourths height at eyes. Posterior eyes in a very slightly recurved line, median slightly larger than lateral, separated by twice the diameter and from the lateral by somewhat less than three times the radius. Anterior eyes in a very slightly procurved line, median somewhat smaller than the lateral, separated by about the diameter and from the lateral by about five times the radius. Width of clypeus slightly less than one half its length; posterior margin very slightly flared.

Chelicerae slightly lighter than carapace, with light gray markings. Lateral surface lightly suffused with gray, except near claw. Viewed from side, dorsal surface slants evenly from clypeus to claw. Cheliceral teeth dorsomedian. File fairly distinct. Upper margin of claw furrow with two stout teeth, one near tip of closed claw, one a little nearer claw base. Lower margin with a heavy, blunt tooth near tip of closed claw; a broad tooth with two or three prongs in a row near claw base; and two smaller teeth between these. Sternum and endites like chelicerae in color, and suffused with gray. Labium dark gray, with grayish white anterior margin. Relative length of legs: 1, 4, 2, 3. Legs lighter in color than carapace. Legs

one and two darker than three and four, especially femora. Femora with two black ventral spots dividing length into thirds, margin next patella darkened; tibiae and metatarsi with central and distal black bands; tarsi lightly suffused with gray except near metatarsi. These markings faint or lacking on first two pairs of legs.

Abdomen ovate, truncate in front and perpendicular behind, black with white markings. Above, two white lateral lines almost meet in front and extend two thirds the length. Posterior part of these lines slightly reddened. Two, sometimes three, white chevrons, the anterior pointing forward, others backward, are connected by a broad median line, enclosing a narrow black median line which is widened opposite each chevron. Sides with many fine alternate black and light longitudinal lines, and a few larger light stripes or spots. Posterior end with a transverse white line broken in middle. Black beneath, brown on epigastrium and in front of spinnerets, a light spot on each side just in back of epigastrium and a similar pair of spots in front of spinnerets. Additional spots on each side of spinnerets sometimes present.

Palpus (Pl. II, fig. 15) a little lighter than carapace, suffused with gray except on coxa and hind part of femur. Seen from the side, dorsal length of femur about four times that of patella, a little less than four times tibia and about equal to cymbium. From the side, patella almost square, femur and tibia attached very near together. From above, greatest width of tibia about one and a half its length; dorsolateral side swollen with a brush of long hairs, a few long hairs on lateral side near cymbium. Greatest width of cymbium a little more than half its length, anterior tip greatly narrowed and bluntly pointed. Dorsal side of tegular plate widest: anterior margin with a blunt, dorsal point extended slightly at tip toward cymbium, and separated by a narrow oblique depression from a more ventral prominence, which is sharp from the side and blunt from below. Median apophysis about equal to longest diameter of tegulum, curved slightly forward. Tip of lateral support not continuous in front with lateral side of median apophysis but tipped by a small sharp membrane. Apical tooth (Pl. II, fig. 15, e) long, flattened, curved laterad. Anterior margin of apical lobe (Pl. II, fig. 15, f) oblique, from base of apical tooth back to lateral margin of apophysis.

Greatest width of lamella of embolic division (Pl. II, fig. 14, D) about its length. Lamella narrowed abruptly behind spur; dorsal anterior angle sharp, extended slightly forward; midpart of folded edge with fine oblique grooves ending in minute teeth on midpart of anterior margin. Lateral process (Pl. II, figs. 13, 14, i) with a large inner thickening (Pl. II, fig. 14, i), and short process furrow; the process widened, where margins of process and inner thickening

fuse. Margin of bluntly rounded distal tip of lateral process thickened. Radix (Pl. II, figs. 13-15, E) with a V-shaped ridge from base to tip. Tip flattened, triangular; embolic arm widened toward embolus, tip sharp. Terminal apophysis (Pl. II, figs. 13, 14, F) with three turns topped by a distal looped piece with the appearance of a fourth turn. Proximal turn plain and narrow. Distal turns and loop striated longitudinally and transversely: longitudinal striations very fine, coarsened distally, diagonal on distal loop; transverse striations very coarse, dividing band into a series of platelets increasing in height and distinctness distally. Anterior and posterior margins slightly raised on middle turn, depression between them deepened. As band turns from spiral to loop, twelve platelets are extended toward center of spiral in a series of spines, middle ones longest. Band twisted at this point so that posterior margin of spiral becomes anterior margin of loop. This margin forms a fold deepened distally till platelet series appears double. Posterior margin of distal loop membranous, platelets rounded behind. Platelets of loop become deep grooves as distal portion turns back on itself to end bluntly. Embolus (Pl. II, figs. 13, 15, H) slightly longer than lamella. Truncus and apical sclerite separate. Apical sclerite slender, rodlike, distal tip sharp and free of pars pendula. Pars pendula extended in a small sharp distal lobe behind tip of duct. Conductor slightly thickened along one side. Long terminal lobe clothed with villi, lateral margin deeply fringed and curved slightly forward.

Female. Length, 4 mm. Cephalothorax yellow to brown, lighter than male; width about three fourths length, head three fourths length of carapace. From the side, carapace rises evenly to median furrow, arched slightly at this furrow; height at anterior end of median furrow a little less than at eyes. Posterior eyes about equal, median separated by slightly more than five times their radius. Anterior eyes in a straight line, median separated by a little more than their diameter. Viewed from the side, dorsoproximate part of chelicerae slightly convex. Gray markings sometimes lacking. Upper margin of furrow of claw with a row of three teeth nearer tip of closed claw than its base, smallest nearest claw tip, largest nearest claw base. Lower margin of furrow with a row of six little teeth extending from near claw base to opposite largest tooth of dorsal margin. Legs light yellow, markings gray or reddish brown.

Dorsal marking of abdomen somewhat varied. A characteristic wide, black folium enclosing a lighter area, becomes a single black band in front; and breaks, behind, into a series of chevronlike figures pointed forward. Light area within folium may contain narrow black median line, its anterior portion crossed by a curving trans-

verse line. Folium occupies considerably less than entire dorsal width of abdomen. White surface outside folium reddened behind.

From below, external length of epigynum (Pl. II, fig. 11) less than width. Opening large; length about three fourths width, showing portion of fertilization canal on dorsal wall of atrium. Atriolum brown or gray, portion of fertilization canal on ventral wall showing through as three dark lines on each side. A large, oval, translucent spot on each side, margined behind by middle turn of fertilization canal. From the side, external height about four fifths length; posterior margin of atriolum strongly convex; posterior tip of dorsal wall of atrium visible. Bursae of internal epigynum (Pl. II, fig. 12) shorter than their greatest diameter. Looped duct and seminal receptacle borne on mesal anterior part. Fertilization canal (Pl. II, fig. 12, g) in a wide spiral with a little less than three close turns. Diameter of spiral ovate and about equal throughout. Spiral groove (Pl. II, fig. 12, f) in a spiral parallel and immediately anterior to canal. A short distance behind anterior end of canal, spiral groove curves sharply laterad, curving in opposite direction to canal spiral for half a turn to looped duct. Looped duct and seminal receptacle small and stout. Loop formed by duct (Pl. II, fig. 12, i) very short, curved to point mesad. Seminal receptacle (Pl. II, fig. 12, j) longer and above looped duct; directed mesad, then ventrad.

Type locality: Washington Territory, California.

Compared with the male and female co-type from the Muséum National d'Histoire Naturelle through the kindness of M. Lucien Berland.

Alaska: Mole Harbor, Adm. Is., June 3, 1932, 1 female (Hasselborg), Admiralty Id. 1933, 2 males, 3 females (Sheppard); Skagway, June 24, 1936, 2 females (Crosby). **B. C.:** Prince Rupert, June 23, 1936, 1 female (Crosby). — **Washington:** Olympia, 6 males, 3 females (Banks); Friday Harbor, June 22, 1926, 1 female (Worley), July 20, 1926, 3 females (Worley), July 22, 1927, 1 female (Worley), Aug. 2, 1927, 1 male, 5 females (Worley), June-July, 1928, 1 female (Shackleford); Blakeley Is., July 1, 1927, 1 female (Worley); Orcas Is. Wn., July 14, 1927, 1 female; Lake Sutherland, Aug. 11, 1927, 1 male, 3 females (Crosby); Longmire, Aug. 22, 1927, 2 females (Crosby); Edmonds, Aug. 16, 1927, 1 female (Crosby); Solduc Hot Springs, Aug. 12, 1927, 2 females (Crosby). — **Oregon:** Portland, Apr. 28, 1916, 1 male, 1 female; Hood River; June 16, 1929, 1 female (Leonard); 1 male, 1 female (co-types). — **California:** St. Cruz Mts., Redwood Corralitos, May 13, 1907, 1 female (Bradley); Miranda, June 4, 1936, 1 male, 1 female (Crosby); Ft. Ross, June 6, 1 male (Crosby).

Linyphia maculata Emerton

Pl. III, figs. 16-20.

Linyphia maculata Emerton. Conn. Acad. Sc. Trans. 14:195, pl. 4, fig. 10. 1909.

Linyphia conferta Banks. Phil. Acad. Nat. Sc. Proc. p. 42, pl. 2, fig. 38. 1892.
(Nec *Linyphia conferta* Hentz).

Floronia conferta Banks. N. Y. Ent. Soc. Journ. 1:126. 1893.

Nerlene maculata Banks. U. S. Nat. Mus. Bull. 72:32. 1910.

Linyphia maculata Petrunkevitch, Am. Mus. Nat. Hist. Bull. 29:251. 1911.
— Banks. Phil. Acad. Nat. Sc. Proc. p. 448. 1911.

Male. Length 4 mm. Cephalothorax bright brownish-yellow, very lightly suffused with gray along margin and furrows. Median furrow red. Width about three fourths length, head about half length of carapace. From above, sides rather strongly curved. From the side, carapace rises about evenly from behind to eyes, slightly rounded behind; height at anterior end of median furrow about four fifths height at eyes. Clypeus straight, width almost three fifths length. Posterior eyes in a straight line, median a little larger than lateral, separated by twice the diameter and from the lateral by the diameter. Anterior eyes in a slightly procurved line, median a little smaller than lateral, separated by slightly more than the diameter and from the lateral by about twice the diameter. In addition to the usual eye spots, area between median eyes suffused with gray.

Chelicerae like carapace in color, without markings. Viewed from side, chelicera narrows evenly from cheliceral tooth to claw base. Cheliceral teeth rounded, compressed, dorso-lateral in position lying immediately in front of clypeus. Upper margin of claw furrow with two teeth a little nearer base of closed claw than its tip and one small tooth near tip of closed claw. A large tooth under tip of closed claw slants to point above claw. Lower margin with a row of three teeth, the largest nearest claw base. Sternum and endites like chelicerae in color. Sternum heavily suffused with gray. Labium dark gray. Endites with light gray markings; tip darkened and separated from rest of endite by gray line. Legs yellow, lighter in color than carapace. Femora one to four with a single dorsal spine.

Viewed from above, abdomen oval; from the side, height about even, extended behind slightly beyond spinnerets. Light gray above; brown-gray below and half way up sides. Above, three or four pairs of dark spots in a row along posterior two thirds of median line, most distinct toward rear, last pair fused. Posterior dorsal end of abdomen black. Three dark spots along each side of abdomen directly below dorsal paired spots. Behind, gray with a slender dark transverse line.

Palpus (Pl. III, fig. 18) like carapace in color, ventral part of coxa, and distal segments suffused with gray, darkest in front. Seen from the side, dorsal length of femur a little more than three times length of patella, slightly less than three times tibia, somewhat shorter than cymbium. From the side, patella almost flat on top behind long dorsal spine, curved sharply down in front. Seen from

above, greatest width of tibia slightly greater than its dorsal length, lateral side rounded with long hairs near cymbium especially on dorsolateral part. Greatest width of cymbium more than half its length; anterior tip long, bluntly pointed. Distal part of paracymbium considerably widened, suddenly constricted and turned to form sharp tip bent forward and in toward bulb.

Dorsal side of tegular plate widest, anterior margin curved evenly back to ventral side, slightly grooved midway. In front of tegular groove, tegular plate bears a rounded ventral swelling and a blunt dorsal point. Median apophysis a little longer than long diameter of tegulum, slim, distal tip turned sharply dorsad. Long apical tooth (Pl. III, fig. 18, e) curved toward small, sharp apical lobe (Pl. III, fig. 18, f). Greatest width of lamella about half its length; anterior part turned slightly ventrad, anterior margin diagonal, slightly rounded, curving from sharp ventral angle back to mesal process (Pl. III, fig. 19, D). Lateral process (Pl. III, figs. 18-20, i) curved slightly around embolic division; distal part semi-membranous, flat, bluntly pointed. Depression in lamella at base of lateral process. Anterior tip of radix (Pl. III, figs. 19, 20, E) longer than either arm; ventral side of tip supports terminal apophysis. Embolic arm slender, slightly curved. Transverse sclerite (Pl. III, fig. 18, l) diamond-shaped from behind. Terminal apophysis (Pl. III, figs. 19, 20, F) formed by two closely interlocked spirals, their margins touching to give a fairly continuous outline to the structure, which is widest in the middle, and greatly narrowed distally, ending in two small interlocked tips. Apophysis curves somewhat mesad. Longest spiral with three turns, anterior margin of two distal turns heavy, with fine longitudinal striations and coarse transverse grooves extending on membranous part. Second spiral with only two turns, a wide band of membrane, heavy at anterior tip and bearing two heavy rods in its posterior turn. Embolus (Pl. III, fig. 20, H) supported along its length by a single, heavy piece, narrowed distally; distal part heaviest, turned forward at blunt tip. Duct free of chitinous support except distal part. Truncus without basal piece: pars pendula extended beyond and behind duct tip in a long distal lobe (Pl. III, fig. 20, u), with a row of minute teeth along margin immediately behind duct tip. Delicate terminal lobe of conductor (Pl. III, fig. 19, y) equipped with minute villi. In figures 19 and 20, Pl. III, the terminal lobe of the conductor is folded back so that its form and the structure of the terminal apophysis may be seen.

Female. Length 4 mm. Gray along margin of carapace and on clypeus, sometimes forming reticulate pattern. Head more than half length of carapace. From above, sides curve more gently than in male, constricted slightly at contact with cervical furrow. From the side, carapace ascends steeply from behind to median furrow, height

at anterior end of furrow about four fifths that at eyes. Clypeus shorter than in male. Posterior median eyes separated by about twice the diameter and from the lateral by a little less than the diameter. Anterior median separated by about the diameter and from the lateral by a little more than twice the diameter.

Chelicerae with light gray markings; midpart of lateral surface suffused with gray. Viewed from side, dorsoproximal part appears slightly convex. Upper margin of claw furrow with a row of four teeth, middle teeth largest. Lower margin of furrow with a row of four small teeth nearer base of closed claw than its tip. Anterior half of endites light in color, darkened at tips. Anterior margin of labium grayish white.

Abdominal markings varied. Dark lateral spots may extend forward to carapace, and may fuse to form a longitudinal line. Below this, a wide white band, more or less broken into spots, extends around posterior end of abdomen. Light portions may be flecked with white. Dorsal spots may be fused longitudinally.

External length of epigynum (Pl. III, fig. 16) less than its greatest width. From below, atriolum covers bursae completely making opening appear single; from behind, opening appears double; two elliptical openings well separated and wider than high. Atriolum narrowed in front, anterior margin rounded, posterior margin broadly wedged-shaped. Viewed from side, external height somewhat less than length; atriolum steep in front, flat below, posterior margin rounded. Two large, lateral, triangular reddish spots bordered with black indicate widened middle portion of bursae beneath. Paracymbium short, slender, directed downward and slightly backward, with bluntly rounded tip extending a little behind atriolum. Bursae of internal epigynum (Pl. III, fig. 17, e) long, tapered tubes twisted to fit spiral process of embolic division of male. Bursae extend dorsad a short distance from well separated openings, then curve mesocephalad till in contact with each other, then ventrolaterad to anterior tip which bears short looped duct and long, slender seminal receptacle. Fertilization canal (Pl. III, fig. 17, g) with a posterior spiral of one and a half turns, then curved cephalad following peculiar twist of bursa to make anterior turn and a half. Canal widened near seminal receptacle. Narrow spiral groove (Pl. III, fig. 17, f) rises on ventrolateral wall of bursa, anterior end makes one more spiral turn than canal; tissue around spiral groove much widened near looped duct. Seminal receptacle (Pl. III, fig. 17, j) at sharp angle to looped duct (Pl. III, fig. 17, i) curved cephalad, then ventromesad at tip.

Type localities: Newton, Mass; Blue Hills near Boston, Mass.

Massachusetts: Blue Hills, near Boston, July 12, 1 female (Emerton); Newton (Riverside), June 21, 1890, 1 male (Emerton). — **New York:** Oakland Valley, May 26, 1920, 1 male; Ithaca, Aug. 1903,

1 female (Crosby); Enfield Glen, Tompkins Co., June 4, 1922, 1 female; McLean Bogs, July 16, 1924, 1 female. — **District of Columbia:** May 1889, 2 females (Fox); Aug. 1 male, 1 female (Fox). — **Minnesota:** Lake Minnetonka. June 22, 1926, 1 female (Fletcher). — **Wisconsin:** St. Croix Falls. 1 male, 1 female.

Linyphia litigiosa Keyserling

Pl. III, figs. 21-23; pl. IV, fig. 24, 25

Linyphia litigiosa Keyserling. Spinnen Amerikas. 2:62, pl. 12, fig. 166. 1886. — Banks. Cal. Acad. Sc. Proc. series 31(7):244. 1898. — Banks. U. S. Nat. Mus. Bull. 72:33. 1910. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 19:251. 1911. — Emerton. R. Can. Inst. Trans. 12:317. 1919.

Male. Length 5.5 mm. Cephalothorax yellow lightly suffused with gray; a narrow black median stripe widened on back of head to an irregular spot; a faint gray line from this spot to each posterior median eye; a broader dark band along lateral margins usually faint, sometimes lacking. Width about five sevenths the length; head rather wide and a little more than three fifths length of carapace. Viewed from the side, carapace almost flat from behind to head; height at anterior end of median furrow slightly less than three fifths height at eyes. Carapace sparsely clothed with fine black hairs. Long hairs behind and about eyes and on clypeus conspicuous against light carapace. Median and cervical furrows rather deep. Clypeus straight.

Posterior and anterior eyes in a slightly recurved line. Eyes about equal except the somewhat smaller anterior median. Posterior median separated by a little more than the diameter and from the lateral by somewhat more than twice that distance. Anterior median separated by about three fifths the diameter and from the lateral by a little less than five times the radius.

Chelicerae orange-yellow, usually without markings. Dorsal surface sparsely covered with slender, black hairs increasing in length toward claw base. Viewed from side, dorsoproximal part swollen, chelicerae narrowed abruptly almost half length from claw base. Small, compressed cheliceral teeth, middorsal in position immediately in front of clypeus. Upper margin of claw furrow with three teeth, two near tip of closed claw, small; one somewhat nearer claw base, large, sharp. Lower margin of furrow with a row of four teeth, two fairly near tip of closed claw and a very small pair nearer claw base. Sternum brownish yellow, deeply suffused with gray, and sparsely covered by long, slender black hairs. Labium dark gray. Endites with a few long, slender hairs; slightly lighter than chelicerae in color, lightly suffused with gray which forms a reticulate pattern next sternum. Relative length of legs: 1, 2; 4, 3. Legs light yellow, long, slender. Metatarsi three and four with three anterior spines,

Abdomen long and slender, slightly narrowed behind. From side, height about even. Above, indication of a long, slender folium, its narrow, dark lateral margin frequently broken except behind where it widens, the enclosed white patches smaller behind. A black median line, narrowed behind, is crossed about one third its length from carapace by a short transverse line, and is connected to lateral margin of folium by several slender dark lines. Sides with irregular oblique, light and dark lines and spots. Epigastrium gray or brownish white, midpart suffused with gray. Median ventral part gray flecked with white, flanked on each side by white band and bearing a short, white longitudinal line in front of spinnerets.

Palpus (Pl. III, fig. 21) light yellow, cymbium and ventral part of coxa suffused with gray, a narrow black ventral line on anterior margin of femur and patella. From the side, dorsal length of femur about four times length of patella, about three times tibia and one and a half the cymbium. Femur cylindrical. Dorsal side of patella gently arched. In a lateral view, greatest width of tibia a little less than its lateral length. Very long hairs on ventral and dorsolateral parts near cymbium. Greatest width of cymbium slightly less than two thirds its length. Anterior margin of tegular plate with an evenly rounded dorsal swelling and a more ventral, bluntly pointed projection, the oblique depression dividing them, ends between two rounded swellings in front of tegular groove. A ridge along center of tegular groove. Median apophysis of the tegulum a little shorter than long diameter of tegulum; width at base about half its length; narrowed in middle. Apical lobe of apophysis gently rounded (Pl. III, fig. 21, f); apical tooth (Pl. III, fig. 21, e) flat, slightly longer than lobe, curved ventrad.

Greatest width of lamella of embolic division somewhat less than half its length. Irregular grooves on convex surface. Anterior margin almost straight, depression at base of lateral process. A slender tooth between mesal process and anterior margin: a tiny tooth just in front of mesal process. Lateral process (Pl. III, fig. 22; pl. IV, fig. 24, i) a little less than half length of lamella, tip sharp. Spur heavy, sharp. Embolic arm of radix slim, widened distally, sharp. Terminal apophysis (Pl. III, fig. 22; pl. IV, fig. 24, F) with one and a half turns. Proximal turn plain; a row of minute teeth on concave surface in front of proximal turn. On distal half turn, convex anterior portion of band with two heavy ridges separated by a deep depression; the posterior ridge formed of little platelets, those near distal tip extending back onto membranous posterior portion of band. Truncus of embolus (Pl. III, fig. 22, s; pl. IV, fig. 24, s) elongate, stout, straight, heavy, blunt at the ends, narrowed slightly in front, mesal anterior angle drawn out in a sharp point ending as duct curves over side of terminal apophysis. Apical sclerite (Pl. III,

fig. 22, t) a small knob wider than long. Pars pendula flattened, flanking each side of duct, extended beyond apical sclerite in a bluntly pointed lobe, slightly heavier at tip and twisted a little in direction of bulb spiral. Delicate terminal lobe of conductor rounded; villi and fringed margin conspicuous. Transverse sclerite (Pl. III, fig. 22, l) a large flattened plate between lateral process of lamella and base of terminal apophysis.

Female. Length, 6 mm. Cephalothorax like that of male in color; slightly longer in proportion to its width; head somewhat wider, shorter and higher, with sides almost parallel near front. Anterior median eyes separated by slightly less than the diameter and from the lateral by almost three times the diameter. Chelicerae slightly darker than carapace. Viewed from side, chelicerae narrowed evenly toward claw base. Upper margin of claw furrow with a row of four or five teeth, smaller at each end. Lower margin of furrow with a row of three teeth opposite three of dorsal margin nearest claw base. Endites darkened next sternum, along median margin and on tips. Dorsal folium on abdomen more distinct than in male. Pattern on sides somewhat like that of *L. marginata*, with a broad, longitudinal anterior band and three or more posterior oblique ones.

From below, external length of epigynum (Pl. IV, fig. 25) less than width. Viewed from below, posterior margin of atrium forms a wide wedge, covering bursae completely. Posterior margin and median part gray. A large brown oval on each side has a heavy margin, thickest on median side; seminal receptacles may show through as dark anterior median spots on this oval. From behind, bursae openings separate, elliptical, and wider than long.

Dorsal wall of atrium with short, very bluntly rounded parmula projecting ventrad a short distance behind atrium. Seen from side, external height of epigynum a little more than one half length, atrium evenly rounded, posterior margin of parmula only slightly thickened. Bursae of internal epigynum (Pl. III, fig. 23) set at an angle, and shorter than their greatest diameter. Epithelial covering of bursa about even in diameter, flat in front. Looped duct and seminal receptacle mesal and anterior in position. Fertilization canal (Pl. III, fig. 23, g) with one and a half spiral turns around bursa; diameter of spiral oval. Short anterior portion of canal slightly twisted, extended forward and mesad of bursa. Spiral groove (Pl. III, fig. 23, f) rises on ventromesal wall of bursa between two posterior turns of canal. It makes one turn around bursa accompanied by a thickening of bursa wall, and one turn around twisted portion of fertilization canal. Loop formed by duct directed mesad, then curved to point dorsad. Seminal receptacle (Pl. III, fig. 23, j) above

looped duct, long and slender, directed dorsad, tips often curved laterad.

Type locality: Washington Territory.

Washington: Olympia 1876, 2 males, 11 females. Seattle, Aug. 7, 1927, 8 females (Crosby); Lake Sutherland Aug. 11, 1927, 7 females (Crosby); Friday Harbor, June-July, 1928, 16 males, 24 females (Shackleford), July 1926, 1 male (Worley); Union City, Aug. 17, 1 male, 1 female, (Bradley). — **Oregon:** Benton Co., Aug. 21, 1912, 1 female (H. E. E.). — **Utah:** Salt Lake City, Sept. 1930, 1 female (Gertch) Tooele Canyon, Aug. 29, 1931, 1 female (Gertch). — **California:** Sequoia, 30 females (Comstock), 1 male, 17 females (Comstock), 1 male, 18 females (Comstock); Sugar Pine, Madera Co. (4300-5000 ft.), Aug. 24, 1914, 2 females (Bradley).

Linyphia marginata C. L. Koch

Pl. IV, fig. 26-31

Araneus triangularis Clerck. Sv. Spindl. p. 71, pl. 3, tab. 2, fig. 2. 1757 (ad partem).

Aranea resupina sylvestris De Geer. Mem. pour serv. l'hist. Insectes 7:244, pl. 14, fig. 22, 1778 (ad partem).

Linyphia triangularis Walckenaer. Tableau d. Aran. p. 70. 1805.

Linyphia marginata C. L. Koch. Herr. Schaef. Deutsch. Ins. p. 127. fig. 21-32. 1834. — Wider et Reuss. Zool. Misc. Arachn. p. 247, pl. 17, fig. 5. 1834.

Linyphia triangularis Walckenaer. Ins. Apt. 2:240. 1837.

Linyphia marginata C. L. Koch. Die Arachn. 12:118, tab. 423, fig. 1041, 1042. 1845.

Linyphia marmorata Hentz. Boston Soc. Nat. Hist. Journ. 6:29, pl. 4, fig. 5. 1850 (Reprint Spid. of U. S. Burgess ed. p. 134, pl. 15, fig. 5, pl. 18, fig. 23. 1875).

Linyphia scripta Hentz. Boston Soc. Nat. Hist. Journ. 6:29, pl. 4, fig. 6. 1850 (Reprint Spid. of U. S. Burgess ed. p. 134, pl. 15, fig. 6. 1875).

Linyphia triangularis Westring. Göteborg. Vet. Hdl. 2:37. 1851. — Blackwall. Annals & Mag. of Nat. Hist. 2nd series. 8:449. 1851.

Linyphia marginata Thorell. Rec. crit. ar. in Reg. Soc. Sci. Upsala Nova Act. 3rd series 2:95. 1856. — Westring. Aran. Suec. p. 105. 1861.

Linyphia tringularis Blackwall. Sp. Gr. Br. & Ire. 2:212, pl. 15, fig. 139. 1864.

Linyphia marginata Ausserer. K. K. Zool. Bot. Ges. Wien Verhandl. 17:147. 1867. — Thorell. Rem. Syn. Eup. Sp. p. 51. 1870. — Pavesi. Soc. Ital. Sc. Nat. Atti. 16:71. 1873. — Pavesi. Mus. Civ. Genova Ann. 4:68. 1873. — Pavesi. Soc. Ital. Sc. Nat. Atti. 18:263. 1875. — Lebert. Allg. Schweiz. Ges. gesamt. Naturw. Neue Denk. 27(2):153. 1877 (Reprint Bau u. Leben Sp. 1878). — Becker. Soc. Ent. de Belgique Ann. 22:103. 1879. — Hermann. Ungarns Sp. 3:58. 1879. — Cambridge. Sp. of Dorset 2:523. 1881. — Kulczynski. Sp. aus Tatra. p. 13. 1882. — Emerton. Conn. Acad. Sc. Trans. 6:61, pl. 18, fig. 1. 1882. — Simon. Arachn. France 5:231. 1884. — Keyserling. Spinn. Amer., Ther., 2:58, tab. 12, fig. 164. 1886. — Banks. Acad. Nat. Sci. Phil. Proc. p. 41. 1892. — Simon. Hist. Nat. Ar. 2nd 1:692. 1894. — Chyzer and Kulczynski. Araneae Hungariae 2a:57, tab. 2, fig. 22. 1894. — Banks. Ent. News 6:205. 1895. — Müller and Schenkel. Naturf. Ges. in Basel Verh. 10:720. 1895. — Becker. Mus. Roy. d'Hist. Nat. Belgique Ann. 12(3):20, pl. 2, fig. 2a-e. 1896. — Strand. Archiv for Mathem. og Naturvid. 21. Nr. 6. p. 17 (1899). — Pickard-Cambridge. List. of Brit. Irish Sp. p. 26. 1900. — Kulczynski in Zichy. Dritte asiatische Forschungsreise 2:315. 1901. — Strand. Archiv for Mathem. og Naturvid. 24. Nr. 2. p. 55. 1901. — Emerton. Common spiders p. 136, fig. 319, 320. 1902. — Strand. Bergens Mus. Aarbog 1902. No. 6. p. 8. — Bösenberg. Sp. Deutschl. p. 67, tab. 5, fig. 66. 1903. — Strand. Kgl.

Norske Vidensk. Selsk. Skrifter 1903. No. 7, p. 8. 1904. — de Lessert. Rev. Suisse Zool. 12:352. 1904. — de Lessert. Rev. Suisse Zool. 13:640. 1905. — Bösenberg & Strand. Japanische Spinnen, p. 173, tab. X, fig. 192 A, B, C, D, E. 1906. — Strand, Fauna Arctica IV. p. 454. 1906. — Strand, Zool. Jahrb., Syst. 24, p. 392. 1907. — de Lessert. Rev. Suisse Zool. 15:118. 1907. — Strand, Zool. Anz. 32, p. 229. 1907. — Bryant. Boston Soc. Nat. Hist. Occ. Papers 7:38. 1908. — Banks. U. S. Nat. Mus. Bull. 72:33. 1910. — de Lessert. Cat. Invert. Suisse Araignees. p. 274. 1910. — Fedotow. Stat. Biol. Borodinskaja de la Soc. Natur. S. Petersb. Trav. 3:71, pl. 2, fig. 12. 1911. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 29:252. 1911. — Banks. Acad. Nat. Sc. Phil. Proc. p. 448. 1911. — Comstock. Spider Book p. 390, figs. 404, 405. 1912. — Fedotow. Rev. Russe. Entom. 12:8. 1912. — Grese. Soc. Ent. Moscow Bull. 1:107. 1915. — Spassky. Inst. Polytechn. du Don Bull. 3:88. 1914. — Strand, Archiv für Naturgesch. 1915, A. 9, p. 7, 16. — Banks. U. S. Nat. Mus. Proc. p. 69. 1916. — Balboa. Las Aranas p. 244. 1917. — Reimoser. Kat. Sp. p. 94. 1919. — Emerton. R. Can. Inst. Trans. 12:317. 1919. — Schenkel. Rev. Suisse Zool. 32:267. 1925. — Spassky. Ecole Super d'Agric. et d'Amélioration du Don Ann. 5:25. 1925. — Strand. Arch. f. Naturgesch. 92:87. 1926. — Schenkel. Rev. Suisse Zool. 34:229. 1927. — Spassky. Siberian Inst. Agric. a. Forestry Trans. 10:7. 1928. — Simon. Arach. France. 6:629 and 743, fig. 956, 957, 958. 1929. — Charitonow. Acad. Sc. de l'U. R. S. S. Mus. Zool. Ann. 32:78. 1932.

Male. Length of single specimen, 4 mm. Considerable variation in length. Cephalothorax yellow to orange-brown, deeply suffused with gray except a wide band along each side and median portion which varies in different specimens. Part around longitudinal furrow and median portion of back of head usually light. Width almost four fifths length. Length of head a little more than half greatest length of carapace. Viewed from side, carapace rises abruptly behind to more than one third height at eyes, then very gently to back of head. Height at anterior end of median furrow about two thirds height at eyes. Hairs about eyes, on back of head and clypeus conspicuous.

Posterior eyes in a slightly recurved line, and equal; median separated by a little more than the diameter, and from the lateral by a little less than twice the diameter. Anterior eyes in a slightly procurved line, median about two thirds the lateral, separated by the diameter, and from the lateral by slightly more than twice that distance.

Chelicerae like clypeus in color with gray markings enclosing an area lightly suffused with gray. Lateral surface with one or more longitudinal gray lines. Cheliceral teeth compressed, rounded, lateral in position lying immediately in front of clypeus on lateral arm of V-shaped dorsal marking. Upper margin of claw furrow with three teeth, one near claw base, two near its closed tip, middle one largest. Lower margin of furrow with a row of two or three teeth, largest one nearest tip of closed claw. Sternum, labium and endites black. Relative length of legs: 1, 2, 4, 3. Legs yellow, lightly suffused with gray, distal segments darkest. All segments except coxae and tarsi with narrow distal, ventral black band,

extend around dorsal side on metatarsi. Femora without dorsal spines.

Abdomen ovate, rounded and widest behind. Black with white markings., Dark gray above, median part lighter. A white longitudinal line along dorsolateral margin extended down sides in irregular, fine white lines and spots. Plates over booklungs brown. A white spot on each side just in front of spinnerets and a similar pair on caudal end of abdomen above spinnerets. This pattern subject to considerable modification, that of many males more or less like pattern of female.

Palpus (Pl. IV, fig. 30) like legs in color, lightly suffused with gray, darker on distal segments and ventral part of femur; a dark anterior band on patella and below on femur. From the side, dorsal length of femur almost four times that of patella, and of tibia, a little less than cymbium. Femur narrowed in front, ventral side slightly swollen. Patella much longer above than below; gently arched above, steepest in front; a somewhat shorter hair behind long dorsal hair. In a dorsolateral view, greatest width of tibia slightly more than its length. Ventrolateral and dorsolateral parts with a few very long hairs. Greatest width of cymbium about half its length, anterior tip bluntly pointed. Base of paracymbium narrow. Anterior margin of tegular plate with a high rounded ventral lobe and a bluntly pointed dorsal projection directed dorsad. Median apophysis of tegulum longer than longest diameter of tegulum, narrowed somewhat where membranous part and lateral support meet, membranous part curved sharply forward, shielding exposed part of embolus in unexpanded bulb. Articular knob large. Apical lobe sharp (Pl. IV, fig. 30, f); apical tooth (Pl. IV, fig. 30, e) curved away from cymbium.

Width of lamella of embolic division (Pl. IV, figs. 28, 31, D) slightly less than half its length, anterior part bent ventrad making anterior margin bluntly pointed. Ventral part of folded edge with deep diagonal grooves, dorsal part with a blunt swelling near mesal process. Lateral process short, narrow, blunt. (Pl. IV, fig. 31, i). Mesal process long, turned sharply forward in a flat, slightly twisted tip rounded in front. Spur sharp. Radix (Pl. IV, figs. 28, 31, E), stout, two arms fused with radix from base to near anterior tip. Tip of radix broad and nearly straight, with mesal anterior angle extended into a slim sharp point behind base of terminal apophysis. Lamellar arm bluntly pointed; embolic arm gently curved, rodlike. Terminal apophysis (Pl. IV, figs. 28, 31, F) twisted in a spiral of one and a half turns; composed of two curved fluted plates joined by a semimembranous midportion which merges imperceptibly into distal plate. Groove deepened on more tightly twisted distal part. Embolus (Pl. IV, figs. 26, 28, 31, H) wide,

flattened and narrowed somewhat near distal tip which lies against side of terminal apophysis. It is one heavy piece holding duct, heavier near distal tip, along dorsal side, and at base. Apical sclerite a small, blunt tip. Conductor (Pl. IV, fig. 28, 31, G) stiffened along dorsal side. Delicate terminal lobe with minute villi.

Female. Length, 4.75 mm. Similar to male in form and color. Cephalothorax a darker gray, light area along median furrow and on back of head faint or lacking; lateral bands narrower, white to light yellow. Lateral margins somewhat more constricted at contact with cervical furrow. From the side, head slightly higher than that of male. Posterior median eyes slightly larger than the lateral, separated by about two thirds the diameter and from the lateral by the diameter. Anterior median separated by somewhat less than the diameter and from the lateral by about three times the radius. Upper margin of cheliceral claw furrow with a row of three equidistant teeth nearer tip of closed claw than its base, smallest tooth nearest claw tip. Lower margin of furrow with a row of three or four teeth nearer base of closed claw than its tip. Legs pale yellow or white.

Abdomen white with black markings. Dorsal surface with narrow, black median folium with three swellings. Posterior end of abdomen covered by a black triangle bearing a pair of white spots about midway in its length, and connected to dorsal folium by narrow, black line. Sides white with two black, longitudinal, anterior bands; and four verticle posterior ones, the hind three fused below and separated from ventral region by white line, anterior vertical stripe extended below to dark ventral region and fused above with most dorsal longitudinal band. Plates over booklungs gray or brownish white. Median, ventral part black, flanked on each side by a white line broken by one vertical lateral stripe and sometimes broken again to form a row of three white spots.

From below, epigynum (Pl. IV, fig. 27) a little wider than long. Atrium large, heavy, strongly convex; rounded in front, concave behind; median juncture of bursae covered. Bursae usually visible through atrium as light lateral areas crossed in middle by part of fertilization canal, and in front and back by part of spiral groove. Parmula very small, bluntly rounded, thickened hind rim, seen from the side, extending back slightly farther than sides of atrium. From the side, external height of epigynum about one half length; posterior margin of atrium convex. Bursae of internal epigynum (Pl. IV, fig. 29) slightly separated, longer than wide, tapered a little and slightly curved to approach at each end. Fertilization canal in a loose spiral of one and a half turns around bursa, canal narrowed on posterior half turn.

Spiral groove rises on lateral wall of bursa immediately in front of posterior turn of canal; parallel to canal for half a turn, then extended forward to make a small turn around anterior end of bursa. Small, slender, semimembranous looped duct and seminal receptacle on mesal anterior margin of bursa. Loop formed by duct (Pl. IV, fig. 29, i) above seminal receptacle; curved to point laterad. Seminal receptacle (Pl. IV, fig. 29, j) directed forward.

Type locality: Sweden.

Nova Scotia: Truro, July 31, 1913, 1 female (Emerton). — **Maine:** Bayville, July 1900, 4 females (Bryant); Westbrook, 1925, 2 males, 1 female (Lathrop); Long Island, June 21, 1900, 3 males, 3 females (Bryant). — **New Hampshire:** Flume, Sept. 1907, 1 female (Bryant); Pike, June, 1908, 1 male (Hayhurst); Shelburne, July 1916, 1 male, 3 females (Deane); Moosilauke, July 4, 1912, 4 males, 12 females (Bryant), July 8, 1912, 1 male, 1 female (Bryant); Intervale, Sept. 1907, 8 males, 49 females (Bryant); Randolph, July 1926, 7 males, 3 females (Emerton and Banks); Gilmanton, June 12-18, 1925, 6 males (Bryant); Hollis, Sept. 1888, 5 females (Fox), Aug. 1, 1911, 1 female (Bryant); South Lyndeboro, June 5-11, 1923, 4 males, 3 females (Bryant); Monadnock, June 22-27, 1924, 4 females (Bryant); Fitzwilliam, July 15, 1923, 1 female (Emerton). — **Vermont:** Stowe, July 29, 1902, 3 males, 7 females (Bryant); South Newfane, June 1929, 5 males, 7 females (Bryant). — **Massachusetts:** Woods Hole, July 10, 1919, 2 males, 1 female (Forbes); Beverly, June 4, 1870, 3 males, 3 females (Emerton); Cohasset, June 17, 1914, 2 males, 7 females (Bryant); Brookline, May 15, 1902, 1 male, 1 female (Bryant); Blue Hills, Aug. 18, 1902, 11 males, 13 females (Bryant); Holliston, June 17, 1923, 1 female (Emerton and Banks); Newton, June 1, 1902, 2 males (Bryant); Plymouth (Sandy Pond), Aug. 1916, 1 male (Clapp); Petersham, May 27-31, 1913, 5 males, 9 females (Bryant); Readville, June 25, 1904, 2 males, 1 female (Bryant); Sharon, Aug. 9, 1902, 1 male, 1 female (Bryant); Stowe (Lake Boon), July 12, 1916, 1 male, 3 females (Bryant). — **Connecticut:** South Meriden, Aug. 30, 1915, 1 female (Johnson); Woodbridge, Oct. 10, 1902, 1 male, 1 female (Bryant). — **Rhode Island:** Kingston, Sept. 1903, 1 male, 1 female. — **New York:** Black Brook, Clinton Co., June 11, 1916, 2 males, (Crosby); Pearl Point, Lake George, July 29, 1920, 1 female (Crosby); Tackawasick Pond, Rensselaer Co., June 25, 1920, 1 male, 1 female (C. and B.); Johns Brook, Essex Co., Aug. 25, 1930, 1 female (Crosby); Artists Brook, Essex Co., July 28, 1923, 2 females (Crosby), June 11, 1933, 1 male, 1 female (Crosby); Chapel Pond, Essex Co., July 19, 1923, 1 male (Bishop); Newcomb, Essex Co., July 1-10, 1925, 1 male, 3 females (House); Adirondack Lodge, Essex Co., June 29, 1923, 4 females (Bishop); Mt. McIntyre, July 1, 1923, 1 male (Crosby), July 24, 1925, 1 female (Crosby);

Axton, 1 male, 1 female (Bryant); Tongue Mt., Warren Co., Sept. 5, 1920, 1 female; Boonville, Aug. 8, 1931, 1 female (Karlskind); Oakland Valley, May 26, 1920, 1 male, 1 female (C. and B.); Lake Mahopac, Sept., 3 females (Fox); Sound Beach, Riverhead, Sept. 19, 1922, 1 male, 1 female (Crosby); Wabeek, June 13, 1927, 1 male; Taughannock, May 11, 1930, 2 males (Hayden); Ithaca, July 1, 1909, 1 female (Bryant); June 23, 1932, 3 males, 10 females (Hayden), Aug. 1902, 1 male, 2 females; Enfield Glen, Aug. 7, 1909, 1 female (Bryant); Danby, May 30, 1915, 1 male (Dietrich); Wilmington Notch, July 5, 1923, 1 female (Crosby); Willseyville, June 24, 1932, 1 male, 1 female (Hayden); Michigan Mills, Sept. 1, 1926, 1 female (Crosby); Cinnamon Lake, Schuyler Co., July 12, 1924, 2 females (C. and B.); Rock City, Cattaraugus Co., June 5th, 1915, 1 male; Otto, Aug. 10, 1903, 1 male, 3 females (Comstock); Trenton Falls, June 5, 1921, 2 males (Crosby); Dunkirk, 7 females (Hayhurst). — **New Jersey:** Hamburg, June 27, 1930, 2 males, 11 females (Hayden). — **Pennsylvania:** White Deer Creek, Aug. 19, 1911, 1 male; Gettysburg, Oct. 3, 1923, 1 female. — **District of Columbia:** 1 female (Marx). — **Maryland:** Hagerstown, Aug. 1915, 1 female (Pennington); South Mountains, July 5, 1916, 2 males, 3 females (Hyslop); Meyersville, Sept. 2, 1915, 5 males, 6 females (Hyslop and Parker). — **Virginia:** Great Falls, Apr. 3, 1921, 1 female (Crosby); Falls Church, 1 male, 1 female (Banks); Great Falls, June 27, 1 female (Banks). — **North Carolina:** Raleigh, Aug. 1912, 1 female (Brimley); Smokemont, Aug. 24, 1930, 1 female (Banks); Nantahala Gorge, Aug. 27, 1930, 1 female (Banks); Bynson City, Aug. 27, 1930, 1 male (Creighton). — **Alabama:** Auburn, Sept. 1924, 1 male (Good); Cohort, Jefferson Co., April 13, 1912, 3 males (H. H. Smith); Pratt's Ferry, June 1912, 1 female. — **Florida:** Rock Bluff, April 4, 1927, 2 females (Crosby); The Glen, Micanopy, Nov., 1 male (Hubbell), March 6, 1927, 1 male, 1 female (Barrows); July 9, 1927, 1 female (Leonard). — **Mississippi:** Ocean Springs, Jan. 1905, 4 females (Comstock); Oxford, Aug., 1 female. — **Missouri:** Columbia, July 1905, 2 males (Crosby), Aug. 1905, 1 male (Crosby); Hollister, Aug. 1912, 1 female (Knight); Darlington, Aug. 1905, 1 female (Crosby). — **Louisiana:** Baton Rouge, March 20, 1903, 1 male, 2 females (Comstock). — **Ohio:** Gambier, Aug. 1905, 4 males, 4 females (Nelson). — **Indiana:** Arlington, 3 females (Banks). — **Michigan:** Douglas Lake, July 1922, 8 males, 3 females (Matheson). — **Iowa:** Ames: 1 female (Banks). — **Kansas:** Manhattan, May 15, 1 male, 1 female (Banks). — **Ontario:** Sanford, June 1906, 2 females (Crosby). — **Manitoba:** Kettle Rapids, July 15, 1917, 1 male, 1 female. — **British Columbia:** Terrace, June 12-20, 1931, 1 female (M. E. Hippisley), July 1931, 2 females (M. E. Hippisley). — **Alaska:** Skagway, June 24, 1936, 1 female (Crosby). — **Texas:** Edinburg, 1932, 1 female (Mulaik); Austin, Aug. 1909, 1 female

(Chamberlin). — **California:** Claremont, 4 females, — **France:** 4 males, 2 females; Foix, July 29, 1932, 1 female (Valentine). — **China:** Nanking, Apr. 1925, 2 females (Ping).

***Linyphia strandia* n. sp.**

Pl. V, figs. 32-35, 37, 38.

Male. Length 3 mm. Cephalothorax pale yellow, lightly suffused with gray except a wide, flattened marginal band on each side which extends on sides of head and clypeus; lower edge of clypeus darkened. Viewed from above, sides evenly rounded to head, constricted slightly at cervical furrow; clypeus almost straight. Width of carapace almost four fifths length. Head rather wide and three fifths greatest length of carapace. Viewed from side, carapace rises gently from behind to head, then more steeply to eyes. Longitudinal and cervical furrows rather deep. Posterior eyes in a very slightly recurved line; about equal, the median separated by somewhat less than their diameter and from the lateral by a little more than their diameter. Anterior eyes in a slightly procurved line, median about two thirds the lateral, separated by about three fourths their diameter and from the lateral by about three times their radius.

Chelicerae like carapace in color, markings light gray. Cheliceral tooth compressed, dorsolateral in position, immediately below clypeus. Viewed from the side chelicera narrows evenly to claw base. Upper margin of claw furrow with two minute teeth near claw base and a pair of teeth near tip of closed claw, the one furthest from claw tip large. Lower margin of furrow with a very small tooth near claw base and a large one nearer tip of closed claw than its base. Sternum and endites like chelicerae in color. Sternum heavily suffused with gray which may form a reticulate pattern. Labium dark gray. Endites with gray markings, tips greatly darkened. Sternum and endites sparsely covered with long, slim hairs longest in front. Relative length of legs: 1, 2, 4, 3. Legs like carapace in color, lightly suffused with gray, darkest beneath.

Abdomen ovate from above, widest behind. From the side, almost straight in front, above and below, slightly rounded and higher behind. White with black or brownish gray markings. Pattern very similar to that of *Linyphia marginata* Koch. A darkly margined folium above with a dark median line, a white dorsolateral stripe interrupted by a narrow line in front and back. Sides with two black anterior longitudinal stripes and four vertical posterior ones. Abdomen dark below, margined on each side by a white line interrupted by most anterior of lateral vertical stripes. Plates over book lungs brown or grayish white.

Palpus (Pl. V, fig. 35) light, distal segments suffused with gray, darkest on cymbium, narrow black distal band on patella and on

ventral side of femur. Viewed from the side, dorsal length of femur slightly more than three and a half times that of patella, somewhat more than three times tibia and equal to cymbium. Mesal side of femur almost straight, proximal half of lateral and ventral sides slightly swollen. Seen from the side, patella evenly convex above, long dorsal hair more than twice length of patella. In a lateral view, length of tibia about three fourths its greatest width; ventral side rounded, lateral half with a few long hairs near cymbium. Greatest width of cymbium a little less than two thirds its length; distal tip bluntly pointed. A very long hair just in front of widest part, another on dorsal margin a little behind the first and two shorter hairs on anterior part of ventral margin. Base of paracymbium narrow. From the side, anterior margin of tegular plate with a rounded dorsal angle, a very short rounded median swelling and a larger ventral lobe. Behind median swelling, a blunt projection on anterior margin of tegular groove is directed ventrad. Seen from in front, dorsal angle of tegular plate sharp. Median apophysis slightly longer than long diameter of tegulum, curved sharply forward, its tip almost reaching tip of cymbium. Articular knob ovoid, spoonlike. Lateral support short; apical lobe tiny, sharp, near tip of lateral support; apical tooth (Pl. V, fig. 35, e) broad, flat, curved dorsolaterad.

Greatest width of lamella of embolic division (Pl. V, fig. 37, D) somewhat more than one third its length. Anterior margin bluntly pointed. Folded edge grooved perpendicular to mesal side of this point. Behind spur, lamella narrows to a sharp point curved laterad then dorsad at tip. Depression at base of lateral process. Lateral process very short, sharp. Mesal process extended in a very large, flat lightly fluted lobe turned sharply forward to lie against terminal apophysis. Spur sharp. Radix (Pl. V, figs. 37, 38, E) stout, tip very broad. Embolic arm (Pl. V, fig. 38, m) more than two thirds length of radix, distal tip flat, membrane between radix and embolic arm heavy. Terminal apophysis (Pl. V, figs. 37, 38, F) twisted with one and a half turns; proximal and distal part heavy, membranous between. Proximal part a very heavy, large, lightly grooved plate narrowed in front; distal part smaller, twisted more sharply, with longitudinal grooves jagged in appearance due to variation in their depth. Truncus and pars pendula of embolus form one heavy piece (Pl. V, figs. 37, 38, H), broad behind, narrowed very suddenly about midway in its length, the ventral part continuing to a broad flat tip bearing small, rodlike apical sclerite. Ventral portion of tip extended in a small, toothlike point, a minute tooth at its base. Conductor (Pl. V, fig. 38, G) twisted just behind oval, terminal lobe, equipped with minute villi.

Female: Length 3.75 mm. Carapace like that of male in form and color. Posterior median eyes slightly smaller than the lateral, separated from each other and from the lateral by three fourths the diameter. Upper margin of claw furrow with a row of four stout evenly spaced teeth, those at each end smallest, second tooth from closed claw tip largest. Lower margin of claw furrow with a row of three teeth, one very near claw base, two opposite those of dorsal row nearest claw base. Spines on legs longer than those of male. On abdomen of specimen examined, light spots immediately above spinnerets lacking; darkened ventral surface with a reticulate pattern.

Seen from below, external width of epigynum considerably less than length. Atrium (Pl. V, fig. 34) heavy, anterior part with a few transverse wrinkles; a semitransparent area on each side with a dark transverse line behind, indicating fertilization canal above. From the side, (Pl. V, fig. 32) height of atrium more than half length; posterior margin gently rounded. Posterior tip of dorsal wall of atrium extends a little behind atrium, thickened and turned slightly ventrad. Internal epigynum (Pl. V, fig. 33) simple in structure. Bursa conical, blunt in front, with short, stout looped duct (Pl. V, fig. 33, i) and seminal receptacle (Pl. V, fig. 33 j) to mesal side of apex. Fertilization canal (Pl. V, fig. 33, g) extends back from seminal receptacle to posterior part of bursa, curves across to lateral side, then up to vagina. Spiral groove (Pl. V, fig. 33, f) rises on lateral wall of bursa in front of fertilization canal, extends parallel to canal, passing to mesal side of seminal receptacle as it enters looped duct. Looped duct above seminal receptacle.

Types: One male, one female. Mt. Poi (5350 ft.). Sarawak, Borneo. Cornell University Coll. — Named for Professor Doctor Embrik Strand.

***Linyphia emphana* Walckenaer**

Pl. V, fig. 36, pl. VI, figs. 39-42

Palpus of male (Pl. V, fig. 36) orange-yellow, cymbium suffused with gray, seen from above, dorsal length of femur about three and a half that of patella, about two and a half tibia and a little more than one and a half the cymbium. Patella gently arched above, somewhat shorter hair behind long dorsal hair. From above, greatest width of tibia about two thirds its length. Dorsolateral part sparsely covered with long hairs which extend down margin of lateral side next cymbium. Greatest width of cymbium three fifths its length. Anterior margin of tegular plate with two bluntly rounded ventral swellings, the larger ventrad. A blunt, pointed projection midway in anterior margin of tegular groove. Median apophysis a little shorter than long diameter of tegulum, straight. Apical lobe

(Pl. V, fig. 36, f) wide, rounded, cut off sharply next small apical tooth (Pl. V, fig. 36, e).

Lamella of embolic division (Pl. VI, fig. 42, D) slender, greatest width about one third the length, anterior portion stout, convex surface lightly grooved. Anterior margin extended in toward bulb in a blunt point. Lateral process (Pl. VI, figs. 40, 42, i) about one half length of lamella from anterior margin; long, sharp tip twisted slightly as it curves around bulb. Mesal process extends toward lateral process in a long lobe, membranous at base, turning sharply forward to lie next transverse sclerite as it ends in a broad, gently rounded, lightly grooved tip. Spur heavy, sharp. Transverse sclerite between lateral process and base of terminal apophysis, heavy, anterior surface flattened. Radix (Pl. VI, figs. 40, 42, E) slightly more than half length of lamella; embolic arm slender. Terminal apophysis (Pl. VI, fig. 40, F) small, with one and a half turns, semimembranous; tip a wide flat lobe folded lengthwise so that tip may appear double. Truncus and pars pendula of embolus (Pl. VI, figs. 40, 42, H) form a large but not very heavy piece tapered behind, curved sharply toward duct tip, and greatly narrowed distally, only ventral part continuing to tip of duct which is capped by small apical sclerite. Pars pendula extended beyond and behind duct tip in a rounded, heavier lobe (Pl. VI, fig. 40, u). Conductor slender, slightly heavier behind lobe, twisted a little just behind terminal lobe. Lobe equipped with minute villi. From below, external length of epigynum of female (Pl. VI, fig. 39) somewhat less than two thirds width. Atrium brown, posterior margin gently concave with a median notch. Width of opening more than twice its length. Posterior end of spiral groove visible within each side of opening. Short parma extended down and back behind atrium, with a thickened bluntly rounded tip, cochlear depression small. Bursae of internal epigynum (Pl. VI, fig. 41) set at an angle, their mesal posterior epithelium turned forward and in contact. Fertilization canal (Pl. VI, fig. 41, g) with one and a half spiral turns narrowing toward seminal receptacle. Spiral groove (Pl. VI, fig. 41, f) with same number of turns but of wider diameter than canal and not narrowed toward looped duct, posterior end heavy on lateral wall of bursa. Looped duct and seminal receptacle about equal in length: loop formed by duct (Pl. VI, fig. 41, i) curved forward, then ventrad, seminal receptacle (Pl. VI, fig. 41, j) curved mesad, then dorsad.

***Linyphia peltata* Wider et Reuss**

Pl. VI, figs. 43-46, pl. VII, figs. 47, 50

Palpus of male (Pl. VI, fig. 44) yellow like coxae of legs, suffused with gray on ventrolateral side of coxa, ventral margins of femur, anterior margin of patella, anterior part of tibia, and, more heavily, on cymbium. From the side, dorsal length of femur almost

three times that of patella, a little more than twice tibia, and a little longer than cymbium. Femur arched slightly as it passes chelicera. Patella gently arched above. In a dorsolateral view, greatest width of tibia about equal to its length; ventral side gently rounded; lateral and ventral sides with a row of long hairs next cymbium. Greatest width of cymbium about two thirds its length; anterior tip bluntly rounded. Anterior margin of tegular plate with a large dorsal swelling, bearing a blunt ventrolateral tooth near its base; and a smaller rounded ventral swelling. Median apophysis of tegulum a little longer than greatest diameter of tegulum, narrowed abruptly in front of lateral support, anterior tip curved forward and twisted so that slender apical tooth (Pl. VI, fig. 44, e) curves laterad. Apical lobe represented by widening of median apophysis behind tooth.

Lamella of embolic division (Pl. VII, fig. 50, D) narrow, greatest width less than a third the length. Anterior margin slightly concave, curved sharply in toward bulb. Anterior part of folded edge with two series of fine grooving producing a scalelike appearance. Lateral process (Pl. VII, figs. 47, 50, i) rises about midway in length of lamella, narrows to a pointed tip. Spur large, blunt. Membrane between tip of radix and lamellar arm heavy; tip of lamellar arm close to lateral process; radix (Pl. VII, fig. 47, E) strongly tapered to anterior tip; tip of embolic arm curved forward. Terminal apophysis (Pl. VII, figs. 47, 50, F) with two turns, posterior turn a plain band, anterior turn with fine longitudinal striations, and with coarse transverse grooves dividing anterior portion of band into platelets. Anterior margin serrate, each platelet ending in a minute spine, those opposite distal tip longer. An ungrooved depression between platelets and heavy posterior margin of band. Truncus and apical sclerite of embolus (Pl. VII, figs. 47, 50, H) separate but opposing ends very close. Truncus constricted gradually in front to a narrow tip. Apical sclerite elongate, thickened at duct tip and curved forward, extended on each side of distal tip to form a lateral lobe. Conductor twisted at base of long oval terminal lobe equipped with villi.

From below, external length of epigynum of female (Pl. VI, fig. 43) less than width. Posterior margin of atrium concave, evenly rounded, completely covering bursae so that opening appears single from below. Two darkened spots on anterior lateral parts of atrium indicate large seminal receptacles above. From behind (Pl. VI, fig. 46) two openings visible, openings of bursae well separated. Parmula short, broad, extended down and slightly backward. From the side, external height of epigynum about half the length, tip of parmula visible.

Bursae of internal epigynum (Pl. VI, fig. 45) about as long as their width at posterior end; conical, each ending in a large seminal

receptacle and looped duct. Median posterior epithelium of bursae in contact. Fertilization canal (Pl. VI, fig. 45, g) with a little more than two round spiral turns circling whole bursa, spiral narrowing toward loop. Spiral groove (Pl. VI, fig. 45, f) apparently a tube, with slightly less than two turns, a little wider in diameter than those of canal and standing well out from wall of bursa; posterior end widened and conspicuous in center of ventral wall of bursa. Loop formed by duct (Pl. VI, fig. 45, i) curved ventrad, then mesad. Seminal receptacle (Pl. VI, fig. 45, j) larger than looped duct, curved mesad then ventrad at tips.

Linyphia furtiva Blackwall

Pl. VII, figs. 48, 49, 51-54

From the side, dorsal length of femur of palpus of male (Pl. VII, fig. 52) four times that of patella and of tibia, almost five-sixths cymbium. Greatest width of cymbium a little less than two thirds its length. Patella much longer above than below, dorsal surface gently arched behind spine, turned sharply toward tibia in front. From the side, greatest width of tibia a little greater than its length. Long hairs on dorsolateral part and on lateral side near cymbium. Paracymbium small. Anterior dorsal angle of tegular wall extended forward in a slender point. Anterior margin of tegular wall with an oblique groove; a rounded swelling below this groove. Median apophysis of tegulum slender; about equal in length to longest diameter of tegulum. Apical tooth (Pl. VII, fig. 52, e) gently curved; apical lobe (Pl. VII, fig. 52, f) no longer than base of tooth, margin almost straight.

Greatest width of lamella of embolic division (Pl. VII, fig. 53, D) more than half its length. Abruptly narrowed behind short, sharp spur; posterior tip slender, pointed. Anterior margin very gently concave, sloping forward a little toward mesal side. Many fine oblique grooves on folded edge end in minute teeth on anterior margin. Anterior mesal angle bluntly pointed, turned in sharply toward bulb. Lateral side of lamella narrows gradually toward lateral process. Lateral process (Pl. VII, figs. 53, 54, i) flattened from base to tip, about even in width, distal tip bluntly rounded. Mesal side of lamella turned in toward bulb.

Base of radix (Pl. VII, figs. 53, 54, E) wide, flattened; constriction on each side between base and anterior part. Embolic arm slender, sharp, shorter than anterior tip of radix; lamellar arm hardly discernible, very near lateral process of lamella. Terminal apophysis (Pl. VII, figs. 53, 54, F) of three turns, diameter greatest on middle turn. Middle turn a wide band with fine longitudinal grooves and heavy anterior margin. Anterior portion of band broken into series of platelets by coarse transverse grooves, platelets increasing in height till they comprise whole width of band on distal turn. A

central constriction, shallow on midturn, deepens distally. Each of five platelets near distal tip, at widest portion of band, extended forward in a long, curved spine. Adjacent platelet on distal side with short spine. Band narrowed beyond spines. Truncus and apical sclerite of embolus (Pl. VII, fig. 54, H) separate. Apical sclerite a very small, sharp tip. Pars pendula extended beyond tip of duct in a long, narrowed lobe, continuing curve of embolus. Anterior portion of lobe minutely serrate. Conductor membranous, constricted behind terminal lobe which bears many minute villi.

From below, external epigynum of female (Pl. VII, fig. 48) wider than long. Atrium a short, convex plate, posterior margin evenly rounded. Parts of internal epigynum indicated by large light area on each side of atrium, usually crossed by a dark, transverse line. Opening single, large, overhung by long, slender hairs of atrium. From the side, height considerably less than length, atrium descends evenly from in front to posterior margin, posterior margin convex. Tip of dorsal wall of atrium bearing cochlear depression gently convex from below; thickened posterior margin barely visible from side. Bursae of internal epigynum (Pl. VII, figs. 49, 51) set at an angle, longer than greatest diameter, gently tapered. Looped duct and seminal receptacle at anterior apex of bursa. Fertilization canal (Pl. VII, fig. 51, g) slender with three spiral turns around bursa. Diameter of spiral oval. Spiral groove (Pl. VII, fig. 51, f) rises on mesoventral wall of bursa between two posterior turns of fertilization canal, extends in front of canal and parallel to it. On mesal side, a short distance from anterior end of canal, spiral groove turns forward suddenly, extending almost as far as distal tip of seminal receptacle, then curves down and back to looped duct. Looped duct and seminal receptacle short and stout. Loop formed by duct (Pl. VII, figs. 49, 51, i) curved to point ventrad. Seminal receptacle (Pl. VII, figs. 49, 51, j) mesad of loop, curved to point forward.

***Linyphia montana* Clerck**

Pl. VIII, figs. 55-59

Palpus of male (Pl. VIII, fig. 55) like legs in color. From the side, dorsal length of femur about four times that of patella, about three times tibia and a little longer than cymbium. Dorsal portion of patella near femur at right angles to shorter part next tibia. From above, length of tibia about four fifths its greatest width; lateral part with a shallow longitudinal groove; dorsolateral part swollen and equipped with brush of long stiff hairs, a few long hairs on ventrolateral portion. Greatest width of cymbium about half its length; a row of slender hairs along anterior part of dorsal margin lie over bulb. Paracymbium small, distal part slightly widened. Tegulum turns sharply from dorsal surface to tegular plate. Anterior margin

of tegular plate with a high, rounded dorsal swelling and a smaller, sharp ventral projection separated by a wide, rounded depression. Anterior margin of tegular groove with a blunt point behind dorsal swelling. Median apophysis of tegulum about equal to long diameter of tegulum. Median apophysis narrowed above articular knob. Lateral support extends to base of apical lobe. Apical tooth (Pl. VIII, fig. 55, e) long, blunt, curved toward apical lobe. Apical lobe (Pl. VIII, fig. 55, f) shorter than tooth, small, rounded, folded between tip of lateral support and slightly heavier area behind tooth.

Greatest width of lamella of embolic division (Pl. VIII, figs. 58, 59, D) about two fifths its length. Anterior margin steeply sloping, ventral side considerably behind dorsal. Folded edge grooved near anterior margin. Lateral process (Pl. VIII, figs. 58, 59, i) directed forward, curved only slightly around embolic division, distal tip thin and bluntly pointed. Spur small and sharp. Lamella narrowed abruptly behind spur. Radix (Pl. VIII, figs. 58, 59, E) with a wedge-shaped ridge along dorsolateral surface. Embolic arm slender, slightly curved; a little shorter than anterior tip of radix. Posterior end of radix nearest lamella. Terminal apophysis (Pl. VIII, fig. 59, F) with four turns. Except on posterior turn, anterior portion of band with fine longitudinal striations, and composed of little platelets which increase in length and distinctness to distal tip, plain posterior portion of band separated from platelets by a groove. On distal turn top of each platelet extended as a spine directed toward center of turn, forming a series of twenty-five, middle spines longest. A narrow transverse sclerite extends behind terminal apophysis from mesal process of lamella. Embolus about equal to length of lamella. Truncus and apical sclerite separate (Pl. VIII, fig. 58, H), apical sclerite rodlike, distal part curved slightly forward; pars pendula with blunt distal lobe. Long terminal lobe of conductor with numerous villi.

From below, length of epigynum of female (Pl. VIII, fig. 56) a little more than two thirds width. Atrium brown, heavy, strongly convex; sparsely covered with slender hairs; posterior margin a semicircle. Three turns of fertilization canal may be visible through each side of atrium as dark parallel lines. Opening single, large; dorsomedian wall of bursae visible from below. From the side, epigynum projects tuberclelike, directed down and back; external height about half length. Parmula short, broad, bluntly rounded, extended down and back. Cochlear depression extends forward on dorsal wall of atrium to junction of bursae. Bursae of internal epigynum (Pl. VIII, fig. 57) set at an angle, mesal posterior epithelium in contact. Length of bursa about equal to greatest diameter. diameter oval, about even until narrowed abruptly in front, looped

duct and seminal receptacle at apex. Fertilization canal (Pl. VIII, fig. 57, g) with four spiral turns around bursa. Spiral groove (Pl. VIII, fig. 57, f) rises on ventromesal wall of bursa between two posterior turns of canal; spiral groove accompanied by a raised rim on wall of bursa. Looped duct (Pl. VIII, fig. 57, i) and seminal receptacle (Pl. VIII, fig. 57, j) short and stout. Looped duct above seminal receptacle; or extending laterad of it.

***Linyphia triangularis* Clerck**

Pl. VIII, figs. 60-62; pl. IX, figs. 63, 65.

Palpus of male (Pl. IX, fig. 63) yellow, narrow black ventral band on anterior margin of femur and patella. From the side, dorsal length of femur about four times that of patella, almost four times tibia and slightly less than one and a third the cymbium. Femur arched slightly as it passes chelicera. Dorsal surface of patella gently arched, steepest in front. In a dorsolateral view, greatest width of tibia somewhat less than its length. Hairs lengthened near cymbium except on dorsal side; a very long hair behind paracymbium. Greatest width of cymbium more than half its length. Anterior margin of tegular plate with a large blunt dorsal lobe directed forward and down, margin below this gently convex. Tegular groove shallow. Median apophysis of tegulum straight, somewhat constricted about midway in its length and slightly shorter than longest diameter of tegulum. Apical lobe slightly widened to a flat, unevenly margined tip; apical tooth (Pl. IX, fig. 63, e) slender.

Anterior margin of lamella of embolic division (Pl. IX, fig. 65, D) evenly rounded. Folded edge slightly grooved, extended behind toward tip of radix. Lateral process (Pl. VIII, fig. 60, i) curves half way around embolic division, distal tip greatly widened, flattened and blunt. Large inner thickening reaches to base of terminal apophysis. Mesal process short, tip very broad and flat. Spur blunt. Sharp anterior tip of radix (Pl. VIII, fig. 60, pl. IX, fig. 65, E) longer than either arm and curved toward lamella. Lamellar arm short: embolic arm about even in width to tip which curves slightly mesad. Anterior end of radix nearest lamella. Terminal apophysis (Pl. IX, fig. 65, F) of six turns narrowing in diameter toward distal tip. A heavy, plain band tapering in width forms proximal five turns; more central margin bearing a heavy thread: margin away from center slightly raised. Band widened on distal turn and composed of little platelets overlapping slightly to make inner and outer distal margins serrate: distal margin flared. Embolus a little more than twice length of lamella, supported along its length by one flattened chitinous piece containing only distal part of duct. Truncus with basal piece (Pl. VIII, fig. 60, v): pars pendula without distal lobe. Distal part of embolus turned

back on itself sharply to end near distal turn of terminal apophysis. Conductor (Pl. VIII, fig. 60, pl. IX, fig. 65, G) long, sheathing exposed part of embolus except distal part, narrowed to distal tip without terminal lobe or villi.

From below, external length of epigynum of female (Pl. VIII, fig. 61) about two thirds its width. Atrium light brown, gently rounded in front, posterior margin broadly wedged-shaped. Darkened areas on each side indicate bursae and seminal receptacles above. Part of spiral groove shows through as a heavy line on each side, parallel to posterior margin, curving forward and laterad in a little terminal hook near median line. Atrium with narrow dark line along posterior margin which indicates part of fertilization canal above. Opening single. From the side, height about one half length. Parmula short spoon-shaped; blunt, greatly thickened tip bearing cochlear depression and directed ventrad.

Bursae of internal epigynum (Pl. VIII, fig. 62) set at an angle. Bursa shorter than greatest width, conelike, with looped duct and seminal receptacle at anterior tip. Fertilization canal (Pl. VIII, fig. 62, g) a tight spiral of six turns greatly narrowed toward anterior end; first two turns widely separated. Spiral groove (Pl. VIII, fig. 62, f) narrow, widened on posterior turn and greatly widened on anterior turn. Posterior end lateral. On ventromesal part of first turn spiral groove curves in form of a twisted S, then continues its normal spiral. Spiral groove has one more turn than that of fertilization canal, heavy anterior turn leading to mesal side of looped duct. Looped duct (Pl. VIII, fig. 62, i) and seminal receptacle (Pl. VIII, fig. 62, j) short and thick, the two pieces twisted in interlocking curves. When dissected from spider, true form of dorsal wall of atrium is seen. It is narrow; lateral margins parallel, constricted very abruptly to the spoonlike parmula.

***Linyphia hortensis* Sundevall**

Pl. IX, figs. 64, 66-69.

Palpus of male (Pl. IX, fig. 68) slightly darker than legs, anterior segments suffused with gray, cymbium darkest. From the side, dorsal length of femur about three times that of patella, two and a half tibia, and a little more than four fifths cymbium. Patella gently arched above, somewhat steeper next tibia. In a dorsolateral view, greatest width of tibia a little greater than its length. Sparsely covered with hairs which are very long on ventral and lateral parts near cymbium. Greatest width of cymbium a little more than half its length; anterior tip straight. Base of paracymbium narrow. Greatest width of tegular plate about equal to its length. Dorsal part of anterior margin evenly rounded, a small notch near dorsal edge; ventral part sloped steeply back with two small swellings. Tegular groove, very wide and shallow. Median apophysis of tegulum longer

than longest diameter of tegulum; slightly curved, twisted so that mesal margin of apical lobe is continued to form lateral margin of median apophysis near articular knob. Apical tooth small, slightly curved near point. Apical lobe longer than tooth, wide to distal margin which is unevenly serrate.

Greatest width of lamella of embolic division (Pl. IX, figs. 64, 67, D) about two fifths its length. Anterior margin straight, its dorsal and ventral angles rounded. Convex surface with irregular grooving and with a slight transverse depression at level of lateral process. Folded edge with two intersecting series of grooves causing a scaly appearance. Lateral process (Pl. IX, fig. 67, i) widened at inner thickening, curved forward and around bulb, tip bluntly pointed, lateral margin uneven. Mesal process (Pl. IX, fig. 64, h) a flat, broad lobe curved slightly forward, tip evenly rounded with fine striations. Spur bluntly pointed. Radix (Pl. IX, fig. 67, E) slight, tapered to a sharp tip in front which lies near posterior margin of folded edge. Anterior end of radix nearest lamella. Embolic arm slightly widened to oblique tip, almost as long as tip of radix. Lamellar arm short. Terminal apophysis (Pl. IX, figs. 64, 67, F) a broad, flattened band with a little more than one and a half turns very close together. It is heavy behind, membranous in front; posterior tip bluntly pointed, posterior turn with fine longitudinal striations; narrowed in front to a rounded terminal lobe equipped with minute villi. Concave margin of distal turn raised opposite terminal lobe. Embolus (Pl. IX, figs. 64, 67, H) a little more than twice length of lamella, supported along its length by a single heavy piece containing only distal part of duct. Truncus with basal piece (Pl. IX, fig. 67, v); pars pendula without distal lobe. Embolus curves back a little before making a wide curve over side of terminal apophysis to end near terminal lobe of terminal apophysis. Conductor (Pl. IX, figs. 64, 67, G) narrowed to a sharp distal tip without villi lying near end of duct in unexpanded bulb.

From below, external length of epigynum of female (Pl. IX, fig. 66), a little more than half width; narrow median division of opening visible. Atrium widened from front to back; posterior margin straight; median part light, darkened areas on each side indicating parts beneath. From behind, spiral course of fertilization canal visible through two large, round openings, separated by narrow median piece bearing parmula which extends down and back, tip directed downward. Parmula short, narrow, broadened to bluntly rounded tip. Cochlear depression deep. From the side, atrium descends evenly from in front to posterior margin; posterior margin straight. Internal epigynum (Pl. IX, fig. 69) an intermediate form between two types, represented by *L. triangularis* and *L. pusilla*. Posterior half of bursa with a short wide cavity, about even in

diameter and circled by fertilization canal. In front of bursa cavity, fertilization canal becomes a tightly twisted tube extending directly toward looped duct and occupying position of axis of spiral groove. Wall of bursa between turns of spiral groove deeply invaginated obliterating cavity of bursa. Fertilization canal (Pl. IX, fig. 69, g) with a very wide posterior turn around opening, second and third turns separated from first by length of bursa cavity and forming an increasingly narrow spiral, beyond fourth turn canal extends directly to looped duct as a twisted tube. Spiral groove (Pl. IX, fig. 69, f) rises on dorsomesal wall of anterior end of bursa cavity making three spiral turns to looped duct around fertilization canal. Looped duct (Pl. IX, fig. 69, i) and seminal receptacle (Pl. IX, fig. 69, j) conspicuous, about equal in size; looped duct laterad of seminal receptacle.

Linyphia cayuga Emerton

Pl. X, figs. 70-74.

Linyphia cayuga Emerton, N. Y. Ent. Soc. Jour. 22 : 262, fig. 7 a-c. 1914.

Male. Length 2.75 mm. Cephalothorax orange yellow; a broad median band faint or lacking behind median furrow, widens on back of head; darkened marginal band on thoracic part formed of four large spots on each side, one opposite each walking leg, median side of each spot narrowed toward median furrow. From above, sides evenly rounded from behind to cervical furrow, sides of head almost parallel; flared margin of clypeus gently convex. Width about two thirds length; head about three fifths length of carapace. From the side, carapace rises evenly from behind to eyes; height at back of cervical furrow a little more than three fifths height at eyes. Hairs about eyes and on median part of clypeus long and conspicuous. Eye spot of each posterior median eye fused on each side with single black spot enclosing both anterior median eyes. Posterior and anterior eyes in slightly recurved rows. Posterior eyes equal, the median separated by twice the diameter and from the lateral by slightly more than the diameter. Anterior median eyes about three fourths the lateral, separated by a little less than the diameter and from the lateral by about twice the diameter.

Chelicerae dark brown, about two thirds length of carapace, extending back at a sharp angle to clypeus, distal tips as far back as coxae of first legs. Cheliceral tooth large, dorsolateral, immediately below clypeus, sharp when viewed from side. Dorsal margin of furrow of claw with a row of three teeth on half of margin nearest tip of closed claw, smallest tooth nearest claw base. Lower margin of furrow with a row of four teeth, two nearest claw base smallest, other two opposite each side of dorsal tooth nearest claw base, and about equal to it in size. Sternum yellow, suffused with

gray, especially along the margin. Labium dark gray, anterior margin and a spot on each side of median line slightly lighter. Endite more than twice length of labium, like sternum in color, suffused unevenly with dark gray, narrow anterior margin black, tips darkened a little. Femora and patellae like carapace in color, distal segments paled to yellow, lightly suffused with gray. All segments except the first, with a dark distal band, only ventral on coxae and femora. Abdomen oval from above; black with a dorsal white transverse line near anterior end broken in middle. Spinnerets and plates over book lungs brown.

Palpus (Pl. 10, fig. 70) light yellow, suffused with gray, darkest on distal part. Viewed from the side, dorsal length of femur about three times that of patella, two and a half the tibia and slightly longer than cymbium. Patella arched a little near femur. From the side, tibia slightly convex below; from above, greatly widened distally. Ventral side with a few long heavy hairs, rest of tibia sparsely covered with slender hairs lengthened near cymbium. Greatest width of cymbium half its length, then narrowed to long bluntly pointed tip. Paracymbium with wide base about even in width; distal part even in width to pointed tip. Greatest width of tegular plate about two thirds its length. Seen from side, anterior margin very bluntly rounded, apex flattened, ventral portion uneven. Anterior angle of dorsal end of tegular plate drawn out along midline in a rounded swelling. Tegular groove narrow, deep. Median apophysis of tegulum about equal to longest diameter of tegulum. Lateral support heavy, extending to apical lobe. Remainder of median apophysis folded back sharply on lateral support, and not membranous except narrow membranous strip next lateral support. Apical lobe (Pl. X, fig. 70, e) shortened, rounded. Apical tooth (Pl. X, fig. 70, f) long, curved, very sharp.

Greatest width of lamella of embolic division (Pl. X, figs. 71, 73, D) about one third its length. Very bluntly pointed behind. Margin next cymbium crescentshaped, bearing spur about midway in its length. Near posterior tip margin bears a heavy tooth curved in toward bulb, which supports embolus. Anterior margin slightly oblique except portion bearing folded edge which extends directly back to lateral process. Lateral process (Pl. X, figs. 71, 73, i) curves mesad then forward, twisted slightly at the sharp, flattened tip. Process furrow deep near base, obliterated near tip. Membranous process (Pl. X, figs. 71, 73, n) slimmer than lateral process, very sharp tip slightly twisted. Anterior part of radix (Pl. X, fig. 71, E) slight, narrowed to threadlike tip. Lamellar arm very short, stump-like. Embolic arm flattened, widened toward tip.

Posterior half turn of terminal apophysis (Pl. X, figs. 71, 73, F) flat with a crescentshaped, thickened margin and connected by short

slender membrane to wide flattened apical lobe. Apical lobe sparsely clothed with stiff bristles lengthened toward blunt, narrowed dorsal tip.

Embolus styliform, more than three times length of lamella, supported behind by tooth of lamella as described above. Basal piece (Pl. X, fig. 71, v) bluntly pointed. Width and length of basal appendage (Pl. X, figs. 71, w) about equal, tip curved sharply. Curve of embolus flattened just behind embolic torque. Terminal lobe of embolic torque (Pl. X, figs. 71, 73, x) longer than rod, twisted once in a corkscrew-like turn. Distal, anterior surface of lobe roughened. Seen in unexpanded bulb, embolus appears to make one oval turn around lamella, distal tip lying near tip of cymbium.

Female. Length, 2.75 mm. Cephalothorax light yellow, markings more distinct than in male. From above, slight constriction of sides at contact with cervical furrow. Head slightly narrower than that of male. From side, carapace rises rather abruptly from behind to median furrow; height at median furrow about equal to height at eyes. Posterior median eyes a little smaller than the lateral. Anterior median separated by a little more than the diameter and from the lateral by somewhat more than twice the diameter. Chelicerae like carapace in color, a little browner toward claw, lightly suffused with gray along median part, less than half length of carapace and extending back at a slight angle to clypeus. Upper margin of claw furrow with a row of three stout, evenly spaced teeth, largest nearest tip of closed claw, smallest nearest claw base. Lower margin of furrow with a row of three smaller teeth nearer base of closed claw than its tip. Legs like carapace in color, dark distal bands more distinct than in male; a faint uneven central band on femora and tibiae sometimes present.

Abdomen ovate from above; from the side, truncate in front, rounded behind. Dorsum white with black markings. Anterior half with a narrow black folium of three segments, margin between segments greatly constricted. A narrow black median line extending along rest of dorsum is crossed in midpart of abdomen by a curved transverse line forming a conspicuous cross. Caudal half of dorsal surface with three spots on each side of midline, which may be joined to midline by narrow black lines. Sides dark below, a dark longitudinal line above, faint behind. Below, dark with a light median spot, a spot on each side behind epigastric furrow, a white spot on each side of tracheal opening, and a pair on each side of spinnerets. From behind, two elongate white spots just above spinnerets.

Seen from below, epigynum (Pl. X, fig. 74) wider than long. Atrium dark yellow, sparsely covered with hairs like those on surrounding integument. Two elliptical openings well separated. Between openings atrium is continuous behind with a short broad

tip covered by smooth modified integument associated with openings of epigynum. This tip bears cochlear depression. Atrium slightly depressed between openings. Two divisions of internal epigynum (Pl. X, fig. 72) extend forward, almost parallel. Fertilization canal (Pl. X, fig. 72, g) with three narrowing spiral turns near opening; remainder of canal extends directly to seminal receptacles as twisted tube. A very small bursa cavity present within posterior turns of fertilization canal.

Spiral groove (Pl. X, fig. 72, f) in a spiral of four close turns around twisted fertilization canal. Turns of groove about even in diameter. Between turns of spiral groove, wall of bursa greatly invaginated till in contact with canal, obliterating cavity of bursa. Epithelium around spiral groove heavy near seminal receptacle. Looped duct and seminal receptacle very heavy. Loop formed by duct (Pl. X, fig. 72, i) conspicuous continuing curve of spiral; seminal receptacle (Pl. X, fig. 72, j) terminates near distal tip of looped duct.

Type locality: Renwick Marsh, Ithaca, N. Y.

New York: Ithaca, May 22, 1911, 1 male, 1 female (types); Dec. 1911, 1 male, 1 female (Crosby); Dec. 29, 1912, 1 male, 1 female (Crosby); May 21, 1932, 2 females (Blauvelt); May 25, 1932, 2 females (Blauvelt); June 5, 1932, 1 male, 1 female (Blauvelt).

Linyphia pusilla Sundevall

Pl. XI, figs. 75-79.

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Linyphia pusilla Bösenberg. Sp. Deutschl. p. 70, tab. 6, fig. 72. 1903. — Strand, Bergens Mus. Aarbog. 1903 (no. 10), p. 8. 1904 (var. *quadripunctata* Strand). — Strand, Kgl. Norske Vidensk. Selsk. Skrifter 1903. No. 7. p. 8. 1904. — de Lessert. Rev. Suisse Zool. 12:353. 1904. — Strand, Fauna Arctica. 6:454. 1906. — de Lessert. Rev. Suisse Zool. 15:118. 1907. — Strand, Zoolog. Anzeiger 32. p. 229. 1907.

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Male. Length of single specimen slightly less than 4 mm. Considerable variation in length. Cephalothorax brown, suffused with gray, often forming a reticulate pattern on head and along margin, darkest along furrows, margin, and on posterior portion of back of head from which a gray line extends to each posterior median eye, and frequently one or two extend toward median eyes. Median furrow reddish. Specimens west of Rocky Mts. with yellow

carapace, rarely brown, marked with gray median stripe and lightly suffused with gray especially along margin and furrows. Width a little more than half length; head almost two thirds length of carapace; about half of carapace in front of first coxae. From above, sides curve evenly from behind to cervical furrow, then almost parallel to eyes; margin of flared clypeus visible from above. From the side, carapace rises gradually from behind to eyes, slightly steeper on back of head; height at back of cervical furrow about two thirds height at eyes. Carapace tilted to raise front. Margin of carapace curled under between endite and chelicera. Hairs behind posterior eyes heavy enough to be clearly visible. Posterior eyes in a slightly recurved row, median a little larger than the lateral, separated by about five times the radius and from the lateral by about three times radius. Anterior eyes in a straight line, median about three fourths the lateral, separated by a little more than the diameter and from the lateral by about three times the diameter.

Chelicerae like carapace in color with gray markings, lighter on distal part, slender, about five sevenths length of carapace, extending back at a sharp angle to clypeus. Chelicerae rarely shorter, resembling chelicerae of female. Cheliceral tooth dorso-medial, immediately below clypeus. Base of chelicera farther than its width from endite. Below, a large raised process, clothed with short hairs, lies almost one third length of chelicera from base; a little blunt mesal tooth between this process and base of chelicera. Upper margin of claw furrow with four teeth in a row, middle two largest, one nearest closed claw tip minute. Lower margin of furrow with four little teeth near base of closed claw and a larger one nearer its tip. Sternum reddish brown deeply suffused with gray, less than half carapace in length. Labium dark gray. Endites yellow brown with gray markings. Legs yellow, suffused with gray, darkest near body, a dark line on each side of proximal half of femora; femora four dark below, and sometimes above.

Abdomen ovate from above; from side, a little higher in front, slightly constricted in middle; black with a dorsal white transverse line near front, broken in middle. In lightly pigmented specimens some of female markings may be present. Color pattern of immature and recently matured specimens lighter in tone. Four to six pairs of dorsal spots on abdomen may fuse to form a folium. White line on each side of abdomen continued around caudal end.

Palpus (Pl. XI, fig. 76) like legs in color suffused with gray, darker toward tip. Parts slender. From the side, dorsal length of femur about four times that of patella, three times tibia and about equal to cymbium. Patella gently arched above. Tibia widened in front, much wider from above than from side, a very long dorsal distal hair. Cymbium slender, greatest width a little less than one

third its length. Base of paracymbium more nearly at right angles than parallel to length of cymbium. Long diameters of tegulum and subtegulum more nearly parallel than perpendicular to length of cymbium so that ventral margin of tegulum is homologous to anterior margin of tegulum of typical Linyphiae. Tegular wall widened gradually toward dorsal side which bears a high, blunt swelling directed forward and laterad. Tegular ridge extends well below tegular wall. Median apophysis slightly longer than longest diameter of tegulum. Lateral support free at tip, membranous portion shorter than lateral support, its mesal margin forms a slightly heavier rod tapered below extending upward and widened to a short, gently rounded apical lobe (Pl. XI, fig. 76, e) and a long, blunt apical tooth (Pl. XI, fig. 76 f) curved toward lobe.

Greatest width of lamella of embolic division (Pl. XI, figs. 75, 79 D) about one third its length. Curvature of lamella flattened behind, posterior tip bluntly pointed, extending behind posterior margin of cymbium. Marginal groove interrupted about one third its length from posterior tip. At this interruption concave side of lamella bears a thickening, its bluntly pointed apex joined to spur by a sharp ridge. Spur near grooved margin. Anterior margin steeply oblique except small portion bearing folded edge which extends directly back. Dorsal angle sharp. Lateral process (Pl. XI, figs. 75, 79 i) curved sharply forward, three sided, very slightly twisted at sharp tip. Process furrow shallow, persisting to tip. Membranous process (Pl. XI, figs. 75, 79 n) stout as lateral process, the two pieces usually crossing at the tips.

Anterior part of radix (Pl. XI, fig. 75, E) membranous, very slim. Lamellar arm short ending bluntly. Embolic arm widened toward tip, a minute tooth near tip directed toward embolus. Terminal apophysis (Pl. XI, figs. 75, 79, F) twisted with a little more than one turn; posterior half turn wide, flattened. distal part narrowed to a small blunt tip terminated by minute villi. Embolus styliform, more than four times length of lamella. Basal piece (Pl. XI, fig. 75, v) bluntly pointed. Basal appendage (Pl. XI, fig. 75, w) very slender, gently curved, tip heaviest. Embolic torque (Pl. XI, fig. 75, x) twisted once, narrowed as it attaches to mesal side of truncus. Rod free of pars pendula some distance before forming short terminal lobe.

Female. Length of single specimen 4 mm. Carapace yellowish brown, marked as in male. Width a little more than three fifths length. Head shorter than that of male; less than half of carapace in front of first coxae. From the side, carapace rises steeply to median furrow, then very gradually to eyes; height at eyes a little greater than at median furrow. Posterior median eyes slightly less than three times the radius from the lateral. Anterior median about five

times the radius from the lateral. Chelicerae much less than half length of carapace. Upper margin of furrow of claw with a row of four or five teeth, middle teeth largest. Lower margin of furrow equipped with a row of five little teeth on half of furrow nearest claw base, smallest teeth nearest claw base. Ventral distal margin of coxae dark; lateral bands on femora one and two only.

Abdomen white above with black markings; a wide black medium folium widest in front, first of the five segments triangular and well separated from others; lateral margins of segments may be extended to meet darkened area on sides of abdomen. Sides black, with a wide longitudinal white stripe, its dorsal margin uneven. Black below, epigastrium sometimes brownish. In darkly pigmented specimens all markings may be lacking except this lateral stripe. Atrium of epigynum (Pl. XI, fig. 78) like surrounding integument in appearance, sometimes yellowbrown, margin of opening usually lighter. Opening single, small, v-shaped, entirely filled by broad, blunt tip bearing cochlear depression. From side, this tip extends a little behind and below atrium. Spirals of internal structure may be visible through atrium as a longitudinal, slightly oblique row of white spots on each side. (In numerous American and several European specimens of *L. pusilla* studied, I have never observed the variation with two external openings described and figured by Simon as occasional (Ar. Fr. 6 (3): 638, fig. 987. 1929). This figure resembles the epigynum of *L. cayuga*). Two small, rounded openings of bursae close together, set at an angle. Two divisions of internal epigynum (Pl. XI, fig. 77) long, slim, conelike, set at a sharper angle than their openings. Fertilization canal (Pl. XI, fig. 77, g) makes one spiral turn around opening then extends directly to seminal receptacle as a twisted tube. Spiral groove (Pl. XI, fig. 77, f) forms spiral of nine turns with twisted fertilization canal as axis of spiral. Wall of bursa between turns of groove invaginated till in contact with fertilization canal obliterating cavity of bursa. Spiral turns of groove narrowed and heavier near looped duct. Looped duct (Pl. XI, fig. 77, i) and seminal receptacle (Pl. XI, fig. 77, j) large, stout, sclerotized; seminal receptacle mesodorsad of looped duct.

Type locality: near Lund, Sweden.

Nova Scotia: 1913, 1 male, 2 females; Weymouth, Aug. 1924, 2 males (Bryant). — **Maine:** Isle au Haut (Kimball's Is.), June 1, 1912, 2 females (Clapp); Long Island, May 17, 1904, 1 male (Bryant); Aug. 27, 1906, 1 female (Bryant). — **Vermont:** Newfane, June 1927, 1 male (Bryant); South Newfane, June 16-23, 1926, 1 male (Bryant). — **New Hampshire:** Randolph, July 1926, 2 males, 11 females (Emerton and Banks); Flume, Sept. 1907, 1 female (Bryant); Moosilauke, July 4, 1912, 2 females (Bryant); Joffrey, June 26, 1932, 1 male

(Bryant); Hollis, 1888, 2 males, 3 females (Fox); April 1927, 1 male (Bryant); Franconia, 2 males (Banks). — **Massachusetts:** Beverly, July 11, 1904, 1 male; Lexington, May 13, 1913, 1 male, Holliston, Aug. 1923, 8 females (Emerton and Banks); Petersham, May 27-31, 1913, 1 male. — **New York:** Black Brook, Clinton Co., June 11, 1916, 5 females (Crosby); Adirondack Lodge, July 24, 1925, 1 female (Crosby); Lake Tear, Mt. Marcy (3400 ft.), July 1918, 1 male (Crosby); Newcomb, Essex Co., July 1-10, 1925, 1 female (House); Black Mt., Lake George, Aug. 1, 1920, 1 female (Crosby); Big Moose, June 1930, 1 male (Crosby); Labrador Pond, May 15, 1921, 1 male, 1 female (Tarris); Tackawasick Pond, Rensselaer Co., June 25, 1920, 1 male, 1 female (Crosby and Bishop); Sea Cliff, 1 male (Banks); Cold Spring Harbor, Long Island, Aug. 1, 1900, 1 male; Barnevelt, 1 female; Otto, Aug. 10, 1903, 15 females (Comstock); Manlius, Aug., 1 female (H. H. Smith); Highland, Apr. 25, 1925, 2 males (Crosby); Clayville, June 8, 1921, 1 male, 3 females (Crosby and Leonard); Ithaca, 1887, 2 females (Emerton det.); 3 females (Banks); Aug. 1903, 2 females, Apr. 20, 1905, 1 male, May 5, 1931, 2 females; July 26, 1909, 1 male; Aug. 3, 1909, 1 male; McLean, May 30, 1921, 1 female (Crosby); Taughannock Falls, July 1911, 1 male, Aug. 1918, 1 female; Enfield Gorge, May 21, 1922, 8 males, 1 female; Cinnamon Lake, Schuyler Co., June 5, 1925, 1 male (Crosby); Lake Keuka, May-June, 1904, 1 male (Crosby); Point Breeze, Orleans Co., June 11, 1923, 2 females (Crosby); Lakeside Park, Orleans Co., July 9, 1921, 1 male (Crosby). — **New Jersey:** Pine Brook, Sept. 15, 1930, 1 male (Hayden). — **District of Columbia:** Apr. 1888, 1 male, 2 females (Fox); May 1889, 2 females (Fox), Aug. 1 male, 1 female (Fox), Sept., 3 males, 2 females (Fox). — **Virginia:** Falls Church, 1 male (Banks). — **Ohio:** Sandusky, June 6, 1929, 2 males, 20 females; Gambier, June 1905, 3 females (Nelson), June 13-24, 1925, 1 male (Nelson). — **Illinois:** Champaign, 1 female (Shackleford). — **Minnesota:** Minneapolis, 2 females (Fletcher). — **Wyoming:** Flat Point, Lopez Co., June 28, 1927, 1 female. — **California:** Ft. Ross, May 28, 1936, 1 male (Crosby); June 6, 1936, 1 female (Crosby); Blue Lake, Humboldt Co., June 25, 1907, 1 female (Bradley); Muir's Wood, Marin Co., Aug. 30, 1908, 1 female; Berkeley, Sept. 1919, 1 male (Dietrich); Stanford, March-April, 1 male; Felton, St. Cruz Mts., May 22, 1907, 1 female (Bradley). — **Washington:** Longmire, Aug. 22, 1927, 3 males, 2 females (Crosby); Blakely Is., July 1, 1927, 1 male, 13 females (Worley), July 5, 1927, 1 male, 2 females (Worley); Friday Harbor, June-July 1928, 1 female (Shackleford); Orcas Is., July 17, 1927, 3 females (Worley). — **Manitoba:** Le Pas, July 1, 1917, 1 female (Emerton). — **Alaska:** Admiralty Id., 1933, 7 males, 21 females (Sheppard); Juneau, June 23, 1936, 3 females (Crosby). — **B. C.:** Alert Bay, June 21, 1936, 1 female (Crosby).

France: Col de Portet d'Aspet, July 27, 1932, 1 female (Crosby); 1 male, 1 female (from Simon Coll.).

Russia: Don, 1 male, 1 female.

Pityohyphantes Simon

Arachn. Fr. 6 (3) : 741. 1929

Type: **Pityohyphantes phrygiana** Koch.

The species of this genus were formerly included in *Linyphia* Latreille.

The most conspicuous character of the genus is the patellar spur of the male palpus (Pl. XII, figs. 85, 86). The posterior and anterior eyes are arranged in slightly recurved rows. The cheliceral tooth is compressed and dorsolateral in position immediately below the clypeus. The male palpus presents the following characteristics: the dorsal length of the femur is a little longer than the cymbium, the lateral side of the patella is extended laterad and forward in a large patellar spur, the paracymbium ends in a membranous oval lobe. The median apophysis of the tegulum is short and very stout. It is without an articular knob. A depression between tegular ridge and base of apophysis probably functions as an articular depression. The apical tooth of the median apophysis is very large, and the apical lobe of *Linyphia* is represented by the sharpened lateral margin. Parts of the embolic division may be joined by very heavy membrane. The lamella lacks the mesal process. The lateral process is well developed, the anterior part forming a heavy prong. The terminal apophysis and radix are reduced. The radix is partially fused with the parts which it supports. The tether membrane is conspicuous. The curved, tapered heavy embolus is shorter than the lamella. The conductor is narrow and heaviest behind. In front, it is widened to form a broad membranous lobe with fringed anterior margin. The villous appendage (Pl. XII, fig. 83, z) is a slim, tapered projection clothed with conspicuous villi. It rises from the tether membrane and extends between prong and embolus. Various inconspicuous membranous processes may be present.

The epigyna of the two species included in this genus differ considerably in appearance. There are two distinct openings. A ventral wall of smooth, hairless integument occurs in *P. limatanea*. The bursa is a short, simple tube when present. The looped duct and seminal receptacle resemble those parts in *Linyphia*.

Key to the species of *Pityohyphantes*

Key to the males.

- I. Patellar spur straight **phrygiana**
 II. Patellar spur curved mesad at the tip **limatanea**

Key to the females

- I. Epigynum with long parmula **phrygiana**
 II. Epigynum without parmula **limatanea**

Pityohyphantes phrygiana C. L. Koch

Pl. XII, figs. 80-84, 86

Linyphia phrygiana C. L. Koch. Die Arachn. 3:83, tab. c, fig. 229, 230. 1836.**Linyphia costata** Hentz. Boston Soc. N. H. J. 6:31, pl. 4, fig. 11. 1850. (Reprint Burgess ed. p. 136, pl. 15, fig. 11; pl. 18, fig. 24; pl. 21, fig. 11, 1875.)**Linyphia phrygiana** Siemaschko. Soc. Ent. Ross. Horae 1:125. 1861. — Westring. Araneae Suecicae p. 97. 1861. — Ausserer. K. K. Zool. Bot. Ges. Wien Verhandl. 17:147. 1867. — Pavesi. Soc. Ital. Sc. Nat. Atti. 11:786. 1868. — Thorell. Rem. Syn. Eup. Sp. p. 48. — Pavesi. Soc. Ital. Sc. Nat. Atti. 18:263. 1875. — Lebert. Allg. Schweiz. ges. Naturw. Neue Denkschr. 27(2):151. 1877. (Reprint Bau u. Leben Sp. 1878). — Hermann. Ungarns Sp. 3:60. 1879. — Emerton. Conn. Acad. Sc. Trans. 6:63, pl. 19, fig. 1. 1882. — Kulczynski. Sp. aus Tatra p. 13. 1882. — Simon. Arach. France. 5:226. 1884. — Keyserling. Sp. Am., Ther., 2:60, tab. 12, fig. 165. 1886. — **Linyphia rubrofasciata** Keyserling. Sp. Am., Ther., 2:66, tab. 13, fig. 168. 1886.**Linyphia phrygiana** Simon. Soc. Zool. France Bull. 18:108 and 109. 1891. — Banks. Phil. Acad. Nat. Sci. Proc. p. 42. 1892. — Emerton. Conn. Acad. Sci. Trans. 9:409. 1894. — Chyzer and Kulczynski. Aran. Hungariae 2a:56, tab. 2, fig. 21. 1894. — Banks. Ent. News. 6:205. 1895. — Müller and Schenkel. Naturf. Ges. in Basel Verh. 10:721. 1895. — Simon. Rev. Suisse Zool. 5:102. 1897. — Banks. Cal. Acad. Sc. Proc. (3) 1:244. 1898. — Strand, Archiv for Mathem. og Naturvid. 21. Nr. 6. p. 16. 1899. — Strand, Nyt Mag. for Naturvid. 38 p. 96. 1900. — Banks. Wash. Acad. Sci. Proc. 2:481. 1900. — Strand, Archiv for Mathem. og Naturvid. 24. Nr. 2. p. 54. 1901. — Emerton. Common Spiders p. 141, fig. 332, 333, 334. 1902. — Strand, Bergens Mus. Aarbog. 1902. No. 6. p. 8. — Bösenberg. Sp. Deutschl. p. 69, tab. 5, fig. 70. 1903. — Strand, Kgl. Norske Vidensk. Selskabs Skrift. 1903. No. 7. p. 8. 1904. — Banks. Cal. Acad. Sc. Proc. (3) 3:346. 1904. —**Linyphia rubrofasciata** Banks. Cal. Acad. Sc. Proc. (3) 3:346. 1904.**Linyphia phrygiana** de Lessert. Rev. Suisse Zool. 12:352. 1904. — Strand, Fauna Arctica IV. p. 454. 1906. — Strand, Zoolog. Anz. 32. p. 229. 1905. — Bryant. Boston Soc. Nat. Hist. Occ. Papers. 7:38. 1908. — Banks. U. S. Nat. Mus. Bull. 72:33. 1910.**Linyphia rubrofasciata** Banks. U. S. Nat. Mus. Bull. 72:33. 1910.**Linyphia phrygiana** de Lessert. Cat. Invert. Suisse Ar. Mus. d'Hist. Nat. de Genève p. 270. 1910. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 29:253. 1911.**Linyphia rubrofasciata** Petrunkevitch. Am. Mus. Nat. Hist. Bull. 29:253. 1911.**Linyphia phrygiana** Banks. Acad. Nat. Sc. Phil. Proc. p. 447. 1911. — Comstock. Spider Book p. 394, figs. 407, 408, 409. 1912. — Grese. Soc. Ent. Moscow Bull. 1:119, 120, 122. 1915. — Fedotow. Mus. Zool. Acad. Imp. Sc. S. Petersb. Ann. 20:448. 1915. — Banks. U. S. Nat. Mus. Proc. 51:69. 1916. — Strand, Archiv für Naturgesch. 1916. A. 1. p. 120. — Reimoser. Kat. Sp. p. 95. 1919. — Emerton. R. Can. Inst. Trans. 12:318. 1919.**Linyphia rubrofasciata** Emerton. R. Can. Inst. Trans. 12:318. 1919.**Linyphia hespera** Chamberlin. Canad. Ent. 52:194. 1920.**Linyphia phrygiana** Charitonow. Inst. Rech. Biol. U. Perm Bull. 2(1)25. 1923. — Schenkel. Rev. Suisse Zool. 32:267. 1925. — Charitonow. Mus. Zool. Acad. Sc. U. R. S. S. Ann. 1925, p. 108. 1926. — Charitonow. Inst. Rech. Biol. Univ. Perm Bull. 4(6):265. 1926. — Strand, Arch. f. Naturgesch. 92:87. 1926.**Pityohyphantes phrygianus** Simon. Arachn. de France. 6(3):623, fig. 935, 936, 937. 1929.**Linyphia phrygiana** Charitonow. Un. Perm. Wiss. Mitt. Abt. 4. Naturw. 1:157. 1931. — Charitonow. Acad. Sc. de l'U. R. S. S. Mus. Zool. Ann. 32:79. 1932.

Male. Length of one specimen 4.75 mm. Great variation in length. Smaller specimens predominate on mountains and in northern latitudes, but occur as far south as Washington, D. C. Intermediate

sizes common. Cephalothorax light yellow, a narrow black band along each side, and a wide black median stripe which forks at cervical groove, each branch ending at a posterior median eye. Each fork may bifurcate sending a branch to each posterior lateral eye. Stiff, small hairs on back of head, ocular area and clypeus conspicuous. From above, sides evenly and rather strongly curved; width about three fourths length; head about two thirds length of carapace. From the side, carapace rises gradually to head, then more steeply to eyes, back of head slightly arched. Posterior eyes about equal, median separated from each other and from the lateral by about twice the diameter. Anterior median a little smaller than the lateral, separated by the diameter and from the lateral by about twice that distance.

Chelicerae rather slender and a little darker than clypeus. Upper margin of claw furrow with two teeth nearer tip of closed claw than its base, larger nearest claw base. Lower margin with two small teeth about midway in its length, one nearest claw base a little smaller. Claw narrowed rather abruptly about midway in its length. Sternum yellow suffused with black or reddish brown except along median line especially in front, and a spot opposite each of first three coxae usually containing a dark spot. Labium dark gray, a small lighter spot on each side of midline, anterior margin grayish white. Endites like sternum in color, with white tips; markings gray when present. Legs like carapace in color with black, dark gray, or reddish brown markings, femora and tibiae spotted especially at base of hairs and spines, coxae and femora with a ventral distal band, trochanters with anterior distal spot; remaining segments with a distal band; a large median band on tibiae faint or lacking above. Many fine black hairs and slender spines on all but first and last segments.

Abdomen light gray sometimes completely overlaid by white, or pink and white, anterior lateral part sometimes tinged with pale green. Pattern reddish brown, brown or red above, a median herring bone design outlined in black has seven segments, the last few very small and sometimes fused. Sides with oblique dark lines sometimes faint and interrupted. Below, a wide median dark band between two lighter bands, whole ventral surface usually flecked with many white spots. Two large white spots on each side of spinnerets may be broken into smaller ones, a light spot behind spinnerets. Coloring described by Keyserling for *Linyphia rubro-fasciata* (Sp. A. Ther. 2:66, 1886) is characteristic of specimens stored in alcohol for some time. Keyserling's species is intermediate between large and small extremes of *P. phrygiana*. Abdominal color pattern usually red on very small specimens.

Palpus (Pl. XII, fig. 86) light yellow, darkened toward the tip.

From the side, dorsal length of femur a little less than three times that of patella and somewhat more than twice tibia. Femur with black ventral distal spot. Patella somewhat widened distally, dorsal distal margin suffused with gray and equipped with a long hair; patellar spur about length of tibia, straight, blunt or sharp, with numerous long, slender hairs on its lateral part. Tibia widened a little distally, with a long dorsolateral spine; ventral side sparsely clothed with long hairs. Greatest width of cymbium about three fifths its length, distal tip narrowed abruptly from ventral side. Distal tip of paracymbium clothed with minute hairs.

Anterior margin of tegular plate slopes back evenly from wide dorsal side. Seen from in front, dorsal part of tegular plate forms a large rounded swelling. Tegular groove hardly perceptible. Median apophysis very stout, lateral margin heavy. Apical tooth heavy, curved at distal tip. Base of tooth convex on dorsal side, with minute stout teeth. Lamella of embolic division bluntly pointed behind. Lateral process curved slightly around parts of embolic division. Prong (Pl. XII, figs. 83, 84, i) sharp, greatly thickened at base. Radix (Pl. XII, figs. 83, 84, E) a long, flattened plate; anterior tip continuous on mesal side with terminal apophysis. About midway in length of radix a small mesal projection serves as embolic arm and is connected to embolus by a narrow strip. Lamellar arm less dense, merging in front with heavy tether membrane. Terminal apophysis (Pl. XII, fig. 83, F) a flattened, heavy band twisted in a half turn: slender behind, widened distally then narrowed to a pointed tip. Anterior margin with small, irregular teeth which appear to terminate fine grooves on convex surface. Margin of terminal apophysis nearest radix continuous with mesal anterior margin of lamella. Embolus (Pl. XII, figs. 83, 84, H) flattened, wide and curved at base: distal portion narrowed suddenly and slightly curved. Conductor (Pl. XII, figs. 83, 84, G) slightly twisted, anterior margin straight, ventral part covering distal tip of embolus. Villous appendage (Pl. XII, fig. 83, z) shorter than embolus, placed against terminal apophysis. A smooth, short, rounded lobe appears between villous appendage and base of prong.

Female. Length of one specimen 5 mm. Considerable variation in length. Head a little broader than that of male. From the side carapace rises evenly from behind to eyes; height at anterior end of median furrow more than two thirds height at eyes. Posterior median eyes separated from each other and from the lateral by three times the radius. Anterior median equal to the lateral, separated by about two thirds their diameter and from the lateral by a little more than three times their radius. Chelicerae like clypeus in color with gray markings, a little stouter than those of male. Upper margin of claw furrow with three large equidistant teeth a little nearer tip

of closed claw than its base, tooth nearest claw tip smallest, center one largest. Lower margin of claw furrow with two teeth, one midway in its length, the other nearer claw base. Claw evenly narrowed to point.

Length of epigynum (Pl. XII, fig. 80) a little less than width. Atrium and ventral part of parma usually suffused with gray, darkened on caudal margin of cochlear depression and along lateral margins of atrium, especially on anterior and posterior parts, indicating canal and seminal receptacle above. Parma and atrium joined at base of parma, separating two rounded openings. Parma extended back a considerable distance to end in oval tip bearing cochlear depression; dorsal part of parma slightly wider than ventral. From the side, atrium descends evenly from in front; parma gently rounded to caudal tip. Thin fringe of slender hairs overhangs openings and extends a short distance down ventral part of parma. Bursae of internal epigynum (Pl. XII, fig. 81, c) short, oval depressions narrowed toward opening of duct on anterior part of mesal wall; ventral wall shorter than dorsal. Distal part of duct looped. Seminal receptacle lateral and anterior in position. Duct (Pl. XII, figs. 81, 82, f) narrows from opening to ventroanterior part of bursa, turns up, then widens greatly, curving around dorsoanterior part of bursa to looped distal part (Pl. XII, figs. 81, 82, i). Loop formed by duct narrow, rather long, curving ventrad, then mesad, tip turned slightly forward. Seminal receptacle (Pl. XII, figs. 81, 82, j) shorter than looped duct, directed mesocephalad. Fertilization canal (Pl. XII, fig. 81, g) slightly twisted, extending directly from seminal receptacle along lateral side of bursa to hind lateral margin of bursa. In some specimens, duct opens on mesal part of anterior wall of bursa making shape of bursa conical when viewed from behind.

Type locality: near Regensburg, Germany.

Labrador: Makkonok, June 1928, 1 male (Austin). — **Nova Scotia:** Truro, May 3, 1913, 5 males, 4 females (Matheson); Grand Pré, Sept. 6, 1913, 1 female (Paine). — **Maine:** Eastfort, Aug. 1, 1913, 1 female (Bryant); East Machias, Aug. 2, 1913, 3 females (Camp); Long Island, July 30, 1904, 4 females (Bryant). — **New Hampshire:** Pike, May 1908, 2 females (Hayhurst); Intervale, Aug. 1915, 1 female (Bryant); Chocoma, June 1-3, 1912, 1 female (Bryant); Randolph July 1926, 1 male, 2 females (Banks and Emerton); Mt. Washington, June 30, 1926, 2 males (Banks). — **Vermont:** Windsor, May 24, 1913, 1 female (Emerton); South Newfane, June 16-23, 1926, 3 females (Bryant). — **Massachusetts:** Waverly, May 5, 1874, 2 males, 1 female (Emerton); Natick, May 25, 1916, 1 female (Bryant); Chestnut Hill, May 15, 1902, 2 females (Bryant). — **New York:** Thatcher Park, May 29, 1920, 1 female (Bishop); Whiteface Mt., Aug. 22, 1916,

1 female (Crosby); Tackawasick Pond, Rensselaer Co., June 25, 1920, 1 female (Bishop); Lake Mahopac, Sept., 2 males, (Fox); Wabeek, June 13, 1927, 2 females; Trenton Falls, June 5, 1921, 6 females (Crosby); Wilmington Notch, June 12, 1927, 1 female; Ludlowville, July 12, 1925, 1 female; McCullom, June 13, 1933, 3 females; Taughannock Falls, Oct. 15, 1902, 7 males, 7 females, May 11, 1930, 6 females; Ringwood, Tompkins Co., May 10, 1930, 1 female (Hayden); Ithaca, June 1871, 1 female, May 31, 1906, 1 male, Apr. 24, 1926, 1 male (Seeley and Fletcher), May 31, 1905, 1 male, 1 female, Apr. 12, 1930, 1 female (Hayden), May 5, 1930, 2 males, 6 females (Hayden), May 14, 1932, 2 males, 4 females (Hayden); Cinnanton Lake, Schyler Co., July 12, 1924, 1 female (C. & B.), June 5, 1925, 1 female (Crosby); Mud Pond, Wayne Co., May 17, 1931, 1 male; Howard, July 5, 1924, 1 female (Crosby); Mendon Pond, May 19, 1930, 1 female (Hayden); Letchworth Park, July 9, 1922, 1 female (Crosby). — **District of Columbia:** 1 female (Marx); fall 1888, 1 female (Fox). — **Virginia:** Great Falls, Apr. 3, 1921, 1 female (Crosby). — **North Carolina:** Blowing Rock, Oct. 10, 1923, 1 female (C. & B.); Black Mt. (Northford, Swannonoa), May 18-30, 4 females (Banks). — **Tennessee:** Newfound Gap, Aug. 1930, 1 male, 1 female (Banks). — **Indiana:** Culver, 1 female (Banks). — **Illinois:** Cook Co., 1 female (Chamberlin). — **Michigan:** Douglas Lake, July 1922, 1 female (Matheson). — **Manitoba:** Kettle Rapids, July 15, 1917, 1 male. — **Wisconsin:** Oconomowoc, June-July, 3 females. — **Kansas:** Manhattan, Oct. 29, 2 males, 2 females. — **Colorado:** Pingree Park, Aug. 19, 1924, 1 female (Crosby), Aug. 20, 1924, 2 males (Crosby); Mummy Range, Aug. 20, 1924, 1 female (Jones); Salina, Apr. 14, 1 female. — **Utah:** Salt Lake City, 1 male (Van Duzee), Sept. 1930, 1 female (Gertch), Silver Lake, July 10, 1933, 1 male, 1 female (Crosby). — **Wyoming:** Grand Teton Pass, July 4, 1933, 2 males, 2 females (Crosby); Yellowstone Park, Yellowstone Lake, Aug. 15, 1923, 5 females, Old Faithful, Aug. 17, 1927, 1 male (Crosby), Monmoth Hot Springs, Aug. 26, 1927, 1 female (Crosby), Aug. 30, 1927, 1 male (Crosby); Grand Canyon, Aug. 30, 1927, 1 male (Crosby). — **California:** Stanford, 1 male, 7 females (Powell); North Fork, March 1920, 1 male (Dietrich); Dalton Creek, Fresno Co. (4800 ft.), May 1920, 4 males, 1 female (Dietrich); Felton St. Cruz Mt., May 22, 1907, 1 male (Bradley); Redwood Corralitos, St. Cruz. Mts., May 13, 1907, 1 female (Bradley); Pacific Grove, Jan. 7, 1917, 2 males; Goose Lake, 1 male, 1 female (Hotterman); Cazadero, 2 females (Van Duzee); Palo Alto, 1 male, 5 females; Upper Yohocamp (7,000 ft.), Aug. 5, 1914, (Emerton); Garberville, June 1, 1936, 1 female (Crosby); Ft. Ross, June 6, 1936, 1 female (Crosby). — **Oregon:** Drain, June 7, 1936, 2 females (Crosby); Portland, May 1, 1916, 1 female. — **Washington:** Wenatchee, Sept.

1929, 1 female (Leonard); Blewitt, May 27, 1929, 2 females (Leonard); Friday Harbor, June-July, 1928, 2 females (Shackleford); Lake Sutherland, Aug. 11, 1927, 1 female (Crosby); Blakely Is., Aug. 10, 1926, 1 female; Longmire, Aug. 22, 1927, 1 female (Crosby). — **Alberta:** Lake Louise, Aug. 4, 1927, 1 male, 1 female (Crosby); Banff, Aug. 2, 1927, 1 male (Crosby); Admiralty Id. 1933, 1 male, 4 females (Sheppard). — **British Columbia:** Galt, May 17, 1919, 1 female (Anderson); Iverness, July, 2 females (Keen). — **Alaska:** Head of Tsirku R., Aug. 1910, 1 female (O. M. Leland); Skagway, June 24, 1936, 2 females (Crosby).

Europe: France: Lac d'Oô, July 27, 1932, 1 female (Crosby); 2 females (from Simon coll.).

Pityohphantes limatanea Emerton

Pl. XII, fig. 85; pl. XIII, figs. 87-89

Linyphia limatanea Emerton. Conn. Acad. Trans. 20:137, pl. 1, fig. 5, 5 a—c. 1915. — Emerton. R. Canad. Inst. Trans. p. 317. 1919.

Male. Length of single specimen 3.5 mm. Considerable variation in length. Cephalothorax yellow brown, lightly suffused with gray, darkened on lateral margins, median furrow, and on posterior portion of back of head; darkened slightly on lateral furrows. Hairs about eyes conspicuous. From above, width of carapace about four fifths length; length of head about three fifths greatest length. Sides gently curved. From the side, carapace rises about evenly from behind to eyes, head slightly arched behind eyes. Median eyes slightly smaller than the lateral. Posterior median separated by three and a half the radius and from the lateral by slightly less than twice the diameter. Anterior median separated by three fourths the diameter and from the lateral by about three and one half times the radius.

Chelicerae slightly darker than carapace, markings light gray. Cheliceral tooth inconspicuous. Upper margin of claw furrow with a row of three well separated teeth, largest midway between base and tip of closed claw, smallest nearer claw base. Lower margin of furrow with two small teeth, one opposite largest of dorsal row and placed beneath claw, one slightly nearer claw base. Sternum like carapace in color, lightly suffused with gray especially along the margin. Labium gray, anterior margin grayish white. Endites like chelicerae in color, wide band of gray behind, a narrow black band in front; tips white. Legs like carapace in color. Abdomen ovate from above; from the side, highest and truncate in front. Dark gray almost overlaid with white. Above, a median dark herring bone design, anterior segments longest. Ventral median part dark.

Palpus (Pl. XII, fig. 85) like legs in color. From above, femur about two and a half patella, about twice the tibia. Femur cylindrical, almost straight. Patella arched above, patellar spur

slightly shorter than tibia, sharp tip curved to point mesad. A long slender hair on mesal side of base of spur. Tibia widened distally, more so from side than from above, mesal side longest, sparsely clothed with slim hairs, those on ventrolateral part very long. Two lateral and one dorsal trichobothria. Greatest width of cymbium two thirds its length; tip bluntly pointed. Base of v-shaped paracymbium broad, almost at right angles to margin of cymbium, narrowed abruptly to turning point, little hairs along anterior part. Distal part about as long as base. Anterior margin of tegular plate slopes back evenly from wide dorsal side. About midway in its length, tegular plate bears a very large, rounded lateral swelling. Tegular groove behind this swelling appears deep and narrow. Tegular ridge double; anterior ridge ends near median base of apical tooth, posterior ridge extended on dorsal side of median apophysis to lateral base of apical tooth. Ridges diverge slightly as they approach median apophysis. Median apophysis constricted a little at base of lateral side; mesal side much shorter than lateral so that duct leaves tegulum near base of apical tooth. Apical tooth (Pl. XII, fig. 85, e) longer than remainder of median apophysis, tapered, sharp, curved.

Lamella of embolic division (Pl. XIII, fig. 87, D) bluntly pointed behind. Prong of lateral process blunt (Pl. XIII, fig. 87, i). Greatly reduced radix (Pl. XIII, fig. 87, E) fused with embolus, narrowed behind; posterior tip slender. Embolus (Pl. XIII, fig. 87, H) curved, narrowed gradually from stout base to sharp tip. Conductor (Pl. XIII, fig. 87, G) with short, sharp villi. Anterior margin rounded. Villous appendage (Pl. XIII, fig. 87, z) slightly longer than embolus. Between villous appendage and embolus lies an elongate, membranous piece (Pl. XIII, fig. 87, F) with distal tip blunt, flattened, not very heavy. This piece has a membranous connection with the radix between lamellar arm and embolus, and is probably a greatly reduced terminal apophysis.

Female. Length of single specimen 4 mm. Considerable variation in length. Head lower than that of male, only a little higher than carapace at median furrow. Posterior eyes in a straight line, median slightly larger than the lateral, separated from each other and from the lateral by a little more than the diameter. Upper margin of furrow of claw with a row of four teeth, two large ones about midway between base and tip of closed claw, a small one nearer claw tip and a very small tooth slightly nearer claw base. Lower margin of furrow with two teeth a little nearer claw base than are largest two of dorsal margin. Lateral margins of endites separated by a considerable distance. Abdomen large, flattened below, rounded above, anterior part extended over carapace a considerable distance. Atrium of epigynum (Pl. XIII, fig. 88) yellow

brown, wider than long, gently convex. Well separated openings born near posterior lateral margins of smooth hairless ventral wall. Posterior margin of ventral wall (Pl. XIII, fig. 88, b) almost straight, a dark spot or crescent on each side indicates seminal receptacle above; small openings within curve of posterior margin of crescent (Pl. XIII, fig. 88, o); V-shaped notch in anterior margin bears cochlear depression (Pl. XIII, fig. 88, d). Crescent-shaped darkened ridge, best seen from side, extends from tip of notch to opening on each side. Thin fringe of very slender hairs overhangs ventral wall. Small looped ducts and seminal receptacles of internal epigynum (Pl. XIII, fig. 89) lie at widely separated openings. Mesal margin of opening with blunt lobe curving inward, its tip well within epigynum. Fertilization canal (Pl. XIII, fig. 89, g) short, curving from posterior margin of epigynum laterad, then forward directly to looped duct. Ventral margin of looped duct ends at opening. Loop formed by duct (Pl. XIII, fig. 89, i) fairly wide, curving laterad, then forward. Seminal receptacle (Pl. XIII, 89, j) slightly shorter than loop, directed dorsad and forward, tip slightly widened.

Type locality: Fort Fairfield, Maine.

Labrador: Cabot Lake, Oct. 10, 1921, 9 males, 8 females (Waugh). — **Nova Scotia:** Truro, 2 females (Matheson). — **Quebec:** Seven Islands, July 20, 1924, 1 female (Waugh). — **Ontario:** Long Lake, July 1916, 2 females (Waugh); Minaki, July 30, 1917, 3 females (Emerton). — **Manitoba:** Kettle Rapids, July 15, 1917, 2 males, 8 females; The Peo, July 1, 1917, 3 males, 4 females; Winnipeg, Victoria Beach, July 26, 1917, 4 males, 19 females. — **Maine:** Fort Fairfield, July 19, 1914, 2 males, 2 females (Emerton).

Frontinella Cambridge

Biol. Cent. Am. Arachn. Ar. 2 : 420. 1902'

Type: **Frontinella laeta** Cambridge

The type of this genus, as described and figured by Cambridge (Biol. Cent. Am. Arachn. Ar. 1 : 261, pl. 35, fig. 10, 10a-d, 11, 11a-d; vol. 2, pl. 40, figs. 1, 1a-e, 2, 2a), resembles *F. communis* in the presence of a patellar tooth on the male palpus and in the general appearance of the embolic division. The abdomen is high behind but not extended behind the spinnerets as in *F. coccinea*.

Keyserling places *F. coccinea* in the genus *Frontina* Simon (Sp. Am. Ther. 2 : 100. 1886). In 1887, Simon changed this genus to *Floronia*, *Frontina* having been preoccupied by Meigen for Diptera in 1838, and stated that *Frontina* Keyserling did not correspond to it (Ann. Soc. Ent. Fr. (6) 7 : CLVIII. 1887). Simon listed *Frontina* Keyserling as a synonym of *Linyphia* Latreille. (Hist. Nat. Ar. 1 : 707. 1894). In 1905, Banks established the genus *Linyphiella* with *coccinea* as type. (Amer. Nat. 39 : 311. 1905).

Key to the species of *Frontinella*

Key to the males

Patella of palpus with stout dorsal tooth **F. communis**Patella of palpus without such a tooth **F. coccinea**

Key to the females

Dorsocaudal tip of abdomen extended tubercle-like well behind spinnerets **F. coccinea**Dorsocaudal tip of abdomen not tubercle-like, not extended behind spinnerets or only slightly so **F. communis**

The species of this genus resemble *Linyphia* in form and appearance. The abdomen is high behind. The median apophysis of the tegulum of the male palpus is simple, tapered, and much shorter than the greatest diameter of the tegulum. The posterior part of the heavy embolus lies transversely across the slender lamella; the tapered anterior portion curves forward. A membranous conductor protects the tip of the embolus. Various membranous processes are present. The well separated openings of the epigynum are borne near the lateral margins of the smooth, hairless ventral wall. The openings are approached by two shallow depressions. The seminal receptacles lie behind the openings and the looped form of the duct found in related genera is missing.

***Frontinella communis* Hentz**

Pl. XIII, figs. 90-94; pl. XIV, fig. 95

***Linyphia communis* Hentz.** Boston Soc. Nat. H. J. 6:28, pl. 4, fig. 4, 1850 (Reprint. Sp. of U. S., Burgess ed. p. 132, pl. 15, fig. 4, pl. 18, fig. 104, pl. 19, fig. 118, 1875). — Emerton. Conn. Acad. Sci. Trans. 6:62, pl. 18, fig. 2, 1882. — Keyserling. Sp. Am., Ther. 2:78, pl. 13, fig. 175, 1886. — Banks. Acad. Nat. Sci. Phil. Proc. p. 41, 1892. — Banks. Cal. Acad. Sci. Proc. 1:244, 1898. — Banks. Ent. Soc. Wash. Proc. 4(3):189, 1899. — Banks. Acad. Nat. Sci. Phil. Proc. p. 533, 1900. — Emerton. Common Spiders p. 138, fig. 323, 324, 1902.

Frontinella communis* F.** Cambridge. Biol. Cent. Am., Ar. 2:422, 1902.Linyphia communis* Bryant.** Boston Soc. Nat. H. Occ. Papers. 7:37, 1908.***Frontinella communis* Banks.** U. S. Nat. Mus. Bull. 72:32, 1910.

***Linyphia communis* Petrunkevitch.** Am. Mus. Nat. H. Bull. 19:247, 1911. — Banks. Acad. Nat. Sci. Phil. Proc. p. 448, 1911. — Comstock. Spider Book p. 386, fig. 400, 1912.

***Frontinella communis* Banks.** Acad. Nat. Sci. Phil. Proc. p. 75, 1916.

***Linyphia communis* Banks.** U. S. Nat. Mus. Proc. 51:69, 1916. — Emerton. R. Can. Inst. Trans. 12:317, 1919.

Male. Length 3 mm, Cephalothorax light orange-brown, lightly suffused with gray especially along the furrows. From above, sides curve gently with slight constriction at contact with cervical furrow. Width a little less than three fourths length, head about three fifths the length. From the side, carapace rises evenly from behind to eyes, back of head slightly arched, height at median furrow about two thirds height at eyes. Hairs about eyes conspicuous. Anterior and posterior eyes in slightly recurved rows, median slightly larger than the lateral. Posterior median separated from each other and

the lateral by a little less than three times the radius. Anterior median separated by about three fourths the diameter and from the lateral by a little more than the diameter.

Chelicerae, sternum, labium and endites like carapace in color, sternum and labium very heavily suffused with gray. Chelicerae with light gray markings and sparsely clothed with slender hairs, longest near claw. Cheliceral tooth dorsolateral, immediately below clypeus. Upper margin of claw furrow with two teeth very near tip of closed claw and two little teeth nearer tip of closed claw than its base, one ventrad of the other. Lower margin of furrow with three evenly spaced teeth in a row along half of margin nearest claw base. Endites with gray markings and dark tips. Legs light orange-yellow, lighter than carapace; legs 1 and 2 a little darker.

From above, abdomen ovate; from the side, height about even, straight behind, slightly truncate in front. Abdomen light gray or white with darker markings. Above, more or less distinct folium, darker behind. Light lines on each side of folium almost meet in front, broken by dark vertical stripes from side of abdomen. Side with an anterior longitudinal stripe fused behind with most anterior of vertical stripes; and four vertical posterior stripes, the last two fuse below. Ventral surface dark gray. These markings sometimes missing, then abdomen is gray with a dorsolateral light stripe on each side.

Palpus (Pl. XIII, fig. 90) like legs in color, suffused with gray and darkest toward the tip. From the side, dorsal length of femur about two and a half that of patella, three times tibia, and a little longer than cymbium. Patella longer above than below with a very stout dorsolateral tooth near tibia. Tibia widened toward cymbium, greatly widened from above, slightly from side. Ventral and lateral sides very sparsely covered with long hairs.

Paracymbium a narrow strip close and parallel to cymbium margin, extending about half length of cymbium and joined to cymbium by slender piece behind. Posterior half like cymbium in texture with a few small hairs and one large anterior one: anterior half a long, semimembranous lobe. Anterior margin of tegular plate extends forward a little from dorsal side to form a bluntly pointed dorsal swelling, then extends back, tegular plate ending ventrally in a small blunt point in front of tegular ridge. Tegular groove hardly perceptible. Median apophysis of tegulum dorsomesal in position so that tegular ridge extends around mesal side of tegulum, forming a depression along its concave side as it approaches median apophysis. Median apophysis very slender, flattened, membranous except distal tip. Lamella of embolic division (Pl. XIII, figs. 91, 92, D) narrowed abruptly behind spur, long posterior tip gently

tapered. Spur (Pl. XIII, figs. 91, 92, k) a little nearer anterior end. Lateral process lacking. Embolus (Pl. XIII, figs. 91, 92, H) in position of lateral process, membranous connection between embolus and lateral side of lamella very heavy. Posterior portion of embolus short, narrowed toward spur; anterior part turned forward very suddenly. Duct enclosed only by slender, conical distal portion. Conductor (Pl. XIII, fig. 91, G) rises behind anterior margin of lamella on bulb side, long terminal lobe equipped with numerous villi and slightly twisted to cover lateral side of tip of embolus in unexpanded bulb. An exceedingly delicate, slender process rising from anterior margin of lamella extends along lateral side of embolus.

Female. Length of one specimen 3 mm. Considerable variation in length. Cephalothorax brown, darker than male. From the side, carapace rises more steeply than in male, height at anterior end of median furrow about equal to that at eyes. Posterior median eyes slightly larger than the lateral, separated by slightly more than three fourths the diameter and from the lateral by a little less than the diameter. Anterior median separated from each other and from the lateral by a little less than the diameter. Upper margin of claw furrow with a row of five teeth, two nearest claw base very small, middle one of remaining teeth largest. Lower margin of furrow with a row of four equidistant teeth along half of margin nearest claw base, one nearest claw base slightly larger. Legs yellow, much lighter than carapace, sometimes lightly suffused with gray. Abdomen white with black markings. Dark folium above, enclosing paired light spots along median line. Abdomen high behind, dorsocaudal tip often extended slightly behind spinnerets.

Smooth, hairless ventral wall of epigynum (Pl. XIII, fig. 93, b) slightly convex, usually lighter than surrounding integument; a little wider than long; narrowed in front. Cochlear depression (Pl. XIII, fig. 93, d) on anterior margin of ventral wall, broadly V-shaped, usually hidden by overhanging fringe of slim hairs, anterior part of ventral wall bears, on each side, an oblique oval bordered in black. Opening (Pl. XIII, fig. 93, o) in anterior part of oval. Duct (Pl. XIII, fig. 94, i) a short, inconspicuous, slightly curved tube directed caudad and laterad. Turning forward at a very sharp angle, duct opens directly into short, stout seminal receptacle (Pl. XIII, fig. 94, j) which curves to form a semicircle. Fertilization canal (Pl. XIII, fig. 94, g) more than twice length of duct, its course as follows: joined to seminal receptacle on caudal side within curve of seminal receptacle, extended forward along ventrolateral side of duct, twisting slightly; curved caudad to pass around opening of duct; then extended back along lateral margin of ventral wall to vagina.

Type locality: United States

Nova Scotia: Truro, 3 males. Weymouth, July 1924, 1 female. — **Maine:** Fort Fairfield, July 19, 1914, 3 females (Emerton). — **New Hampshire:** Pike, May 1908, 1 male (Hayhurst), June 1908, 2 males 1 female (Hayhurst); Carrol, June 15, 1908, 3 females; Hollis, Aug. Sept. 1888, 7 females (Fox); Randolph, July 1, 1926, 8 males, 1 female (Emerton and Banks); Intervale, Aug. 14, 1914, 1 male (Bryant), Aug. 26, 1915, 1 female (Bryant); Chocorua, June 3, 1912, 2 males (Bryant); Fitzwilliam, July 15, 1923, 1 male (Emerton); Moosilauke, July 4, 1912, 5 females. — **Vermont:** Stowe, July 29, 1902, 4 females; Underhill Notch, July 19, 1902, 3 females; South Newfane, June 16-23, 1926, 2 females (Bryant); June, 1927, 2 males (Emerton). — **Massachusetts:** Peabody, June 14, 1874, 2 males, 3 females (Emerton); Blue Hills (south of Houghton's Pond), June 5, 1913, 1 male, 2 females (Emerton); Sharon, Aug. 9, 1902, 1 female; June 1, 1903, 1 male, 2 females (Emerton), June 12, 1924, 1 male (Emerton). — **New York:** Peru, June 10, 1916, 1 male; Newcomb, Essex Co., July 5, 1918, 1 male, July 1-10, 1925, 4 females (House); Bumps Point, Washington Co., July 28, 1920, 2 females; Adirondack Lodge, Essex Co., July 1, 1923, 3 females, June 29, 1923, 1 female (Bishop); Mt. McIntyre, July 24, 1925, 1 female (Crosby); McCollom, June 13, 1933, 1 male, 2 females; McLean Bogs, Tompkins Co., May 30, 1921, 1 female; Ithaca, 2 males, 2 females (Banks); Point Breeze, Orleans Co., June 11, 1923, 1 female (Crosby); Stowe, 1927, 1 female (Crosby). — **Maryland:** Beltsville, 1 male (Fox). — **District of Columbia:** May 1889, 1 male, 3 females (Fox); Aug. 1889, 3 males, 1 female (Fox). — **Virginia:** Pamunky R., Oct. 27, 1923, 1 female; Alberta, Oct. 27, 1923, 2 females (C. and B.); Great Falls, April 3, 1921, 1 male, 1 female (Crosby); Falls Church, 2 males, 3 females (Banks). — **North Carolina:** Raleigh, Aug. 1912, 1 male, 5 females (Brimley); Deep Creek, Aug. 23, 1930, 1 female (Banks); Canton, 4 females (Holden); Little Switzerland, Aug. 12, 1930, 1 male (Creighton); Balsam Gap (3,315 ft.), Aug. 23, 1930, 1 female (Banks); Murphy, 5 males, 3 females (Banks). — **Kentucky:** Noble, June 29, 1925, 1 female (Giovannoli); Hart Co., Aug. 2-10, 1921, 5 females (Funkhouser). — **Tennessee:** Beersheba, July 1888, 1 male, 3 females (Fox); Glenraven, Robertson Co., June-July, 1904, 2 females (Fox). — **Georgia:** Okefenokee Swamp, June 1912, 1 female (Crosby); Thomasville, March 1, 1915, 1 female (Spooner); Spring Creek, Seminole Co., April 11, 1927, 1 female (Crosby); Atlanta, April 2, 1903, 1 female. — **Alabama:** Piper, Aug. 1918, 1 female; Cohort, April 11, 1912, 2 females (H. H. Smith). — **Florida:** Gainesville, Sept. 1-15, 1926, 1 female (Bradley); March 5, 1925, 2 females (Hubbell); Rock Bluff, April 4, 1927, 1 male, 1 female (Crosby); Micanopy, March 6, 1927, 1 female (Crosby). — **Mississippi:** A. and M. College, March 25-31, 1903, 4 males (Comstock); Oxford, Aug.

3 females; Ocean Springs, Jan. 1905, 2 males, 10 females (Comstock); Lucedale, Feb. 1930, 1 female (Dietrich). — **Louisiana:** Shreveport, 1 female (Banks). — **Missouri:** Hunter, Aug. 1905, 1 male (Crosby); Springfield, April 1916, 3 females (Knight), July 1916, 2 females (Knight); Sept. 1903, 5 males, 9 females (Hayhurst). — **Michigan:** Douglas Lake, July 1922, 15 females (Matheson), Aug. 1922, 1 female (Matheson). — **Minnesota:** Minneapolis, June, 1922, 1 female (Fletcher). — **Arkansas:** Hope, Aug. 11, 1926, 2 females (Krobel). — **South Dakota:** Mt. Rushmore, July 2, 1933, 1 female (Crosby). — **Kansas:** Manhattan, June, 4, 2 females. — **Texas:** Austin, March 12-18, 1903, 2 males, 2 females (Comstock); Palm Grove, March 26 1936, 1 male (Crosby).

Frontinella coccinea Hentz

Pl. XIV, figs. 96-100

Linyphia coccinea Hentz. Boston Soc. Nat. Hist. J. 6:30, pl. 4, fig. 8. 1850 (Reprint. Sp. of U. S., Burgess ed. p. 132, pl. 15, fig. 8, pl. 18, fig. 12. 1875).

Frontina coccinea Keyserling. Sp. Am., Ther. 2:100, pl. 14, fig. 188. 1886.

Linyphia coccinea Emerton. Common Spiders p. 140, fig. 330, 331. 1902.

Floronia coccineus Banks. Acad. Nat. Sci. Phil. Proc. p. 340. 1903.

Frontina coccinea Banks. Acad. Nat. Sci. Phil. Proc. p. 128. 1904.

Linyphiella coccinea Banks. U. S. Nat. Mus. Bull. 72:32. 1910. — Banks Nat. Acad. Sci. Phil. Proc. p. 448. 1911.

Linyphia coccinea Petrunkevitch. Am. Mus. Nat. H. Bull. 19:247. 1911.

Nerlene coccinea Comstock. Spider Book p. 384, fig. 397. 1912.

Linyphia humilis Franganillo. Soc. Ent. de Espana Bol. p. 9. 1926.

Linyphia vicina Franganillo. Soc. Ent. de Espana Bol. p. 10. 1926.

Male. Length 3.3 mm. Cephalothorax orange-yellow, very slightly darkened along furrows; furrows hardly perceptible. Form of carapace almost identical with that of *F. communis*. Posterior eyes in a slightly recurved row, the median about one and a third the lateral, separated by a little more than twice the diameter and from the lateral by a little more than the diameter. Anterior eyes in a straight row, about equal, the median separated by the diameter and from the lateral by slightly more than twice the diameter. Area between black spots enclosing eyes suffused with gray. Hairs about eyes conspicuous. From the side, clypeus straight.

Chelicerae and endites like carapace in color; sternum and labium a little darker. Chelicerae without cheliceral tooth. Upper margin of claw furrow with two teeth near tip of closed claw, smallest one nearest tip, and a flat, short ridge cut off squarely at either end and hiding middle of closed claw. Lower margin of furrow with a minute tooth near claw base and three little teeth nearer tip of closed claw than its base, largest nearer claw tip, smallest nearer claw base. Sternum and labium lightly suffused with gray. Tips of endites darkened. Legs light yellow, lightly suffused with greenish gray, darker toward tips.

Abdomen long and slim, widest in front, rounded at each end. From the side, constricted about one third its length from spin-

nerets, height about equal in front and back, dorsal part extended in back of spinnerets. Above, light gray with darker spots of gray or lavender; dorsal caudal tip with a transverse black spot. Reddish brown below and on sides. Plates in front of lung slits brown suffused with gray. Specimens from Cuba lighter in color with gray markings as follows. Cephalothorax and its appendages light yellow, sternum a little darker. Sides of carapace, and legs lightly suffused with gray. Legs 3 and 4 with a white band around each end of femur and posterior end of tibia. Abdomen with dark dorsocaudal spot, a narrow longitudinal dark stripe on each side not extended to caudal end, a wide median dark band below.

Palpus (Pl. XIV, fig. 98) yellow. Seen from side, dorsal length of femur about three times that of patella, a little more than once and a half tibia and cymbium. Patella arched a little above, with a dorsal spine near tibia. Tibia widened in front, greatest width about equal from above and from side, several long lateral hairs, two lateral and one dorsal trichobothria conspicuous. Cymbium a little longer than tibia, greatest width about two thirds length, narrowed in front to a broad, rounded tip. Base of paracymbium short, broad, almost perpendicular to length of cymbium, equipped with a few small hairs. Distal part of paracymbium greatly widened, membranous, ending in two rounded lobes. A dark line through base extended into distal part.

Anterior margin of tegular plate slopes back very slightly from dorsal to ventral side. Dorsal portion of tegular plate extended in a rounded swelling directed laterad and slightly forward. Tegular groove not perceptible. Median apophysis of tegulum short, sharp, heavy. Lamella (Pl. XIV, figs. 96, 97, D) sharp behind, tip slightly curved; anterior mesal angle sharp, lateral part roughened. Lateral process (Pl. XIV, figs. 96, 97, i) sharp, heaviest part of lamella. Duct enclosed by embolus (Pl. XIV, figs. 96, 97, H) as it leaves tegulum. Conductor (Pl. XIV, figs. 96, 97, G) long, slender; terminal lobe gently rounded and twisted sharply once around distal part of embolus. From bulb side of anterior margin rise two blunt membranous processes directed forward. A third shorter process rises near sudden forward curve of embolus. A minute tooth lies between this process and embolus.

Female. Length 3 mm. From above, cephalothorax like that of male in form and color. Median furrow deeper than in male. Posterior median eyes one and two thirds the lateral, separated by slightly more than twice the diameter and from the lateral by a little less than the diameter. Anterior median slightly smaller than the lateral and separated by slightly more than the diameter. Dorsal margin of furrow of claw with a row of four or five teeth, increasing in length from a minute tooth near claw base to fourth tooth

from claw base. Lower margin of furrow with a row of five little teeth nearer base of closed claw than its tip, largest tooth nearest tip of closed claw. Legs and last two segments of palpi darker than in male, white band around posterior end of tibia four. Abdomen ovate from above. Specimens from Cuba with the following markings. Bands on legs more distinct than in male, white band around posterior end of metatarsi 3 and 4. Ventral median band extended on each side of spinnerets. Lateral stripe widened and broken into irregular spots. Above, in front of dorsocaudal spots, two short oblique dark lines, one on each side of median line, fuse in front.

Epigynum (Pl. XIV, fig. 99) like surrounding integument in color. A shallow, median depression is bordered in front and on sides by a narrow, darkened, U-shaped ridge. In front, ridge is highest and extends back slightly over depression to form a pocket. Two large oval depression, one on each side in front of ridge, are almost continuous in front and bear openings (Pl. XIV, fig. 99, o) on posterior margins. Dark spot near each opening indicates parts of internal epigynum above. Internal epigynum lacks a bursa copulatrix. Seminal receptacle (Pl. XIV, fig. 100, j) a short tube directed mesocaudad from opening to posterior margin of ventral wall of epigynum, posterior part curved suddenly dorsad to end in a blunt, broadened tip. Seminal receptacle constricted in front of this curve where fertilization canal (Pl. XIV, fig. 100, g) rises on ventral side. Fertilization canal very short, extending back and up along lateral margin of modified integument leading to ventral wall of vagina.

Type locality: North Carolina.

Maryland: Bay Ridge, 2 females (Banks). — **Virginia:** Virginia Beach, 1 male, 1 female (Banks). — **Georgia:** Thalmann, Apr. 1911, 1 female (Bradley); Thunderbolt, June 26, 1912, 1 female; Clayton (2000 ft.), May 1911, 1 male (Bradley); Spring Creek, Apr. 11, 1927, 1 female. — **Florida:** Sanford, July 27, 1927, 2 females (Stone); Biscayne Bay, 1 male, 1 female (Banks); Punta Gorda, 1 male (Banks); Marianna, Aug. 1903, 1 female (Morse). — **Cuba:** 1 male, 1 female (Franganillo); 1 male (Franganillo). — **Louisiana:** Jennings, 1 female; Baton Rouge, 1903, 1 female; March 20-23, 1904, 1 female (Comstock); March 20, 1927, 1 male, 2 females (Rosewald); Shreveport, 3 males, 1 female (Banks). — **Texas:** 1 female; Houston, June 15, 1932, 1 male (Mulaik).

Helophora Menge

Preuss. Sp. p. 126. 1866

Monotype **Helophora pallescens** Westring

In the few species included in this genus the carapace is lightly suffused with gray along the margin, more conspicuously in the female. The head of the male is rather narrow. The eyes of the female are in straight rows except the anterior eyes of *H. ontario*.

riensis. The lateral surface of the chelicera is roughened to form an easily discernible stridulating file in both sexes.

The abdomen is ovate from above; from the side it is highest near the front, gently tapering toward the spinnerets. The abdomen is light gray with dark gray or gray-brown markings. When the markings are fully developed, the dorsal surface bears a narrow median line in front, and on the posterior part a series of transverse lines are longest in back and form chevrons in front. The sides usually bear oblique lines which may be broken into irregular spots. This pattern is usually reduced, especially in *H. insignis*. The posterior dorsal markings are the most persistent.

The femur of the male palpus is a little longer than the cymbium. The patella is slightly longer above than below, the dorsal surface flattened behind and gently arched in front. It is equipped with a heavy dorsal distal hair and two slightly shorter dorsolateral hairs. The tibia is slightly swollen below. It bears a lateral process, the tibial process, and three trichobothria, one dorsal and two dorsolateral in position. The greatest width of the cymbium is about three fourths its length; the anterior tip is very blunt.

The paracymbium (Pl. XVI, figs. 113, 114) is large, heavy and complex in form. The ventral side of the base bears a shallow depression; the dorsal side is sparsely covered with small hairs; and the rounded anterior tip is curved slightly downward. The distal part of the paracymbium is tapered and curved to point dorsad. It bears a few small hairs on its exposed surface. The distal part of the paracymbium bears a large process behind, the caudal process, which is extended mesocaudad to end in a blunt, flattened tip. The caudal process is extended dorsad to form a heavy dorsal tip. Between this dorsal tip and the distal part of the paracymbium proper, lies a flattened lobe, the median lobe. A few, small, stiff hairs lie at the base of the median lobe near the dorsal tip of the caudal process.

The tegulum is rather flattened. The anterior margin of the tegular groove bears a very thin, high ridge, which extends caudad and is highest on the mesal part. The bezel (Pl. XVI, fig. 114, L) is membranous and high. The median apophysis (Pl. XV, fig. 106, C) rises on the dorsomesal part of the tegulum. It is a long, heavy sclerite curved gently in the direction of the bulb spiral; the tip is sharp and directed mesad. The convex surface of the median apophysis bears a sharp, longitudinal, median ridge. There is a depression between this ridge and the dorsal margin of the apophysis. After leaving the tegulum, the duct is enclosed in the median apophysis for slightly more than half the length of the apophysis, running near the concave surface. The duct then passes to the embolic division surrounded by a short, wide membrane.

The embolic division possesses an embolus (Pl. XV, fig. 107, H) and a very long lamella (Pl. XV, fig. 107, D). Two membranous processes rise from the membrane which encloses the duct as it enters the embolic division. They are most firmly fastened to the median apophysis. One of these processes is very blunt and dorsal in position. It is the dorsal process. (Pl. XV, fig. 107, M). The other membranous process is the conductor (Pl. XV, fig. 107, G). The conductor is about even in width, ending near the tip of the embolus. The embolus is exposed, its dorsal surface resting against the conductor. The conductor may be clothed with long, tapered villi except on the smooth tip. The lamella is a long, flat, slender plate in the form of a loop, each tip anterior in position. The lamella is attached near its mesal tip which is greatly narrowed, blunt, heavy and curved toward the tegulum. The lateral tip of the lamella is much wider and equipped with small hairlike villi. The embolus is styliform, slender, but heavy. It is curved in a semicircle, its tip near the tip of the cymbium.

In this genus, the entire region of the epigynum forms a base for a long scape directed caudad. The scape of *H. ontariensis* is directed ventrad so that the dorsal and ventral surfaces of the epigynum in this general discussion are the posterior and anterior surfaces respectively of the epigynum of *H. ontariensis*. The cochlear depression is born on the ventral surface of the tip (Pl. XVI, figs. 116, 117, d). The dorsal surface of the scape and the ventral surface behind the cochlear depression is the hairless modified integument associated with the openings of the epigynum. The ventral surface of the scape in front of the cochlear depression is like that of the abdomen in texture and is sparsely covered with long hairs.

The median ventral surface of the scape is sunken. (Pl. XV, fig. 108, b). On each side this sunken part forms a groove directed laterad (Pl. XV, fig. 108, k). These lateral grooves may extend to the ventral tip of the scape (Pl. XV, fig. 109). The lateral grooves lead directly to the openings of the epigynum. Their lumen is narrowed by a dorsal, longitudinal ridge (Pl. XV, fig. 108) which varies in size in different parts of the groove.

The openings are longitudinal slits near the base of the scape on the dorsal side. They lead directly to the ducts. In *H. insignis* and *H. reducta*, the duct is short, curving up and back before opening into the seminal receptacle which lies laterad to it. In *H. ontariensis* the duct is long and curved to form a complicated pattern. The seminal receptacle varies in shape. The short fertilization canal extends above the lateral margin of the modified integument leading to the ventral wall of the vagina.

Key to the species of *Helophora*

Males

1. Tibial process very slender *H. insignis*
 2. Tibial process very heavy *H. reducta*

Females

- I Scape more than one third length of abdomen . . . *H. insignis*
 Scape less than one fourth length of abdomen II
 II. Upper margin of claw furrow of chelicerae with a row of three
 teeth *H. reducta*
 Upper margin of claw furrow of chelicerae with a row of five
 teeth *H. ontariensis*

Helophora ontariensis Emerton

Pl. XIV, figs. 101, 102; pl. XV, figs. 103, 104

Linyphia ontariensis Emerton. Canad. Ent. 57:68, text fig. 5a—e. 1925.

Female. Length 3.75 mm. Cephalothorax light yellow very lightly suffused with gray and darkened along furrows. Seen from above, greatest width of carapace about three fourths its length, length of head somewhat less than three fourths length of carapace. From the side, carapace rises from behind to eyes, steepest behind median furrow; back of head slightly arched. Eyes about equal except the slightly smaller anterior median. Posterior median separated by five sixths the diameter and about the same distance from lateral. Anterior eyes in a very slightly recurved row, the median separated by two fifths the diameter and from the lateral by four fifths diameter.

Chelicerae slightly darker than carapace. Upper margin of claw furrow of chelicera with a row of five teeth, middle three about equal, tooth at each end smaller. Lower margin of claw furrow with a row of four small teeth, larger teeth nearer tip of closed claw. Endites, labium and sternum like chelicerae in color, suffused with gray which is heaviest on sternum especially along the margin. Tips of endites white, bearing conspicuous black scopula. Anterior margin of labium white. Legs and palpi like carapace in color, very lightly suffused with gray.

From the side, abdomen highest near the middle; curve of dorsal surface steepest behind. Light yellow-gray, mottled with darker gray above and halfway down sides. Five transverse gray stripes on dorsal hind half of abdomen. Gray below and halfway up sides, lightened to yellow below near spinnerets. Epigastrium and spinnerets light yellow. Below, a narrow light line on each side not extended to spinnerets. Abdomen sparsely clothed with short, black hairs.

Scape of epigynum dark yellow and about three tenths length of abdomen. Scape (Pl. XIV, fig. 101, 102) directed ventrad and slightly caudad, its greatest width two thirds its length. Seen from

the side, caudal surface swollen near base, gradually narrowed to tip; dorsal side abruptly narrowed near bluntly pointed tip. Seen from behind, scape swollen, narrowing rather abruptly near slender blunt tip. Cochlear depression not present. Lateral grooves on posterior surface wide, rising on anterior side of tip. Sunken posterior part narrow at tip and midway between tip and openings.

Seminal receptacle (Pl. XV, figs. 103, 104, j) long, slender, slightly wider in front, placed laterad of opening. Fertilization canal (Pl. XV, figs. 103, 104, g) short, gently curved, extending from dorsal end of seminal receptacle to vagina. Duct long and complex in arrangement (Pl. XV, figs. 103, 104, i). Between opening and seminal receptacle the duct curves to form a series of loops, the loops nearest the seminal receptacle directly dorsad of the others. The loops are formed by the duct curving back sharply upon itself. No part of each loop directly overlaps any other part. The looped parts of the duct are so curved that in any single view only a part of the duct is visible. In a lateral view (Pl. XV, fig. 104), three loops are seen. When seen from in front (Pl. XV, fig. 103) two loops and a part of the ventral third loop are visible. Duct heavier near seminal receptacle, ending on dorsolateral part of seminal receptacle. Tissue between curves of duct stiffened.

Type locality: Six Nations Reservation, near Brantford, Ontario.

New York. Beaver River Flow, trail to Mt. Stillwater, Herkimer Co., Aug. 8, 1931, 2 females (Crosby and Davis).

Helophora insignis Blackwall

Pl. XV, figs. 105-110; pl. XVI, figs. 113, 116

Linyphia insignis Blackwall. Linn. Soc. London Trans. 18:662. 1841. — Walckenaer. Hist. Nat. Insect. Apt. 4:499. 1847. — Blackwall. Annals & Mag. of Nat. Hist. series 2, 9:18. 1852.

Linyphia pallescens Westring. Aran. Svec. p. 119. 1861.

Linyphia insignis Blackwall. Sp. Gr. Br. and Ire. p. 328, pl. 17, fig. 160. 1864.

Helophora pallescens Menge. Preuss. Spinn. p. 127, pl. 23, tab. 50. 1866.

Linyphia insignis Thorell. Rem. Syn. Eur. Sp. p. 63. 1872. — Pickard-Cambridge. Sp. of Dorset. 1:219. 1879.

Helophora insignis Emerton. Conn. Acad. Sc. Trans. 6:67, pl. 21, fig. 3. 1882.

Linyphia insignis Simon. Ar. Fr. 5:224. 1884. — Keyserling. Spinn. Amer., Ther., 2:80, pl. 13, fig. 173. 1886. — Simon. Hist. Nat. Ar. 1:692, 1894. — Chyzer and Kulczynski. Araneae Hungariae. 2a:58. 1894.

Helophora insignis Strand, Archiv for Mathem. og Naturvid. 21, Nr. 6. p. 25. 1899.

Linyphia insignis Emerton. Common Spiders p. 146, fig. 348-350. 1902.

Helophora insignis Strand, Bergens Mus. Aarbog. 1902. No. 6. p. 9. — Strand, Kgl. Norske Vidensk. Selskabs Skrifter. 1903. No. 7. p. 8. 1904.

Linyphia insignis Strand, Fauna Arctica IV. p. 455. 1906. — Banks. U. S. Nat. Mus. Bull. 72:33. 1910. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 19:250. 1911. — Reimoser. Kat. Spinn. p. 94. 1919.

Helophora insignis Strand, Archiv f. Naturgesch. 92. p. 88. 1926.

Linyphia insignis Simon. Arach. France. 6:745. 1929. — Charitonow. Mus. Zool. Ann. 32:78. 1932.

Male. Length 3.66 mm. Carapace light yellow, sometimes darkened along furrows. From above, greatest width of carapace about four fifths its length, head about three fifths length of carapace. From the side, back of head arched, carapace gently arched behind median furrow; height at median furrow about three fifths height at eyes. Margin of clypeus slightly flared. Posterior eyes in a straight row, median slightly smaller than the lateral, separated by a little more than the diameter and from the lateral by one and one fourth the diameter. Anterior eyes in a very slightly recurved row, median about three fourths the lateral, separated by a little more than the diameter and from the lateral by three times the radius. Chelicerae a little darker than carapace. Sternum, endites, palpi and legs like carapace in color. Sternum deeply suffused with gray, especially along the margin. Median ventral surface of abdomen light except on epigastrium.

Seen from the side, dorsal length of femur of palpus (Pl. XV, fig. 105) a little less than four times that of patella, and about three times tibia. Tibial process slender with two stout hairs on blunt tip, and one heavy dorsal hair near base. A few distal, dorsomesal hairs and two ventral hairs lengthened. Dorsal tip of caudal process of paracymbium heavy, sharp, flattened, and curved to point laterad. Median lobe of paracymbium slender, tip bluntly pointed with two stiff hairs at base. Bezel of tegulum (Pl. XV, fig. 106, L) long, tapered; tip turned to point dorsad. Longitudinal ridge on median apophysis roughened near tip. Dorsal process of embolic division (Pl. XV, fig. 107, M) widened from base to tip: tip slightly narrower than length of process. Tip of conductor (Pl. XV, fig. 107, G) bluntly rounded. Tapered villi conspicuous on greater part of conductor. Mesal end of lamella curved sharply toward median apophysis of tegulum; mesal tip of lamella lying perpendicular to length of lamella. Lamella (Pl. XV, fig. 107, D) widened toward lateral tip. Ventral margin constricted sharply in middle of lateral part of lamella; a transverse depression just behind this constriction. Ventral margin of narrowed lateral distal part constricted again near tip. Lateral tip bluish gray in color and covered with short, heavy, minute villi.

Female. Length, 4 mm. From the side, carapace rises almost evenly from behind to eyes, gently depressed at median furrow, clypeus straight. Posterior median eyes a little larger than the lateral, separated by somewhat less than the diameter and from the lateral by somewhat more than the diameter. Anterior median about four fifths the lateral, separated by the radius, and from the lateral by slightly more than the diameter. Lower margin of claw furrow of chelicera with a row of four small teeth, largest tooth nearest tip of closed claw.

Scape of epigynum (Pl. XV, figs. 109, 110, pl. XVI, fig. 116) lies parallel to ventral surface of abdomen. Scape more than one third length of abdomen. Greatest width of scape slightly less than one fourth its length. Cochlear depression (Pl. XV, fig. 109, pl. XVI, fig. 116, d) a wide flat pocket, directed caudad. Dorsomedian sunken part (Pl. XV, fig. 110, b) very slender, widened slightly at tip and behind openings. Lateral grooves narrow (Pl. XV, fig. 110, k) rising on dorsal surface of scape tip. Duct (Pl. XV, fig. 110, i) very short and inconspicuous. Seminal receptacle small and rounded (Pl. XV, fig. 110, j) lying laterad and caudad of adjoining tip of duct.

Type locality: Trafford near Manchester, England.

Nova Scotia: Truro, 1 female (Matheson). — **Quebec:** Mt. Royal, Montreal, Sept. 16, 1925, 4 males and 5 females (Barnes). — **Ontario:** Pointe au Baril, Aug. 26, 1925, 2 females (Giovannoli). — **Maine:** Presque Isle, Aug. 26, 1925, 1 female (Crosby); Winterport, Aug. 29, 1925, 1 female (Crosby); Greene, Aug. 23, 1925, 1 female (Crosby). — **New Hampshire:** Meredith, Aug. 22, 1925, 1 female; Hollis, Aug. 27, 1888, 2 females (F & T). — **Massachusetts:** Mt. Greylock (3,500 ft.), Oct. 22, 1927, 1 female, (Bishop). — **New York:** Elizabethtown, Aug. 1921, 2 females (Crosby); Wilmington Notch, Aug. 27, 1921, 4 females (Crosby); Wilmington, Aug. 1916, 4 males, 8 females; High Falls, Essex Co., Aug. 26, 1921, 1 female (Crosby) Rensselaer, Nov. 21, 1915, 1 male, 1 female (Hartman); Indian Head Mt., Lake George, Sept. 18, 1925, 1 female (Leonard); Normansville, Nov. 2, 1922, 2 females (Crosby); Mt. Whiteface, Essex Co., (2,300 ft.), Aug. 25, 1921, 3 females (Crosby); Danby, Oct. 17, 1924, 2 females (Crosby); Enfield Gorge, Sept. 23, 1931, 1 female (Hayden); Ithaca, Sept. 5, 1926, 1 male (Seeley); Oct. 1902, 1 male, Oct., 1 male, Nov., 1 female, Aug. 1932, 1 female (Crosby); Nov. 1902, 1 female; Taughannock Falls, Aug. 1918, 4 females; Watkins Glen, Oct. 1918, 1 male, 1 female, (Crosby); Fish Pond Creek, Franklin Co., Sept 6, 1931, 1 male, 7 females (C. and M.); Johnstown, Sept. 8, 1910, 1 female (Burke), Oct. 1918, 1 male 1 female (Crosby); Cheshire, Oct. 1918, 1 male; Ceres, Sept. 16, 1925, 1 male (Crosby); Penn Yan, Sept. 6, 1922, 1 male (Crosby); Whetstone Gulf, Lewis Co., Sept. 2, 1926, 1 male (Crosby); Newfane, Oct. 1915, 1 male (Crosby); Nigger Pond, Oswego Co., Sept. 3, 1926, 1 male (Crosby); Richburg, Sept. 16, 1925, 1 male (Crosby); Olcott, Sept. 19, 1925, 1 male, 1 female (Crosby); Wellsville, Sept. 15, 1925, 1 male, (Crosby). — **Pennsylvania:** Laurenceville, Oct. 2, 1923, 1 male, 1 female (Crosby). — **Utah:** Salt Lake City, Sept. 1930, 5 males, 10 females (Gertch).

Europe: England, Yorkshire, 2 males, 1 female (Hancock). Ireland, Co. Carlow, 2 females (Pack-Beresford).

Helophora reducta Keyserling

Pl. XVI, figs. 111, 112, 114, 115, 117, 118

Linyphia reducta Keyserling. Sp. Am. Ther. 2:83, pl. 13, fig. 172. 1886. — Banks. Wash. Acad. Sc. Proc. 2:481. 1900. — Strand. Fauna Arctica. 4:454. 1906. — Petrunkevitch. Am. Mus. Nat. Hist. Bull. 29:254. 1911.

Linyphia orinoma Chamberlin. Ent. Soc. Amer. Ann. 12:248. 1919.

Male. Length, 3.33 mm. Carapace brownish yellow, darkened along furrows. From above, greatest width of carapace about four fifths its length; head about three fifths length of carapace. From the side, carapace only a little higher at eyes than at median furrow; gently convex behind and in front of median furrow. Margin of clypeus not flared. Posterior eyes in a very slightly recurved line; about equal, median separated by slightly less than the diameter and from the lateral by slightly more than the diameter. Anterior eyes in a very slightly procurved row, median somewhat smaller than the lateral, separated by the radius and from the lateral by somewhat more than the diameter. Chelicerae and sternum like carapace in color. Upper margin of claw furrow of chelicera with a row of three stout teeth, middle tooth largest. Lower margin of claw furrow with a row of four small teeth, largest tooth nearest tip of closed claw. Endites, legs, and palpi slightly lighter than carapace. Sternum lightly suffused with gray, especially along margin, labium dark gray with light anterior margin. Endites suffused with gray at the base; tips white. Tips rather long and slender. Median ventral surface of abdomen dark.

Seen from the side, dorsal length of femur of palpus (Pl. XVI, fig. 111) about three times that of patella and a little less than three times tibia. Tibial process heavy, pointed tip near anterior margin of tibia. Lateral surface of tibial process with three, long, heavy hairs. Anterior margin with a long, slender tooth above tibial process. Median lobe of paracymbium much wider than long; tip broad and straight; three stiff hairs near base. Dorsal tip of caudal process widened to a straight tip. Bezel of tegulum (Pl. XVI, fig. 111, L) about even in width. Median apophysis of tegulum (Pl. XVI, fig. 112, C) bears a flat, small tooth on longitudinal ridge, near attachment point of embolic division; dorsal process (Pl. XVI, fig. 112, M) widened a little at tip and equipped with a small tooth on middle of lateral margin. Tip of conductor (Pl. XVI, fig. 112, G) straight; tapered villi only conspicuous near tip. Lateral tip of lamella near bezel of tegulum. This tip of lamella widened; distal margin with a narrow fold on lateral side of lamella. Dorsal anterior angle of lateral tip extended dorsad in a long bluntly pointed tip. Numerous short, heavy, minute villi on this dorsal anterior tip and on distal lateral part of lamella.

Female. Length, 3.5 mm. Posterior median eyes separated from the lateral by the diameter. Anterior median separated from

the lateral by very slightly more than the diameter. Two pairs of white spots, below, in front of spinnerets.

Scape of epigynum (Pl. XVI, figs. 115, 117) directed ventro-caudad, and less than one fourth length of abdomen. Greatest width of scape slightly more than one third its length. Ventral posterior part of scape with a depression, which holds a short, stout process from median part of tip of scape. This process curves down and then forward to form cochlear depression (Pl. XVI, figs. 115, 117, d). Dorsomedian sunken part (Pl. XVI, fig. 118, b) widened somewhat in front of tip of scape; greatly narrowed at tip. Lateral grooves (Pl. XVI, fig. 118, k) wide, rising on ventral part of tip of scape. Duct (Pl. XVI, fig. 118, i) inconspicuous, forming a complete loop before reaching seminal receptacle (Pl. XVI, fig. 118, j). Seminal receptacle oval, heavy and placed laterad to adjoining tip of duct.

Type locality: Spring Lake, Utah.

Utah: Salt Lake City, Aug. 1930, 4 females (Gertch). — **Oregon:** Tillamook Co., Aug. 20, 1931, 1 female (Macy). — **Washington:** Olympia, 1 female. — **Alaska:** Metlakatla, 4 males, 3 females (Banks), Admiralty Id. 1933, 1 female (Sheppard).

Stemonyphantes Menge

Preuss. Sp. p. 138. 1866

Monotype: **Stemonyphantes bucculentus** Clerck.

The tibia of the male palpus bears a short process which supports the paracymbium (Pl. XVII, fig. 125, N). The epigynum possesses two openings and the looped duct of related genera is lacking. A ventral plate between and behind the openings is smooth and hairless. This is obviously the modified integument typically associated with the openings of the epigynum.

Stemonyphantes bucculentus Clerck

Pl. XVII, figs. 119-126

Araneus bucculentus Clerck. Svensk. Spindl. p. 63, pl. 4, tab. 1. 1757.

Aranea lineata Linnaeus. Syst. Nat. 10ed. 1:620. 1758. — Linnaeus. Fauna Suecica 2ed. p. 487. 1761.

Aranea trilineata Linnaeus. Syst. Nat. 12ed. p. 1031. 1767.

Aranea bucculenta Olivier. Encycl. Méthod. 4:211. 1789. — Sundevall. Vet. Akad. Handl. f. 1831. p. 109. 1832.

Linyphia bucculenta Sundevall. Vet. Akad. Handl. f. 1831. p. 108. 1832.

Theridium albomaculatum Sundevall. Vet. Akad. Handl. f. 1831. p. 117. 1832.

Linyphia cellulana Sundevall. Vet. Akad. Handl. f. 1831 p. 108. 1832 (ad partem).

Bolyphantes trilineatus C. L. Koch. Ar. Syst. 1:9. 1837.

Linyphia reticulata Walckenaer. Ins. Apt. 2:260. 1837.

Bolyphantes trilineatus C. L. Koch. Die Arachn. 8:67, tab. 272, fig. 641. 1841.

Neriene trilineata Blackwall. Linn. Soc. Trans. 19(2):124. 1843.

Neriene graminicolens Blackwall. Linn. Soc. Trans. 19(2):125. 1843.

Neriene trilineata Blackwall. Annals & Mag. of Nat. Hist. series 2. 9:271. 1852.

Linyphia bucculenta Thorell. Rec. crit. aran. in Nova. Acta Reg. Soc. Sci. Upsala series 3. 2:90. 1856. — Westring. Araneae Suecicae. p. 109. 1861.

- Neriere trilineata** Blackwall. Sp. Gr. Br. and Ire. 2:279, pl. 19, fig. 193. 1864.
- Stemonyphantes trilineatus** Menge. Preuss. Spinn. 1:139, pl. 26, tab. 58. 1866.
- Linyphia bucculenta** Canestrini and Pavesi. Soc. Ital. Sc. Nat. Atti 11:786. 1868. — Ausser. K. k. zool. bot. Ges. Wien Verhandl. 17:147. 1867. — Thorell. Rem. Syn. Eur. Sp. p. 53. 1870. — Pavesi. Soc. Ital. Sc. Nat. Atti. 16:71. 1873.
- Stemonyphantes bucculentus** Karsch. Verzeichnis Westfälischer Spinnen (Verh. nfh. Ver. Rheinl. XXX). 1873.
- Linyphia bucculenta** Pavesi. Soc. Ital. Sc. Nat. Atti. 18:263. 1875. — Lebert. Allg. Schweiz. Ges. gesamt. Naturw. Neue Denk. 27(2):154. 1877 (Reprint. Bau u. Leben Sp. 1878). — Hermann. Ungarns Spinn. 3:57. 1879. — Becker. Soc. Belg. Ann. 22:102. 1879. — Cambridge. Sp. of Dorset. 1:224. 1879.
- Stemonyphantes bucculentus** (trilineata in fig.) Emerton. Conn. Acad. Sc. Trans. 6:64, pl. 20, fig. 1. 1882.
- Linyphia lineata** Simon. Arachn. France 5(2):223. 1884. — Keyserling. Spinn. Am., Ther., 2:64, pl. 13, fig. 167. 1886.
- Stemonyphantes bucculentus** Banks. Acad. Nat. Sci. Phil. Proc. p. 43. 1892. — Chyzer and Kulczynski. Aran. Hungariae 2a:53, pl. 2, fig. 20. 1894.
- Linyphia lineata** Simon. Hist. Nat. Ar. 1:692. 1894.
- Stemonyphantes bucculentus** Emerton. Conn. Acad. Sc. Trans. 9:409. 1894.
- Linyphia lineata** Becker. Mus. Roy. d'Hist. Nat. Belgique, Ann. 12(3):14, pl. 1, figs. 7, 7a—d. 1896.
- Stemonyphantes bucculentus** Strand, Archiv f. Mathem. og Naturvid. 21. No. 6. p. 19. 1899.
- Stemonyphantes lineata** Pickard-Cambridge. List of Brit. and Irish Spid. p. 26. 1900.
- Linyphia trilineata** Emerton. Common. Sp. p. 143, fig. 335. 1902.
- Stemonyphantes lineatus** Strand, Bergens Mus. Aarbog 1902. No. 6. p. 7. — Strand, Kgl. Norske Vidensk. Selsk. Skrifter. 1903. No. 7. p. 8. 1904.
- Stemonyphantes bucculentus** de Lessert. Rev. Suisse Zool. 12:354. 1904.
- Stemonyphantes lineatus** Strand, Fauna Arctica IV. p. 454. 1906. — Strand, Zoolog. Anzeiger 32. p. 229. 1907.
- Stemonyphantes bucculentus** Bryant. Boston Soc. Nat. Hist. Occ. Papers. 7:39. 1908. — de Lessert. Cat. Invert. Suisse Araignées p. 279. 1910.
- Linyphia lineata** Petrunkevitch. Am. Mus. Nat. Hist. Bull. 19:250. 1911.
- Stemonyphantes lineatus** Strand, Archiv f. Naturg. 1915. A. 9. p. 7, 16. — Reimoser. Kat. Spinn. p. 95. 1919.
- Stemonyphantes bucculentus** Strand, Archiv f. Naturg. 92. p. 88. 1926.
- Stemonyphantes lineatus** Spassky. Ann. de l'Ecole Supér. d'Agric. et d'Am. du Don 5:7. 1927. — Simon. Arachn. de France 6(3):621 and 740, fig. 933, 934. 1929.
- Stemonyphantes bucculentus** Charitonow. Mus. Zool. Ann. 32:87. 1932.

Male: Length of one specimen 4 mm. Considerable variation in length. Carapace light to dark yellow, with a narrow black marginal band on each side. A black median band, widened before and behind median furrow, discontinued halfway up back of head. Width of carapace a little less than length. Seen from above, sides curve evenly and rather strongly from behind to clypeus. From the side, carapace rises rather abruptly behind, then almost flat to eyes; slightly convex behind cervical furrow.

Eyes nearly equal; posterior lateral slightly smaller, anterior lateral slightly larger. Median eyes separated by about three fourths the diameter. Posterior eyes in a slightly recurved row, the median separated from the lateral by the diameter. Anterior eyes in a very

slightly procurved row, median separated from the lateral by a little more than three fourths the diameter.

Chelicerae a little darker than carapace, very lightly suffused with gray. Seen from the side, chelicera narrows gradually toward claw; dorsal surface slightly convex in front of clypeus. Lateral surface with easily discernible stridulating file. Dorsal margin of claw furrow with a row of three stout equidistant teeth, middle tooth largest. Lower margin of furrow with two smaller teeth on half of margin nearest claw base. Sternum, labium, endites and legs like carapace in color. Sternum with black or gray marginal band widened opposite each coxa. Labium and endites lightly suffused with gray, labium darkest. Endites darkened near labium, tips white. Markings on legs varied, many males have female markings. The following parts are usually darkened ventrally: distal end of coxae, each extremity of femur and distal part of tibia. These markings may be lacking except on leg IV. Metatarsus I peculiar in shape (Pl. XVII, figs. 122, 123). From above, mid portion of metatarsus slightly swollen; from the side, gently curved so that dorsal side is slightly concave near tibia, and ventral side is concave near tarsus.

From above, abdomen oval. Seen from the side, truncate in front, gently rounded behind. Abdomen gray overlaid with irregular white spots. Above, a median and two lateral rows of black spots, lateral lines joined near front, crossing the median line. All three rows end behind near spinnerets. Sides with four to six oblique black spots or lines. Below, epigastric plate yellow, a central area and lateral margins gray. Posterior part of ventral surface with irregular black lines often broken into spots.

Palpus (Pl. XVII, fig. 125) like carapace in color. Seen from the side, dorsal length of femur about two and a fifth that of patella, two and a half tibia, and one and a third cymbium. Dorsal surface of femur, patella and tibia clothed with short, black hairs. Patella a little longer above than below, equipped with a very long dorsolateral distal hair. Tibia widened slightly near patella, then even in width to cymbium. Hairs on tibia lengthened on mesal side, a few long ventral hairs. Three very long tibial hairs, one ventromesal and posterior, one ventrolateral and more anterior and one dorsomesal near cymbium. Two lateral and one dorsal trichobothria. Ventral surface of tibia with small hook-like process supporting paracymbium (Pl. XVII, fig. 125, N). Greatest width of cymbium about one half length; long tip bluntly pointed. Cymbium bears a small, very blunt process above and in front of paracymbium. Paracymbium heavy; base rounded and equipped with slender hairs; narrowed in front to sharp point. Distal part of paracymbium heavy, curved to form a hook, abruptly narrowed at small blunt tip.

Long diameter of subtegulum and tegulum more nearly parallel than perpendicular to length of cymbium. Anterior margin of subtegulum covers posterior margin of tegulum. Walls of tegulum very narrow except greatly widened dorsolateral part which forms bezel.

Anterior margin and mesal surface of bezel bear various irregularities which probably fit into the ornate structure of the embolic division, when fully expanded. Dorsal anterior margin of bezel (Pl. XVII, figs. 119, 125, L) ends in a thin rounded lobe, curved toward embolic division at tip.

This piece turns sharply to continue on mesal side of tegulum, a short distance, to a square end. Immediately below this lobe, anterior margin of bezel bears a short, pointed projection directed ventrolaterad. Below this last piece, mesal side of bezel bears a deep invagination directed up and forward (Pl. XVII, fig. 119).

Median apophysis (Pl. XVII, figs. 119, 120, C) slender, short, heavy; proximal part enclosing duct. Duct passes to embolic division in a wide membrane which firmly fastens slightly narrowed distal part of median apophysis to embolic division. Tip of median apophysis forked, each prong sharp and curved slightly toward embolic division, mesal fork longest.

Embolic division (Pl. XVII, figs. 120, 121) formed by embolus and a gently concave plate, which is a little longer than cymbium. Anterior part of plate forms the distal sclerite (Pl. XVII, fig. 121, K), wide, heavy and somewhat complex in form. Posterior part much lighter; tapered behind till very slender, then widened at posterior tip, and continued as embolus. Duct enters lighter part of embolic division in middle of mesal margin, passing directly back to embolus. Embolus (Pl. XVII, figs. 120, 121, H) a single, heavy, styliform piece enclosing duct. It passes forward along lateral margin of embolic division, then curves to extend near anterior margin of distal sclerite. Tip of duct inserted in small, anterior mesal tooth on distal sclerite. Lateral and anterior margins of distal sclerite folded toward bulb to cover embolus, fold widened in front. Anterior margin of distal sclerite with slender process curved toward bulb, then forward. Mesal margin of distal sclerite greatly widened, with two blunt dorsal processes. Anterior process large and curved; posterior one small and resting in distal fork of median apophysis of tegulum.

Female: Length 6 mm. Seen from above, sides of carapace curve evenly from behind to cervical groove, then almost parallel to clypeus. Head longer than in male. From the side, back of head slightly arched. Eyes unequal; posterior median a little smaller and separated by slightly less than the diameter. Anterior eyes in a very slightly recurved row, median separated by the diameter and from the lateral by a little more than the diameter. From the side, dorsal

surface of chelicerae strongly convex. Lateral surface of endites gray. Legs marked below with black as follows: femora and tibiae with a central transverse band and one at each end, coxae and patellae with a narrow distal band. On tibiae, ventral markings continued on dorsal surface, more distinct on legs III and IV. Metatarsus I similar to other metatarsi in shape.

Abdominal markings somewhat more distinct and regular than in male. Epigynum (Pl. XVII, fig. 124) inconspicuous. Sides of atriolum light yellow, median part suffused with gray, darkest on margin next openings. Posterior margin of ventral plate dark gray. Ventral plate distinct from atriolum on each side. A slightly raised median band extends from this plate forward on to atriolum. Openings between atriolum and ventral plate on each side of median band. Posterior part of atriolum with a shallow depression on each side of median band, each depression leading to an opening. Openings (Pl. XVII, fig. 124, o) only visible from in front. Median band widened behind, each lateral margin a thin plate which covers an opening below. A small portion of ventral plate extends above atriolum at each opening, forming a small bursa.

Each division of internal epigynum (Pl. XVII, fig. 126) ovate, widest near tip, tip slightly mesad of base. Functional parts embedded in a thick heavy mass of tissue. Duct (Pl. XVII, fig. 126, i) with about two spiral turns, diameter of anterior turn widest. Duct widened in front. Wall of seminal receptacle (Pl. XVII, fig. 126, j) deeply wrinkled. Fertilization canal (Pl. XVII, fig. 126, g) twisted, extending directly back from seminal receptacle and forming axis of duct spiral. When it reaches ventral plate, canal turns dorsad to vagina. Canal tips curved somewhat mesad. Posterior opening of duct mesad of canal.

Type locality: Sweden.

Ottawa: 1 male (N. Banks). — **New Hampshire:** Flume, Sept. 1907, 1 female (Miss E. B. Bryant). — **Massachusetts:** Wellfleet, Aug. 28-31, 1918, 1 male, 1 female (N. Banks); Lexington, April 19, 1874, 1 male, 2 females (J. H. Emerton). — **Rhode Island:** Providence, 1 female (N. Banks). — **New York:** Montauk Point, May 24, 1924, 1 female (Crosby); Sea Cliff, 15 males, 13 females (N. Banks); Poughkeepsie, 2 males, 1 female (J. H. Emerton); Florida, July 1930, 1 male (Maughan); Ithaca, Aug. 20, 1903, 1 male (J. H. Comstock); April 18, 1902, 1 female (Crosby); Aug.-Nov. 1902, 1 male; Taughan-nock, March, 1 female; McLean, April 17, 1925, 1 female (Crosby); Montour Falls, Sept. 8, 1903, 2 females (Crosby); Lake Bluff, Sept. 19, 1920, 1 male (Crosby); Lake Keuka, Sept. 1903, 1 male (Crosby); Olcott, April 19, 1919, 1 female (Dietrich), Feb. 1925, 2 males. — **District of Columbia:** 2 females (Marx). — **Virginia:** Falls Church, 5 males, 3 females (N. Banks). — **Ohio:** Urbana, July 17, 1905,

1 female (Nelson). — **Indiana:** 1 female (Fox). — **Utah:** 1 male (Chamberlin). — **Washington:** Pullman, June 6, 1910, 1 male, 1 female (J. A. Hyslop). —

Europe, **England:** Worcestershire, 1 male, 1 female (Hancock).

Ireland: Co. Dublin, 1 male, 1 female (Pack-Beresford).

France: 2 males, 2 females (Ex. Mus. Hist. Nat. Paris coll.).

Germany: 2 males, 4 females (Menge coll.).

Estrandia nov. gen.

Type: **Linyphia nearctica** Banks

Estrandia nearctica resembles *Linyphia* sufficiently to have been placed in that genus since the description of the species. *E. nearctica* differs from *Linyphia* most conspicuously in the lack of a cheliceral tooth in the male, the structure of the epigynum, and the nature of the median apophysis of the tegulum. The embolic division of the male palpus of *E. nearctica* resembles that of *Pityohphantes* in the position of the terminal apophysis and the well developed lateral process of the lamella. *Estrandia* differs from *Pityohphantes* in the lack of a tibial process on the male palpus, the character of the median apophysis of the tegulum and the structure of the embolus.

The median apophysis of the tegulum of *E. nearctica* is a long, heavy, tapered piece (Pl. XVIII, fig. 130, C). Its tip lies among the parts of the embolic division (Pl. XVIII, fig. 128, C). Another process of the tegulum, the accessory process (Pl. XVIII, fig. 130, q) rises mesad of the opening through which the duct passes to the embolic division. It possesses an apical tooth and apical lobe. The accessory process is independent of the median apophysis in *E. nearctica* but, undoubtedly, represents that part of the median apophysis of *Linyphia* which bears the apical tooth and lobe. The palpal organ is characterized by a long, tapered embolus with a pars pendula which holds the duct to the tip of the embolus. The radix is represented by two fragments.

The epigynum has two openings. The seminal receptacles are similar to those of *Linyphia*. The duct forms a loop but is not like that of *Linyphia*, in position or appearance.

Named for Professor Doctor Embrik Strand.

Estrandia nearctica Banks

Pl. XVIII, figs. 127-133

Linyphia humilis Emerton, Conn. Acad. Sc. Trans. 9:409, pl. 2, fig. 3. 1895. — Simon, Museum Paris Bull. 9:387. 1903.

Linyphia nearctica Banks. U. S. Nat. Mus. Bull. p. 33. 1910 (*humilis* preoccupied by L. Koch in 1879).

Linyphia humilis Emerton, Conn. Acad. Sc. Trans. 16:398, pl. 4, fig. 2. 1911.

Linyphia nearctica Petrunkevitch, Am. Mus. Nat. Hist. Bull. 19:252. 1911. — Emerton, R. Can. Inst. Trans. 12:318. 1919.

Male. Length, 2.5 mm. Cephalothorax yellow-brown, lightly suffused with gray, darkest along margin and furrows. A dark line on median furrow forks at head sending a branch toward each posterior lateral eyes; space between these branches usually darkened. One or two faint gray lines from median furrow to anterior median eyes usually present. Width a little less than four fifths length. Viewed from the side, carapace rises evenly from behind to eyes, ascent rarely steeper on back of head. Head arched slightly just behind eyes. Height at anterior end of median furrow a little more than half height at eyes. Hairs behind eyes long, conspicuous, arching over posterior median eyes. Width of clypeus about three fifths its length.

Posterior and anterior eyes each in a slightly recurved line. Eyes about equal except anterior median, which are five sixths the others. Posterior median separated by slightly less than twice the diameter and from the lateral by one and two thirds the diameter. Anterior median separated by a little more than the diameter and from the lateral by somewhat more than twice the diameter.

Chelicera yellowish brown. Cheliceral tooth lacking. Three teeth on upper margin of furrow of claw, largest in middle; lower margin with one tooth a little nearer claw base than large tooth of upper margin. Sternum brownish yellow suffused with dark gray. Labium dark gray. Endites brownish yellow with gray markings. Tips darkened. Legs yellow, distal segments, beginning with femora, darkened to olive green.

Abdomen about even in height, slightly narrowed behind. Height a little more than half the length. Dark gray or brown above and on sides. Above, irregular light spots and lines, sometimes two light gray lateral lines about half length of abdomen, almost meeting in front, are present. Sides with many fine light gray longitudinal lines. Below, brown, deeply suffused with gray; two light brown lateral lines, sometimes present, extend from epigastric furrow halfway to spinnerets.

Femur of palpus (Pl. XVIII, fig. 131) cylindrical. Patella gently arched above, with three or four long hairs on dorsal, distal part. Tibia widened distally, lateral side rounded and bearing a few long hairs. Two lateral and one dorsal trichobothria. In a dorsal view, femur two and a half dorsal length of patella, about equal to cymbium. Greatest width of cymbium somewhat more than half length. Cymbium narrow at base, widened to a sharp downward turn, part narrowed slightly to a straight end, with sides curved in toward longer distal portion almost at right angles to proximal part. Distal bulb. An oblong hairless lobe supports base of U-shaped paracymb-

ium. Long, narrow base of paracymbium, narrowed at turning point, then slim to a blunt, membranous, slightly widened tip.

Tegular plate short, anterior margin gently rounded. Median apophysis heavy, long, tapered, the tip lying in front of posterior part of embolus (Pl. XVIII, fig. 128, C). Accessory process (Pl. XVIII, fig. 130, q) short, heavy. Apical tooth (Pl. XVIII, fig. 130, e) stout; tip curved; apical lobe very wide, tip straight.

Lamella of embolic division (Pl. XVIII, fig. 129, D) slender. Posterior tip sharp. Long, bluntly pointed spur and long lateral process curved to point forward. Lateral process heavy, slightly flattened, ending in a very stout prong and two smaller teeth.

Embolus (Pl. XVIII, figs. 127, 129, H) at least one and a half length of lamella. Composed of a long slender flattened tapered sclerite which supports length of embolus, and a membranous pars pendula which holds duct, except duct tip, which enters heavy part. Pointed posterior tip placed against base of accessory process in unexpanded bulb. Embolus not directly supported by any sclerite in expanded bulb. Tip of embolus passes between lateral process of lamella and terminal apophysis. Terminal apophysis a flat plate, twisted in a half turn, wide behind, narrowed in front terminating in two small sharp points. A large membranous piece, attached to terminal apophysis behind, passes between lateral and terminal apophyses ending in a very bluntly rounded tip. This piece acts as conductor, tip of embolus lying against it (Pl. XVIII, fig. 129, G). Within curve of basal half of embolus and fastened to it by membrane lie two small sclerites, no doubt homologous with radix parts in other species. Smaller sclerite lateral in position, widened and thickened near lateral process; larger sclerite flat, twisted, pars pendula holding duct attached along mesal length of this piece.

Female. Length, 2.75 mm. Similar to male in color. Cephalothorax slightly wider in proportion to its length; head longer and a little wider at the eyes in proportion to rest of carapace than in male. Viewed from the side, carapace rises steeply from behind to median furrow, then more gradually to the eyes; height at anterior end of median furrow three fourths height at eyes. Hairs about the eyes shorter and finer than those of male. Clypeus narrower compared to its length than in male. Posterior median eyes slightly larger than the lateral, separated by somewhat less than three times the radius and from the lateral by a little more than the diameter. Anterior eyes in a very slightly procurved line, separated from the lateral by slightly less than twice the diameter.

Viewed from below, epigynum (Pl. XVIII, fig. 132) wider than long. Ventral plate and margins of openings darkened. Ventral plate very broad and thick, bearing cochlear depression in its square posterior tip. A large, rounded, light yellow opening (Pl. XVIII, fig.

132, o) on each side of ventral plate. In front, sides of ventral plate curve laterad forming true anterior margins of openings. From the side, epigynum projects tuberclelike. Ventral plate flat behind, extending below, but not behind atrium. Heavy fringe of slender hairs overhangs openings and ventral plate. Bursae of internal epigynum (Pl. XVIII, fig. 133) separated by slightly more than width of ventral plate; short, conical, anterior median part bearing widened opening of loop. Bursa and loop openings visible externally. Loop formed by duct, long, curved in a wide semicircle in front of bursa (Pl. XVIII, fig. 133, i). Long, narrow seminal receptacle (Pl. XVIII, fig. 133, j) mesal in position, tip directed dorsad. Fertilization canal mesal, very short, extending directly back from seminal receptacle, then up to vagina.

Type locality: Rocky Mts., near Laggan.

Labrador: Mecatina to Blanc Sablon, July 1915, 1 male (C. W. Townsend); Cabot Lake, 1 male, 1 female, Oct. 10, 1921 (F. W. Waugh). — **Nova Scotia:** Cape Breton, Baddeck, July 31, 1928, 1 male (J. H. Emerton, G. Fairchild); Laggan, 1 male, 1 female (Emerton). — **Alberta:** Lake Louise, Aug. 3, 1927, 4 females, (Crosby). — **Maine:** Milbridge, July 12, 1927, 4 males, 4 females (J. H. Emerton); Gouldsboro, July 13, 1922, 1 male, 2 females, (J. H. Emerton). — **New Hampshire:** Moosilauke, July 3, 1912, 2 males, 2 females (E. B. Bryant). — **Massachusetts:** Mt. Greylock, (3,000 ft.) July, 1 male, 1 female (Banks). — **New York:** Whiteface Mt., Aug. 22, 1916, 1 male, 3 females (Crosby); Aug. 25, 1916, 2 females (Crosby); Aug. 25, 1921, 5 males, 3 females (Crosby); Aug. 24, 1921, (3,900 ft.) 17 males, 16 females (Crosby); Mt. McIntyre, July 1, 1923, 5 males, 4 females (Crosby); July 24, 1925, 1 male (Crosby); Avalanche Lake, July 24, 1925, 4 females (Crosby); Mt. Marcy, (4,000 ft.) Aug. 27, 1930, 3 males, 5 females (Crosby); Artist's Brook, Essex Co., June 11, 1933, 3 males, 1 female (Crosby). — **Virginia:** Mt. Mansfield, June 17, 1909, 2 males, 2 females (J. H. Emerton). — **North Carolina:** Mt. Mitchell, Oct. 22, 1923, 5 immature specimens (C. & B.). — **Tennessee:** Mt. Leconte, Oct. 10, 1926, 5 males, 6 females (Crosby).

Explanation of Plates

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Explanation of Lettering on Figures**Palpal Organ**

- a. tegular ridge
- b. tegular groove
- c. articular knob of median apophysis
- d. lateral support of median apophysis
- e. apical tooth of median apophysis
- f. apical lobe of median apophysis
- g. folded edge of lamella
- h. mesal process of lamella
- i. lateral process of lamella
- j. inner thickening
- k. spur of lamella
- l. marginal groove of lamella
- m. embolic arm of radix
- n. membranous process of lamella
- o. lamellar arm of radix
- p. tether membrane
- q. accessory process in *Estrandia*
- r. pars pendula of embolus
- s. truncus of embolus
- t. apical sclerite of embolus
- u. distal lobe of embolus
- v. basal piece of embolus
- w. basal appendage of embolus

- x. embolic torque of embolus
- y. terminal lobe of conductor
- z. villous appendage
- A. subtegulum
- B. tegulum
- C. median apophysis of tegulum
- D. lamella
- E. radix
- F. terminal apophysis
- G. conductor
- H. embolus
- I. transverse sclerite
- J. tegular plate
- K. distal sclerite
- L. bezel
- M. dorsal process
- N. process supporting paracymbium

Epigynum

- a. atrium
- b. dorsal wall of atrium
- c. parmula
- d. cochlear depression
- e. bursa copulatrix
- f. spiral groove of the bursa copulatrix

- | | |
|-------------------------------|--|
| g. fertilization canal | l. depression on dorsal wall of atrium |
| h. end of fertilization canal | m. gland above dorsal wall of atrium |
| i. duct | n. opening of duct |
| j. seminal receptacle | o. opening of epigynum |
| k. lateral groove | |

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Neu-Eingänge von Skorpionen im Zoologischen Museum in Hamburg.

(Mit 12 Textfiguren.)

Von
F. Werner (Wien).

Im Jahre 1934 erhielt ich durch Herrn Dr. Titschak das Material an Skorpionen zugesandt, das seit dem Hinscheiden des berühmten Skorpionenforschers K. Kraepelin dem Zoologischen Museum in Hamburg neu zugekommen war. Es ist eine ganz gewaltige Menge von teils in Alkohol aufbewahrten, teils gespiess-ten oder eingetüteten Exemplaren, nahezu 1000 Stück; dass ihre Bearbeitung so spät erfolgte, ist darin begründet, dass ich vorher die Skorpione und Pedipalpen in «Bronn's Klassen und Ordnungen des Tierreiches» zu Ende bringen musste. Nun kann ich den ersten Teil, die altweltlichen Skorpione veröffentlichen.

Es ist bemerkenswert, dass trotz der grossen Menge von Gattungen und Arten, die seit Kraepelin's Tod beschrieben wurden, von diesen nur äusserst wenige in diesem Material enthalten sind, dass dagegen eine so beträchtliche Anzahl von noch unbeschriebenen Arten sich vorfand. Es scheint, als ob Kraepelin diese Arten, die gewissen schwierigen und artenreichen Gattungen angehören, für eine spätere eingehendere Untersuchung zurückge-