

**A RECLASSIFICATION OF THE SPECIES OF
LINYPHIA LATREILLE BASED ON THE FUNCTIONING
OF THE GENITALIA (ARANEIDA, LINYPHIIDAE)**

Part I. *Linyphia* Latreille and *Neriene* Blackwall

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With 2 tables, 2 plates, and 408 text-figures

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INTRODUCTION

The genus *Linyphia*, as it figures in the catalogue of Bonnet, has a world-wide distribution. It has often been a challenge to arachnologists. Menge, Simon, and others, have seriously attacked the genus, still very large in their days, and they have created many new genera for the reception of the removed species. This process has been continued, be it on a less intensive scale, during the last forty years, when Gerhardt, Chamberlin & Ivie, Homann, and Oi, tried to improve upon the complex heterogeneity of the

genus. Their activities were mainly concentrated on the European and North American faunas, in the case of Oi on Japan. Material of the other regions has always been, and unfortunately still is, very scarce, with the exception perhaps of Central America.

Earlier contacts with the European species of the genus, as conceived in recent handbooks (Simon, Locket & Millidge, Wiehle), had already convinced me of the still confusing heterogeneity. A brief investigation of the species described from Africa and South East Asia, showed the necessity to include other geographical regions in any serious attempt to understand the relationships within the genus. It appeared sensible, however, to exclude the Australian region and Central and South America, as the *Linyphia* species from these regions are different from the Holarctic, Ethiopian, and Oriental species to such a degree, that their exclusion would not affect or obscure the relationships. The species from Australia and New Zealand apparently belong to different genera, e.g. *Paralinyphia* and *Mynoglenes*, while the Central and South American species seem to belong to *Frontinella*, *Florinda*, and other, possibly new genera.

Thus having limited the investigations geographically, all species were selected from the names listed in Bonnet (1957) under *Linyphia*, which on the ground of the description or after a re-examination of the type-material appeared to really belong to *Linyphia* (*Prolinyphia* and *Neolinyphia* included), as conceived by recent authors. Besides, this study includes most species described in *Linyphia*, *Prolinyphia*, and *Neolinyphia*, after 1939, up to which year Bonnet's catalogue goes, the status of these genera being one of the aims of this study. Several species were found to fit into the genus *Microlinyphia*, and these will be dealt with in a separate paper at a later time, together with the members of the new genus *Frontinellina*, proposed here for *Linyphia frutetorum* C. L. Koch on the ground of the morphology of the genitalia and their functioning. Many other "*Linyphia*" species in the catalogue of Bonnet have already been removed since 1939, or now prove to belong to different genera. These species will be treated separately at a later time. For each species only references to taxonomically or geographically important papers are given, besides references to frequently used faunistic studies.

Most of the older species of the genus, those from Europe and North America excepted, have been very superficially described, barely any attention having been paid to chaetotaxy, genitalia, etc., and often without any illustrations of the latter. Therefore it was my intention in the first place to redescribe these species, and to provide figures of the genital organs, which at present are thought to be of great taxonomical importance. The

original material, often the only material ever recorded, had to be located for the purpose.

Gradually the scope of this study had to be widened, because many characters needed for a proper understanding of the relationships, were not or only superficially known for the European and North American species. A more detailed study of epigyne and male palp was particularly needed, for it was also clear from the start that the various suggestions about the functioning of the genitalia in *Linyphia* (Osterloh, Gerhardt, Wiehle) were only partly understandable from a morphological point of view. The recent progress in the comprehension of the functional aspects of the genitalia in spiders has been a stimulus to study the genitalia of some species of *Linyphia* in functional contact, in order to see to what extent the resulting knowledge could be used for taxonomical purposes. Soon the necessity became evident to include all known species of the genus, with the above mentioned restrictions.

HISTORY

Linyphia, the weaver of linen. More than a century and a half ago a group of unobtrusive spiders was named after what most betrayed their presence to the observer's eye: their closely woven webs like horizontal sheets. This group had been recognized as a unity by Walckenaer (1802: 213), who subdivided the spiders according to their mode of life and type of web in a much more radical way than did his predecessors. "Les Napiformes"¹⁾ of Walckenaer were characterized by the relatively long legs, by the position and size of the eyes, and by the horizontal sheet-web below which the spider hangs in an inverted position. Latreille (1804b) provided the different groups of Walckenaer with generic names, and with that created the first genera in this group after the days of Clerck and Linnaeus. "Les Napiformes" then became the genus *Linyphia*.

One genus had always been sufficient for all spiders in the early days of arachnology, from pre-Linnaean times till the end of the 18th century, though there was no uniformity as to the gender of this name. At the start of the nomenclatorially critical period it was called *Araneus* by Clerck (1757), *Aranea* by Linnaeus (1758). According to Bonnet (1945: 11), 668 species had been described, probable synonyms included, when Walckenaer made his subdivisions of this large genus. Did the need to create new genera spring forth from the increasing number of species, which had become too large to

1) This name is probably derived from the French noun *nappe* (= napkin), which on its turn must have the Latin substantive *mappa* as an origin; the loss of the consonant remains unsolved.

survey? Or was it a change in the concept of the genus, which now became more rigidly defined? Probably both factors were involved. It is noteworthy that we can observe the same phenomenon in another group of animals, viz., the work of Meigen (in 1800 and later years) in the Diptera.

For some twenty years after its creation, *Linyphia* served as an all-embracing genus for Linyphiid spiders. From 1825 onwards other genera were erected: *Erigone* by Savigny & Audouin (in 1825); *Nerienne*, *Savignya*, and *Walckenaeria* by Blackwall (in 1833); *Micryphantes* and *Bolyphantes* by C. L. Koch (in 1833); and *Tapinopa* by Westring (in 1851). Different authors appear to have had different preferences. Westring, for instance, used *Linyphia*, *Tapinopa*, and *Erigone*, as did Thorell. Blackwall, and later O. Pickard-Cambridge, kept to *Linyphia*, *Nerienne*, and *Walckenaeria*. Walckenaer used *Linyphia* and *Argus*, the latter also comprising species of other families. Koch employed his own genera *Micryphantes* and *Bolyphantes* beside *Linyphia*. *Linyphia* has been used by all. After 1860, in what Bonnet calls the Golden Age of Araneology (1945: 13), Menge, Simon, and others, have created the larger part of our present genera. Again a sudden need for new subdivisions, resulting in much smaller genera.

Thorell (1870) has contributed much to the uniformity in the use of names by tracing the synonyms among the names used by different authors. With regard to the genera, one gets the impression that he was still rather conservative in those days, because the newly erected genera of Menge and Simon were listed again as synonyms of the old and reliable *Linyphia* and *Erigone*. *Nerienne*, which is of special importance for the present paper, he referred to the synonymy of *Linyphia*, and it has remained there ever since as far as the European authors are concerned. It was brought into use again by F. O. Pickard-Cambridge (1902) for some American species, and he has been followed by several American authors for a few decades. But in the end *Linyphia* triumphed again.

Thanks to the studies of Menge, Simon, and subsequent authors, the genus has got its present size. There was no misunderstanding about its use as far as the comparatively well-known geographical regions were concerned. Many of the older species of the less frequently investigated areas often remained within the genus, because nobody paid any attention to them. And several of the older species from Europe remained there by force, because the descriptions were too poor to recognize the species from. In the catalogue of Bonnet (1957), for instance, three species are listed, described from Germany by C. L. Koch; they were never recorded since, a very incredible situation. Likewise, there are three such species from France, described by Walckenaer, three from the British Isles (by Blackwall), two from Italy (by

Blackwall and L. Koch), and one from unknown origin, described by Walkenaer. I am almost sure that most of them are synonyms of other, well-known, species, but as in most of these cases the original material is lost to science, there is no chance to solve the problem.

In the 20th century the genus *Linyphia* still was subjected to improvements. Gerhardt (1928: 632) arrived at the conclusion that *Linyphia pusilla* Sundevall could not belong to this genus, and he erected *Microlinyphia* for its reception. Chamberlin & Ivie (1943: 23) came to the same conclusion on the basis of North American relatives of *pusilla* and created *Pusillia* for the purpose, which name consequently must be regarded as a synonym of *Microlinyphia*. Homann (1951: 131), when investigating the anatomy of the eyes in spiders, came across two different types of eyes within *Linyphia*, and this led him (1952: 349) to erect again another genus *Prolinyphia*. Finally Oi (1960: 223) created the genus *Neolinyphia* for some new Japanese species, including also one of the common Palearctic species of *Linyphia*. Thanks to the latter author we now have a much better idea about the distribution of the Palearctic species in Japan, while many new species were described by him from that region.

Two papers have to be mentioned here, which are of great importance for all students of *Linyphia* and related genera. Blauvelt (1936) extensively dealt with the North American species of the genus, including also several species from Europe. She was the first to depict the elements of the male palp and the vulva consistently. A comparative study of the male palps of many Linyphiid species from the hand of Merrett (1963) has given an excellent basis for a further study of the relationships within the family. It is to be regretted that the female genitalia have not yet been investigated on a comparable scale.

MATERIAL

As far as possible the original material of all species has been located, and lectotypes have been selected when necessary. Of the oldest species, described by Clerck, Linnaeus, Sundevall, C. L. Koch, and Blackwall, only the descriptions have been left to us. The collections from this period are either lost completely, or they have been fused with the collections of the Institutions they were presented to, or with the collections of the arachnologists who came into possession of the material.

I am very much obliged to the following persons and Institutions, who have most generously helped me with the location and loan of types and other material, and often have given most valuable advice. The abbreviations of the Institutions, as used in the text, are given here alphabetically:

- AMNH = American Museum of Natural History, New York; Dr. W. J. Gertsch.
 BM = British Museum (Natural History), London; Mr. D. J. Clark.
 CAS = California Academy of Sciences, San Francisco; Dr. P. H. Arnaud.
 CD = Collection Mr. J. Denis, Longeville, France.
 CL = Collection Mr. J. C. Ledoux, Montpellier.
 CO = Collection Prof. Dr. R. Oi, Osaka.
 CSC = California State College, Department of Zoology, Los Angeles; Dr. D. C. Lowrie.
 CU = Cornell University, Ithaca (New York); Dr. L. L. Pechuman.
 HDO = Hope Department of Entomology, University Museum, Oxford; Mr. D. M. Ackland.
 HM = Hungarian Natural History Museum (Természettudományi Múzeum), Budapest; Dr. S. Mahunka.
 ISNB = Institut Royal des Sciences naturelles de Belgique, Bruxelles; Mr. J. Kekenbosch.
 IZW = Instytut Zoologiczny, Polska Academia Nauk, Warszawa; Dr. J. Prószyński and Dr. W. Starega.
 LZAB = Laboratorio di Zoologia applicata alla Caccia, Bologna; Prof. Dr. A. Toschi.
 MB = Museu Bocage, Lisboa; Dr. J. de A. Fernandes.
 MCZ = Museum of Comparative Zoology, Cambridge, U.S.A.; Dr. H. W. Levi.
 MD = Museu do Dundo, Dundo, Angola.
 MECB = Museo civico di Scienze naturali "Enrico Caffi", Bergamo; Prof. Dr. A. Valle.
 MG = Museo civico di Storia naturale "G. Doria", Genova; Prof. Dr. E. Tortonese and Dr. Delfa Guiglia.
 ML = Rijksmuseum van Natuurlijke Historie, Leiden.
 MNP = Muséum National d'Histoire naturelle, Paris; Dr. M. Hubert.
 MS = Naturhistoriska Riksmuseet, Stockholm; Dr. P. I. Persson.
 MSNM = Museo civico di Storia naturale, Milano; Prof. Dr. C. Conci.
 MT = Koninklijk Museum voor Midden-Afrika, Tervuren; Prof. Dr. P. L. G. Benoit.
 MV = Museo civico di Storia naturale, Verona; Prof. Dr. S. Ruffo.
 MZF = Museo Zoologico de "La Specola", Firenze; Dr. A. Martelli.
 NKU = National Kyungpook University, Taegu, Korea.
 NM = Natal Museum, Pietermaritzburg; Dr. R. F. Lawrence.
 NMB = Naturhistorisches Museum, Basel; Dr. L. Forcart.
 NMW = Naturhistorisches Museum, Wien; Mr. J. Gruber.
 SMF = Natur-Museum Senckenberg, Frankfurt; Dr. O. Kraus.
 UUC = University of Utah Collections, Museum of Zoology, Salt Lake City; Mr. W. P. McCafferty.
 UZM = Universitetets Zoologiske Museum, Copenhagen; Dr. S. L. Tuxen.
 ZII = Zoologisches Institut, Innsbruck; Dr. K. Thaler.
 ZIU = Zoologiska Institutionen, Uppsala; Dr. Å. Holm.
 ZMB = Zoologisches Museum, Berlin; Dr. W. Crome† and Dr. M. Moritz.
 ZMH = Zoologisches Museum, Hamburg; Dr. G. Rack.
 ZUC = Department of Zoology, University of Cambridge, England; Dr. C. B. Goodhart.

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I am also greatly indebted to Mr. J. Kekenbosch (Brussels), Mr. J. C. Ledoux (Montpellier), and Dr. K. Thaler (Innsbruck), who have been so kind as to send me live specimens of several species, of which I have been able now, thanks to their co-operation, to study the functional aspects of the genitalia.

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METHOD

The descriptions of the genera and species are preceded by references to the original descriptions of the valid names and of all positive and putative synonyms. The author who has recognized a synonym for the first time is referred to, and his arguments are discussed in the remarks. Other references are restricted to taxonomically and zoogeographically important papers.

The measurements in the descriptions give the lowest and highest values observed. Mean values are not given, because series long enough for statistical conclusions were hardly ever available. The height of the clypeus, usually given proportionally to the diameter of the anterior median eyes or length of the eye-region, is much more constant when presented proportionally to the length of the cephalothorax; the length of the femora, too, has been calculated in proportion to the length of the cephalothorax, the total length of the specimen being dependent on the condition of the animal (with or without eggs, etc.). The length of tibia I is given in proportion to its diameter, which was always measured at the base of the basal-most dorsal (i.e. retro-dorsal) spine in order to prevent the slightly swollen extreme base of the segment, found in some species, from affecting this ratio. In each species the length of all segments are listed for one male and one female specimen as an example of their proportions; if available and in good condition, type-specimens have been selected for the purpose.

Much attention has been paid to the chaetotaxy and its variability. The positions of the spines on the legs are indicated by the following abbreviations: *d'* (pro-dorsal), *d''* (retro-dorsal), *l'* and *l''* (pro- and retro-lateral), *v'* and *v''* (pro- and retro-ventral). Pairs of spines are enclosed in round brackets, whorls of spines in square brackets. The indices *a* and *b* are used for apical and basal. Spines that are not always present are noted in italics. Positions of spines and trichobothria (*Tm*), when mentioned, are noted in imitation of Denis (1948: 133) and Locket & Millidge (1953: 175), with the exception of the length of the segments, for which the maximum length

has been measured instead of the length on the dorsal side of the segment. As to the eyes, the usual abbreviations are used: PME (posterior median eyes), PLE (posterior lateral eyes), AME (anterior median eyes).

Colour patterns of cephalothorax and abdomen, dentation of the chelicerae and their variability have been investigated rather in detail. The necessity to do so has been demonstrated by history. The variability of the abdominal patterns has caused much confusion in the past, and often the earlier descriptions were so sketchy in this respect they might refer to most species of a species-group or a genus, to say the least. Moreover, this paper is meant to facilitate the identification of subadult specimens as well as the placing of new species, which Africa, the Oriental region, and East Asia certainly will yield in the future.

The genitalia have been depicted with the aid of a camera lucida. Hairs usually have been omitted, only spines and spinehairs are indicated. In the description of the palp the terms dorsal, ventral, lateral, and mesal are meant to indicate the orientation of the palp when stretched out in front of the animal, while the cymbium is supposed to lie at the dorsal side, the lamella at the ventral side. Though the real situation is strained to some extent by this procedure, it considerably simplifies the description of the position and orientation of the various elements. In reality the mesal margins of cymbium and lamella lie rather close to each other, and the dorsal and ventral sides of the palp are separated by a narrow mesal portion only, the whole palp being triangular rather than squarish in cross-section.

The male palps have been dissected usually after a short treatment with caustic potash. The epigynes have been treated with the same solution, to such a degree that the interior parts were clearly visible through the outer layers. As to the structure of the male palp and the names of the various elements, the reader is referred to the papers of Blauvelt (1936), Merrett (1963), and Van Helsdingen (1965), and also to the schematic representation (fig. 1) in the present paper.

The functional positions of the genitalia have been observed in living specimens, which were kept in glass cages for the purpose, and which were allowed to copulate in the field of view of a microscope. In order to obtain complexes of the genitalia in functional contact, a pair in copula was sprayed with ethyl chloride during phase B (Van Helsdingen, 1965: 19) of the long sequence of alternate applications of the palps against the epigyne. During phase B the haematodocha often remains expanded for a considerable time, and the ethyl chloride brings about a fixation of the genitalia in functional contact as well as the death of the animals. The couple was then kept in 70% alcohol at -10°C for a few weeks, in order to obtain permanent fixation. After-

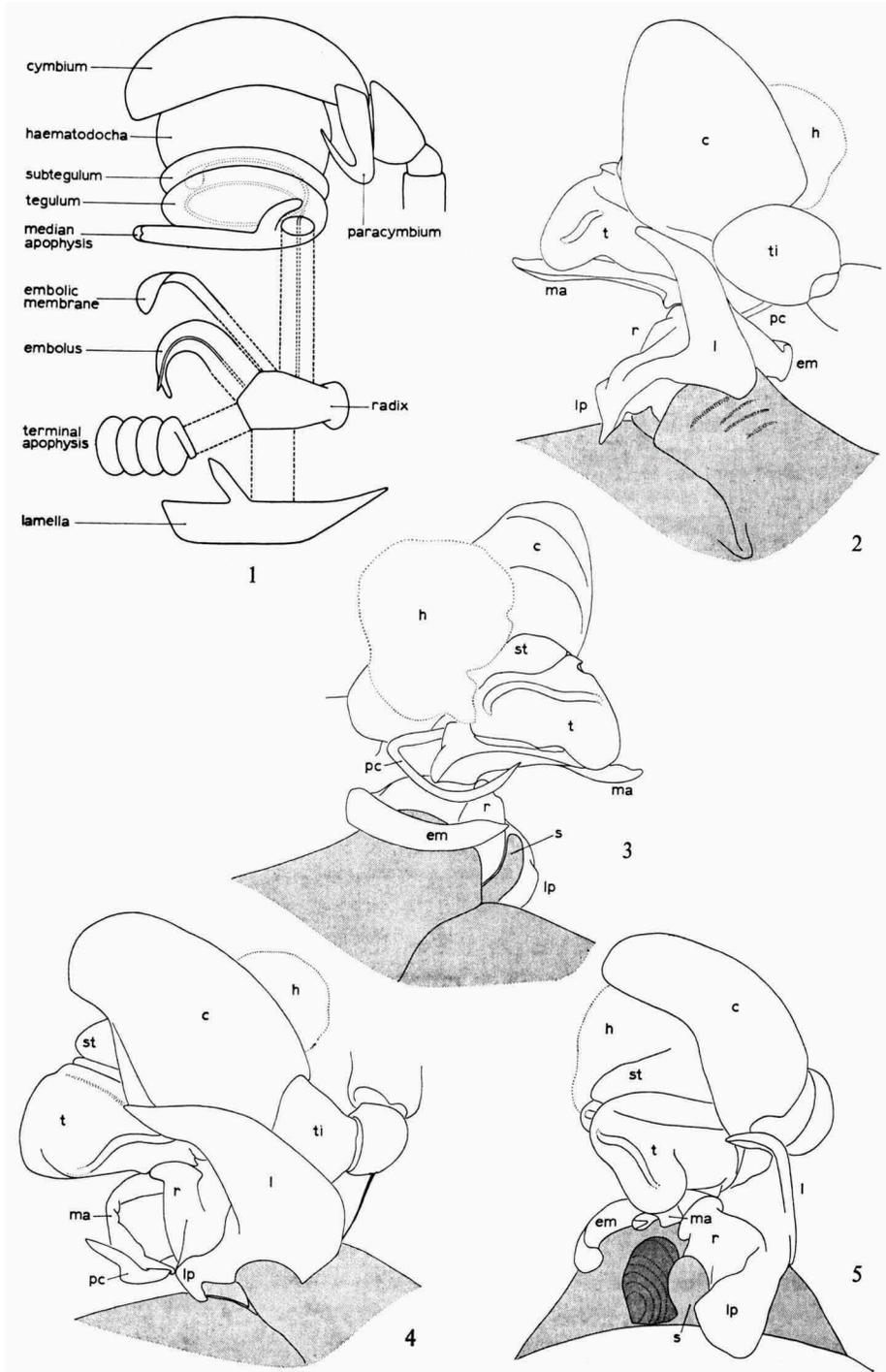


Fig. 1. Schematic representation of male palp. Fig. 2-5. Copulatory complexes. 2, *Linyphia triangularis*, functional aspect; 3, do., non-functional aspect; 4, *Neriene hammeni*, functional aspect; 5, *Linyphia triangularis*, functional aspect. 2-5, $\times 49$. For explanation of symbols, see text.

wards the genital complexes can easily be cut loose from the animals and observed from all sides. The clearing of the complexes is still a problem, as all chemical solutions used so far have lubrication as a secondary effect, loosening the palp again from the epigyne.

For the sake of uniformity a functioning left palp has always been chosen for the purpose. The left palp uses the left half of the epigyne. This has been called the functional side, and a left-side view then gives the functional aspect, while the right side is the non-functional side with the non-functional aspect. The terms anterior, posterior, dorsal, and ventral, are used in relation to the female.

FUNCTIONAL POSITIONS OF THE GENITALIA

Beside the usual morphological study and the interpretation of distributional and ecological data, a number of species have been investigated with regard to the functioning of their genitalia during copulation. Because living specimens are required for observations of this kind, I had to restrict my attention to the European species. It was my intention to investigate one representative of each group of species, but up to now all attempts have failed with the species of the *Linyphia hortensis* group.

The new generic arrangement of the species of *Linyphia*, *Prolinyphia*, and *Neolinyphia*, as proposed in this paper, is to a high degree based on the results obtained from these observations. Consequently I deal with the functional part first. The names of the species, however, are already employed here in their new combinations, to which, for convenience' sake, the combinations used formerly are added in parentheses.

For the structure and shape of the epigyne and the elements of the male palp, the reader is referred to the descriptions and figures of the species concerned in the taxonomical part, while the names of the palpal elements also can be found in the schematic representation of the palp (fig. 1). The size of the haematodocha in the complexes depicted does not correspond with the situation at the moment of maximum expansion. This very large, bladder-like part of the expanded palp obviously shrinks considerably during the fixation with ethyl chloride, or while it is kept in cold alcohol. However, this process seems to have no influence on the positions of the other elements.

Linyphia triangularis (Clerck) (fig. 2, 3, 5). — This species is of particular interest, being the type-species of the genus, and representing at the same time a rather aberrant type within the genus *Linyphia*, as used up to the present.

As in the species of *Neriene*, which have an equally large lamella (*l*) with broad tip, narrow base, and (usually) distinct lateral projection (*lp*),

this element rests with its broad tip on the posterior margin of the ventral surface of the epigyne at the functional side (fig. 2). The broad lateral projection of the element is pressed against the posterior surface of the scape (*s*), also at the functional side (fig. 5). The proximal tip of the lamella lies close against the chitinous lateral margin of the basal half of the cymbium (*c*). The latter element is situated at the ventral-most point of the complex, its tip pointing obliquely in posterior and non-functional direction, and slightly away from the female. The dorsal surface of the cymbium is turned to the functional side, while haematodocha (*h*), subtegulum (*st*), and tegulum (*t*), lie at the non-functional side (fig. 3). The median apophysis (*ma*) is visible below the tegulum, pointing in posterior direction. The embolic membrane (*em*) can be found at the anterior side of the epigyne, curving from functional to non-functional side. The paracymbium (*pc*) is distinct in the non-functional aspect, at which side it curves freely in posterior direction.

The radix (*r*) lies between scape and lamella at the functional side, disappearing into the entrance of the functioning atrium. The knob-shaped proximal tip of the radix fits into the depression at the base of the median apophysis, a round pit, which apparently serves as a socket and point of support for the radix. Terminal apophysis and embolus are not discernible from the outside. Both have disappeared into the functioning atrium of the vulva.

The embolic membrane seems not to be in a functional position. It probably serves no purpose during copulation, but protects the tip of the embolus in the unexpanded palp. The same might be the case with the paracymbium, which seems to have no apparent function at the moment of maximum expansion of the haematodocha. The median apophysis certainly is in a functional position, as the depression at its base holds the knob-shaped proximal tip of the radix. However, it has another, probably very important function at the moment when the palp is applied to the epigyne and starts to expand. When watching the unfolding of the palp, one may observe the hook-shaped distal tip of the element grip into the semi-covered depression of the scape, thus keeping the palp in the right position above the epigyne. When terminal apophysis and embolus disappear into the functioning atrium, the median apophysis suddenly springs free from the scape.

As has been suggested by many authors, the shape and size of the terminal apophysis correspond remarkably well with the cone-shaped atrium of the vulva. Indeed, terminal apophysis and embolus, both attached to the distal tip of the radix, lie completely within the functioning atrium. Cleared genital complexes, however, show two remarkable and curious phenomena.

In the first place, it appears that the atrium at the functional side is much

longer than that at the non-functional side, because the concertina-like wall has become stretched by the insertion of the terminal apophysis (pl. 1). Apparently the atrium returns again to the unstretched condition, when the palp is withdrawn from the epigyne. The wall of the atrium is thin and membranous, with the exception of the darkly coloured and more sclerotic fertilization duct, which runs spirally through the wall from receptaculum to posterior margin. Probably this chitinous duct acts as a spring, alternately yielding to the penetration of the terminal apophysis, and regaining again the non-functional condition when the palp is withdrawn.

In the second place, it should be emphasized that the embolus does not follow the spiral fold as has always been supposed. Instead it lies twisted through the hollow axis of the terminal apophysis as far as the fifth coil, and only then leaves for the outside of the element, reaching the spiral fold at the point where it passes into the spiral tube. The embolus then follows about two windings of the tube, probably as far as the turning-point, but I have not been able to follow the element as far as that. Only in cleared complexes the course of the element can be discerned, but because of the secondary lubricating effect of the medium used for clearing, a solution of caustic potash (KOH), the terminal apophysis and embolus get detached more or less from the atrium, and the embolus consequently is partly withdrawn from the spiral tube of the vulva. However, there is no doubt about the general positions of terminal apophysis and embolus during the moment of maximum penetration into the functioning atrium.

Linyphia hortensis Sundevall. — Attempts to bring about the fixation in this species have failed. In all cases the palp detached from the epigyne during the process of spraying, or when the couple was transferred to the cold alcohol. From the positions of the elements of the palps in the males of these couples, one may infer that, here too, the embolus lies in the axis of the terminal apophysis, be it only in the axis of the first coil of the differently shaped element. This seems to point to a similar way of functioning as in *Linyphia triangularis* (Clerck), an assumption which is in accordance with the structure of epigyne and male palp.

Neriene hammeni (Van Helsdingen) (*Linyphia hammeni*) (fig. 4, 6, 7). — The lamella (*l*) is most conspicuous in the functional aspect (fig. 4). The distal margin of the element is pressed against the ventral surface of the epigyne, the lateral projection (*lp*) curves to the posterior surface of the scape, the narrow proximal tip points away from the epigyne and lies closely pressed against the chitinous brim laterally at the base of the cymbium

(c). The element as a whole thus stands perpendicularly to the epigyne with the ventral surface turned to the functional side. The mesal margin and mesal surface of the lamella appear to fit closely the outline of the cymbium and tibia (*ti*), the salient corner on the mesal side of the element, distally of the narrow proximal tip, fitting nicely into the constriction between tibia and cymbium. The cymbium points in posterior and non-functional direction, and slightly away from the female's abdomen. The haematodocha (*h*), when fully expanded, lies as an oblong bladder parallel to the longitudinal axis of the female's abdomen. Subtegulum (*st*) and tegulum (*t*) are visible between the haematodocha and the epigyne. The radix (*r*), most distinctly observable in functional and posterior aspect (fig. 6), bridges the distance between the base of the median apophysis (*ma*) and the entrance of the functional atrium; the knob-shaped proximal tip is held by the socket-like depression at the base of the median apophysis, and the distal tip has disappeared into the vulva.

Median apophysis and paracymbium can be followed in the non-functional (fig. 7) and posterior aspect. The paracymbium (*pc*) curves from the base of the cymbium, which lies anteriorly at the functional side, along ventral and non-functional side to the posterior side of the complex. The median apophysis points in posterior direction from below the tegulum, but the distal part is bent towards the epigyne again. In the fixed genital complexes the hook-shaped tip appeared to be caught by the paracymbium, not by the semi-covered depression of the scape of the epigyne. From observed copulations it could be inferred that the median apophysis is first hooked into the scape, but is forced to leave this point of support before the palp has fully expanded. Terminal apophysis, embolus, and embolic membrane lie concealed in the vulva, the first pair in the functional atrium, the embolic membrane in the non-functional one.

From cleared complexes it could be concluded that the embolus connects with the spiral groove by means of the spermduct-tooth, while the terminal apophysis occupies the whole lumen of the atrium with the exception of the spiral groove. The transversal sclerite lies against the inner surface of the lateral wall of the epigyne at the functional side. The spermduct of the male palp, from the tegulum along the radix and through the embolus to the spermduct-tooth, is now linked with the receptaculum seminis of the functioning atrium by means of the spiral groove, which forms an open gutter-like connection.

There is no deformation of the functioning atrium, as observed in *Linyphia triangularis*, and the embolus has a completely different position in the fixed complex.

Neriene montana (Clerck) (*Linyphia montana*) (fig. 8-10). — All three European species of the *clathrata*-group (*clathrata*, *montana*, and *furtiva*) have been subjected to an investigation into the functioning of their genitalia. Differences of any importance between them have not been observed in this

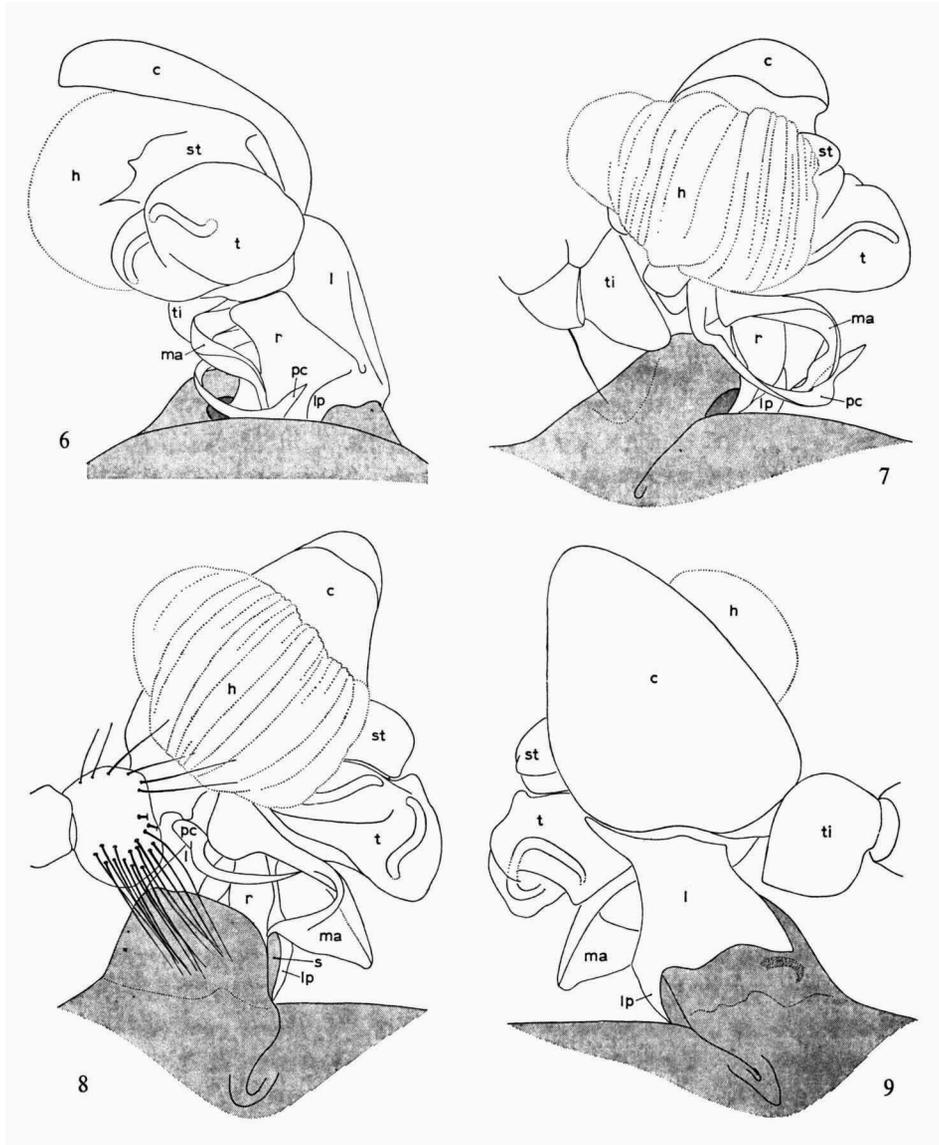


Fig. 6-9. Copulatory complexes. 6, *Neriene hammeni*, posterior aspect; 7, do., non-functional aspect; 8, *N. montana*, non-functional aspect; 9, do., functional aspect. 6, 7, $\times 49$; 8, 9, $\times 33$.

respect, while the differences with *Neriene hammeni*, described above, are very slight. It seems sufficient to compare *N. montana* with *N. hammeni* here.

The lamella (*l*) is relatively shorter than in *N. hammeni*, and in consequence, cymbium (*c*), haematodocha (*h*), and tegulum (*t*), lie closer to the epigyne. The emarginate or straight anterior margin of the lamella (*l*) fits well against the much more bulging ventral surface of the epigyne. The general positions of the lamella, haematodocha, subtegulum, and tegulum, apart from lying closer to the epigyne, do not differ from those of *N. hammeni*. The knob-shaped proximal end of the radix (*r*) again is kept in place by the depression at the base of the median apophysis, but the element is much less distinct from any side as it has disappeared much farther into the functioning atrium. The median apophysis (*ma*) again points in posterior direction (fig. 8), but the dorsal tip of the distal part of the element is bent towards the epigyne, where it is hooked into the median depression of the scape (*s*); the membranous middle part of the element makes it possible to endure such distortion.

The embolic membrane disappears into the non-functioning atrium, as it does in *N. hammeni*. As in *Linyphia triangularis*, the function of this element probably must be looked for in the unexpanded palp, where it covers the spermduct-tooth of the embolus. Embolus and terminal apophysis lie completely inside the functioning atrium. The latter occupies the lumen of the whole atrium, the former connects with the spiral groove by means of the spermduct-tooth.

The shape of the atrium is not altered by the insertion of the palp.

Neriene emphana (Walckenaer) (*Linyphia emphana*, *Prolinyphia emphana*) (fig. 11, 12). — Positions of the elements as in *N. hammeni* and *N. montana*, with the following differences. The distal tip of the lamella (*l*) is curved in dorsal direction, and it appears that this tip is hooked into the lateral depressions of the epigyne (fig. 11). The lateral projection of the lamella is pressed against the dorsal surface of the scape (*s*), and the concave marginal surface of the lamella, at the dorsal side between curved distal tip and lateral projection, closely fits the slightly raised posterior border of the ventral surface of the epigyne. The narrow proximal tip of the element points in posterior direction, and not away from the female's abdomen as in the other species of *Neriene*. The cymbium (*c*) lies nearly parallel to the ventral surface of the abdomen, and the tegulum (*t*) comes nearer to the abdomen of the female than in any of the other species of the genus (fig. 12). The hook-shaped tip of the median apophysis (*ma*) points freely in posterior

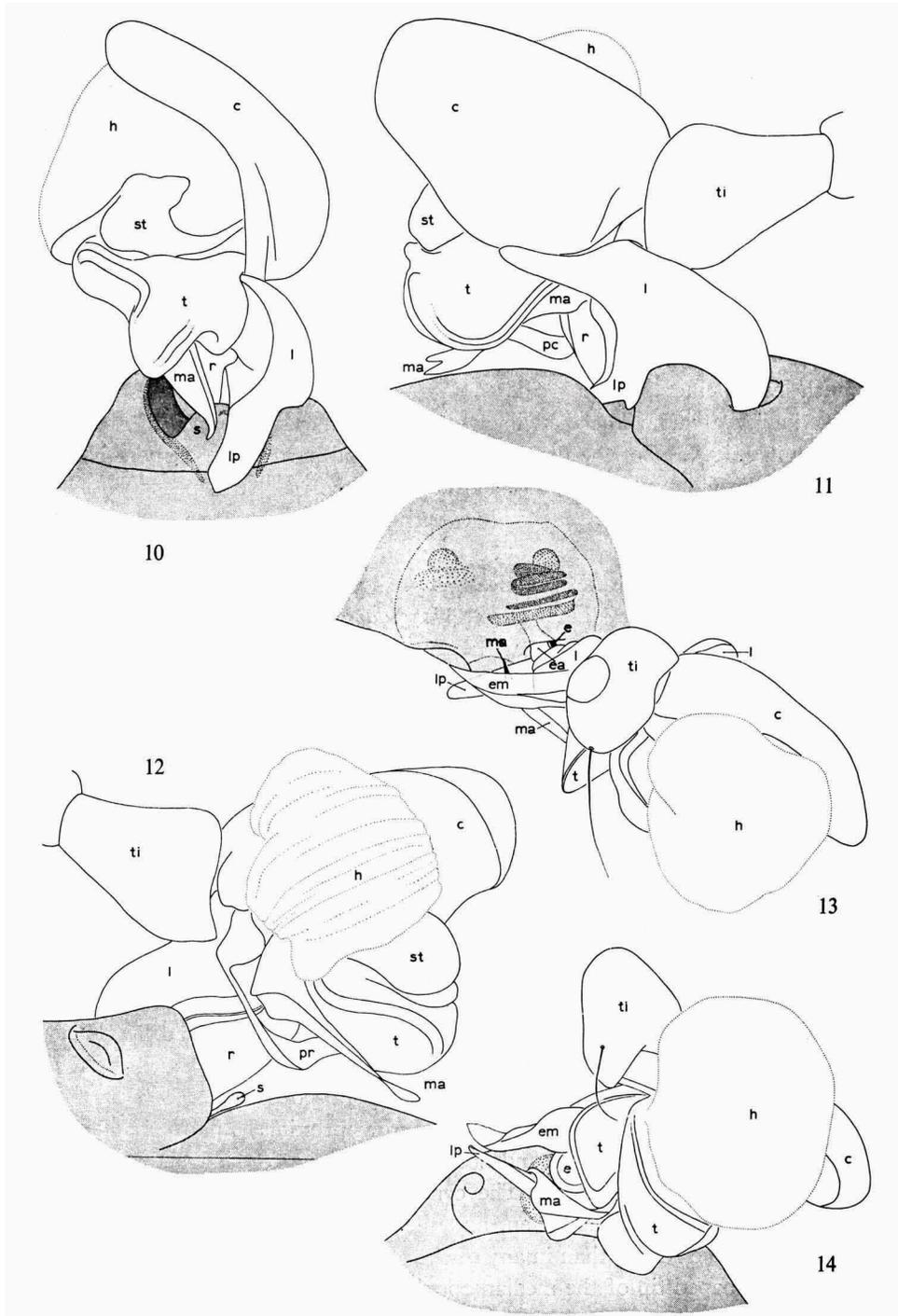


Fig. 10-14. Copulatory complexes. 10, *Neriene montana*, posterior aspect; 11, *N. emphana*, functional aspect; 12, do., non-functional aspect; 13, *Microlimnephia impigra*, ventral aspect; 14, do., posterior aspect. 10, $\times 33$; 11-14, $\times 67$.

direction; its functional contact with the scape is lost before the haematodocha (*h*) has fully expanded.

Radix (*r*), terminal apophysis, and embolus are situated as usual. The positions of embolic membrane and terminal sclerite are the same as in *N. hammeni*. As in the other species of the genus, the spermduct-tooth of the embolus reaches the entrance of the spiral groove.

Neriene radiata (Walckenaer) (*Linyphia marginata* C. L. Koch). — This species again shows the functional positions of the genitalia, as described for the other species of the genus. The lamella stands perpendicularly to the surface of the abdomen as in *montana* and *hammeni*. The hook-shaped tip of the median apophysis remains connected with the scape of the epigyne even when the palp has fully expanded. The embolic membrane is thrust into the non-functional atrium, the terminal sclerite disappears into the functional half of the epigyne, together with the terminal apophysis. The embolus curves around the terminal apophysis, and with the extreme tip reaches the entrance of the spiral groove. Figures of the genital complex are not given here, as they do not produce any new results compared with the other groups of the genus.

Microlinyphia impigra (O. Pickard-Cambridge) (*Linyphia impigra*) (fig. 13-16). — The functional positions of the genitalia have not been studied in the type-species of the genus, but in *impigra*, which happened to be easier available.

In the functional aspect (fig. 15) the cymbium (*c*) is seen from the dorsal side and slightly from in front. The tip points to the functional side and in oblique posterior direction. The haematodocha (*h*) forms the functional-posterior side of the complex, the subtegulum (*st*) and tegulum (*t*) lie between the haematodocha and the ventral surface of the abdomen. The complex as a whole lies at the functional side of the median plane (fig. 13).

The lamella (*l*), which is always a flat element in this genus, lies transversely behind the epigyne with the ventral side against the epigyne, the round proximal tip at the functional side of the complex, and the long lateral projection (*lp*) and embolic membrane (*em*) pointing in non-functional direction (fig. 13, 14). The element stands perpendicularly to the ventral surface of the abdomen with the lateral margin nearly touching the abdomen. The radix (*r*) and the base of the embolus are connected by membrane to the dorsal side of the lamella, and consequently are lying now at the posterior side of the element. However, the embolus runs from the dorsal side, through the incision between the main body of the lamella and the lateral projection,

to the entrance of the epigyne at the functional side. The radix is forced out of its normal position and stands nearly perpendicularly to the dorsal surface of the lamella.

The embolus (*e*) has disappeared into the spiral tube of the epigyne, and

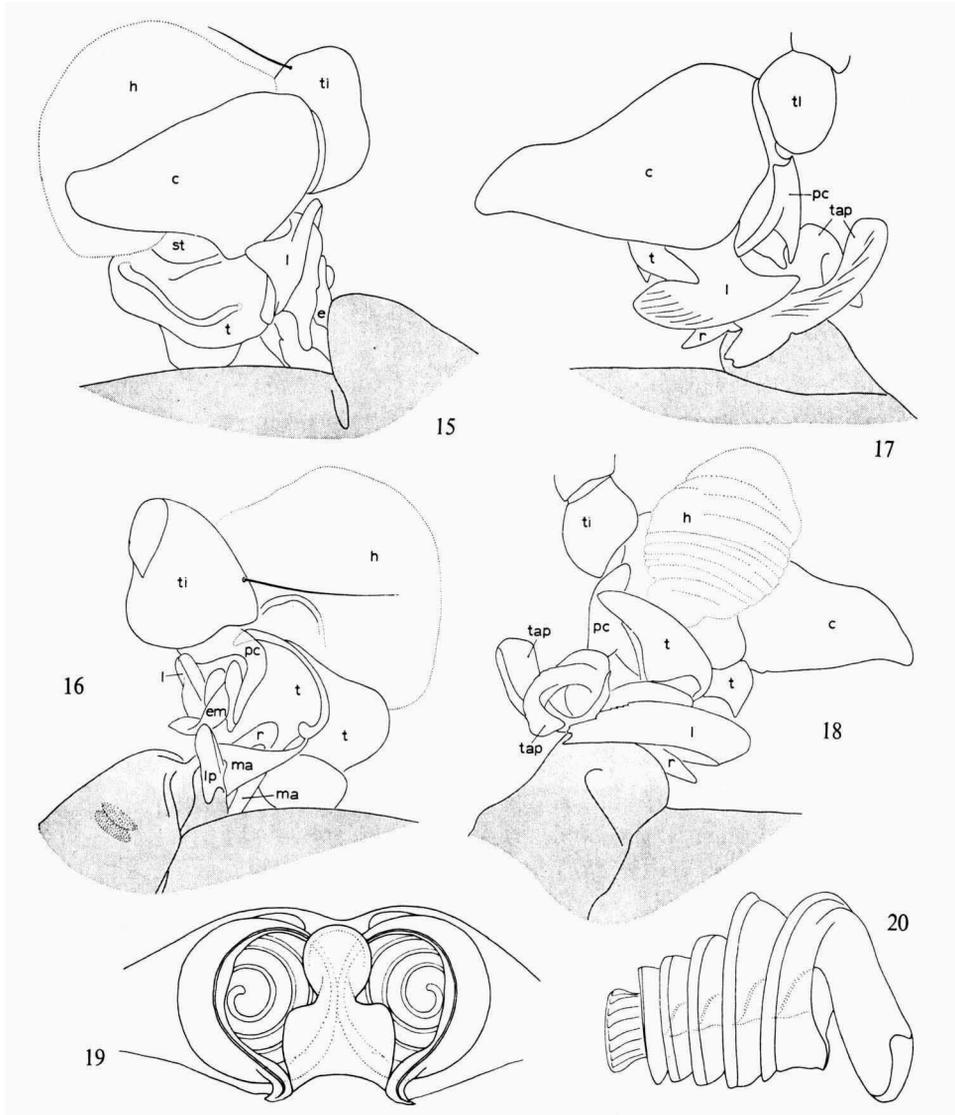


Fig. 15-18. Copulatory complexes. 15, *Microlinyphia impigra*, functional aspect; 16, do., non-functional aspect; 17, *Frontinellina fruletorum*, functional aspect; 18, do., non-functional aspect. Fig. 19-20. *Linyphia triangularis*. 19, vulva, posterior aspect; 20, terminal apophysis. 15, 16, 19, $\times 67$; 17, 18, $\times 49$; 20, $\times 100$.

in cleared complexes it can be followed up to the turning-point. The embolic apophysis (*ea*) has been pulled into the entrance at the functional side. The blade-like free end now blocks the entrance, and prevents a deeper penetration of the embolus.

The antero-mesal surface of the tegulum is visible in the non-functional aspect (fig. 16), with the median apophysis (*ma*), which is the continuation of a rather strongly chitinous rib, directed forwards. The rod-shaped proximal part points to the ventral surface of the abdomen just behind the epigastric furrow, the tip of the distal part lies across the lateral projection of the lamella and reaches the mesal lobe of the epigyne. When the palp is laid against the epigyne and starts to expand, it is kept in place by the median apophysis, which finds a point of support on the mesal lobe of the epigyne. During the expanding movements the lateral projection of the lamella is wedged in between the median apophysis and the epigyne.

The very small terminal apophysis could not be recovered in the complexes, but it should lie concealed and probably functionless in the excision between the main body and lateral projection of the lamella. The paracymbium (*pc*) is visible in the non-functional aspect (fig. 16), and for this element, too, it is difficult to indicate a distinct function.

Frontinellina frutetorum (C. L. Koch) (*Linyphia frutetorum*) (fig. 17, 18). — The functioning of the genitalia has been investigated in *Frontinellina frutetorum*, the only European representative of this new genus. The figures as usual show the left palp in contact with the left half of the epigyne.

The cymbium (*c*) of the palp in this species lies parallel to the ventral surface of the female's abdomen (fig. 17), rather at the functional side, its tip pointing in posterior direction and slightly towards the abdomen, while lateral margin and paracymbium (*pc*) are turned towards the epigyne. The dorsal surface of the cymbium thus lies at the functional side, the haematodocha (*h*) at the non-functional side, oblong, slightly deviating from the abdomen in posterior direction. The tegulum (*t*) is turned towards the epigyne, and all other elements, which are attached to the small central bladder, lie between the tegulum and the epigyne.

Most conspicuous is the sickle-shaped lamella (*l*), the base of which lies against cymbium and paracymbium at the functional side, while the long distal arm curves around the posterior side of the spherical epigyne, ending with the serrate tip at the non-functional side (fig. 18), there lying free from epigyne and other elements. The radix (*r*) lies lengthwise across the epigyne, the hook-shaped tip pointing in anterior direction. The bases of the two terminal appendages (*tap*) lie at the functional side against the epigyne,

reaching the non-functional side with their tips. Apart from their bases, both are free, not lying against the epigyne (fig. 18).

The embolus is not visible from the outside of the genital complex. In slightly cleared complexes the embolus can be followed through the five coils of the spiral tube, reaching as far as the turning-point. The base of the element lies immediately behind the entrance of the tube, and none of the elements of the palp is in functional contact with the entrance. It is remarkable how few elements of the palp serve the purpose of fastening the palp to the epigyne during the moment of maximum expansion of the haematodocha. Only the two terminal appendages are giving support with their bases.

However, the radix, which lies across the mesal bulge of the epigyne during the maximum expansion, has an important function during the expansion itself. The pointed distal tip is put into the mesal semi-covered depression of the epigyne, anchoring the palp to the female genital organ. At the same time the tips of the embolus and of the two terminal appendages, all three lying close together in the unexpanded palp, are inserted into the slit-like entrance at the functional side. In the course of the expansion the embolus disappears slowly into the epigyne, supported by the long distal arm of the lamella, the sheath-shaped end of which clearly is adapted to this purpose. The two terminal appendages also support the long thread-like embolus near the entrance. The embolus is pressed into the epigyne by the tegulum, which on its turn is forced downwards by the expanding haematodocha. Not until the larger part of the embolus has disappeared into the epigyne does the rotation of the tegulum suddenly force the radix out of the semi-covered depression, and at the same time turns away the two terminal appendages from the functional entrance. The embolus leaves the gutter-shaped end of the distal arm of the lamella, and the point of contact between lamella and embolus shifts in proximal direction; the former is then pressed into the final position, and the latter disappears completely into the epigyne. Radix, lamella, and terminal appendages thus are not performing their main functions, when the palp as a whole is at the climax of its physiological activity.

SUMMARY AND DISCUSSION OF THE FUNCTIONING OF THE GENITALIA

Summarizing the results of the investigations described above, we may say that in all species dealt with the cymbium and paracymbium have no special adaptations to the function of fastening the palp to the epigyne. This is in strong contrast with the findings in *Lepthyphantes leprosus* (Ohlert), where both elements firmly anchor the palp to the scape and chitinous wall of the epigyne (Van Helsdingen, 1965). It is difficult to ascribe here to the

paracymbium any function at all, though in the case of *Neriene hammeni* the median apophysis seems to be caught by the element, and possibly the subapical posterior appendage of the paracymbium, present in most species of the *hammeni*-group, is an adaptation to this function.

In *Linyphia* and *Neriene* the lamella firmly leans upon the ventral wall of the epigyne and against the posterior or dorsal side of the scape, and this seems to be one of the major points of support for the unfolding palp. The median apophysis is the first element to establish contact with the epigyne. When the hook-shaped tip has been caught by the median pit or depression of the scape, the lamella comes to rest automatically in the right position at the functional side; if it fails to hit the right spot, the palp partly unfolds in the air and immediately collapses again, without being able to establish a functional contact. When contact between palp and epigyne has been established properly, lamella and median apophysis, together with the terminal apophysis, must withstand the pressure of the swelling haematodocha, and keep the palp in place. A strong frame-work is formed by the elements tegulum — basal socket of median apophysis — radix — terminal apophysis, while the radix, by means of the membraneous connection with the lamella, links these elements firmly with the lamella — cymbium complex at the functional side.

In *Microlinyphia* and *Frontinellina* the lamella is not used for the purpose of fastening the palp to the epigyne. In *Microlinyphia* the median apophysis plays again the first part in the orientation of the palp, while in *Frontinellina* this function has been taken over by the modified radix. In the latter genus the lamella, together with the two terminal appendages, guide the long embolus to the entrance, and serve as a supporting frame for the slowly penetrating element. In *Microlinyphia* the lamella serves the same purpose, be it less obvious; in *M. impigra* it is not at all clear by what force the embolus is pushed into the vulva, but the tip of the element is guided to the correct entrance by the embolic membrane, which lies in one line with the main body of the lamella. In the two species observed of these two genera, the lamella in the end lies transversely behind the epigyne, without attributing to the fixation of the palp.

In *Microlinyphia* and *Frontinellina* the embolus follows the long spirally coiled tube as far as the turning-point. A terminal apophysis is not present, or does not enter the epigyne. In *Microlinyphia* the embolus is prevented from entering too far into the spiral tube by the embolic apophysis, which is pulled into the entrance of the tube but is too large to go into it. The results of the analysis of the functioning of the genitalia fully confirm the existence of a separate genus, as it has been created independently by

Gerhardt (1928: *Microlinyphia*) and by Chamberlin & Ivie (1943: *Pusillia*), on ethological and morphological grounds, respectively. *Pusillia* must, however, be regarded as a junior synonym of *Microlinyphia*. *Frontinellina* is proposed here for the reception of *Linyphia frutetorum*, the palpal structure of which is very different from that of the other species.

It has always been clear to students of this group, that the terminal apophysis of *Linyphia*-species is brought into the vulva during copulation, a functioning suggested by the remarkable agreement in shape of the terminal apophyses and the atria of the vulva. It is not surprising that this is fully confirmed by my experiments. It holds true for *Linyphia* and *Nerienne*, as conceived in this paper. In the species of *Nerienne* there is no difference in size between atrium and terminal apophysis, and the shape of the atrium consequently is not altered when the palp is inserted into the epigyne. In *Linyphia* (at least in *triangularis*) the concertina-like wall of the atrium is stretched to some extent by the terminal apophysis, because the latter is longer than the atrium (pl. 1). When the palp is withdrawn, the original situation is restored again.

Concerning the embolus the course of things has never been understood correctly. Osterloh (1922: 394) supposed that in *L. triangularis*, when the left palp was applied to the epigyne, the terminal apophysis was brought into the right atrium, while at the same time the embolus penetrated the left atrium. The scape was supposed to help and guide the embolus to the correct side. Strange enough Osterloh reported the terminal apophysis of the left palp to be coiled clock-wise, and consequently only to be used in the equally clock-wise coiled right atrium. However, in the left palp the embolus, terminal apophysis, and median apophysis, are all coiled counter-clock-wise. In this group there are no exceptions to the rule that a palp transfers sperm to the receptaculum at the corresponding side of the female. Gerhardt (1923: 81) wrote, that in *Linyphia montana* [= *Nerienne montana*] the embolus undoubtedly was driven forward along the coils of the "Konductor" (terminal apophysis) as far as the receptaculum seminis. And still quite recently Wiehle (1956: 3; 1967: 188) pointed out, that in *Linyphia* (depicted is *Nerienne montana*) a very short tube in the apex of the atrium leads to the receptaculum, and that the embolus therefore can be very short, because it has to pass through this short tube only.

As has been mentioned above (p. 14), it now appears that in the case of *Linyphia triangularis* the embolus lies twisted through the axis of the terminal apophysis, reaching (probably) the turning-point through the spiral tube. The deep and conspicuous spiral fold of the atrium has nothing to do with the conducting of the embolus or with the transport of sperm. In the species

of *Neriene*, on the other hand, the much shorter embolus, lying curved around the terminal apophysis, is inserted in this position into the functioning atrium, and thus following the outer curve of the terminal apophysis and the inner curve of the atrium near the entrance, the embolus is connected with the posterior end of the spiral groove. In these species the tip of the embolus often bears an appendage, which must prevent the embolus from entering the groove; the spermduct usually ends with a distinct spermduct-tooth, and only this tooth is thrust into the entrance of the spiral groove. In *Neriene* the spiral groove is not a fold, but an invagination of the inner surface of the atrium, resulting in an open gutter, through which the sperm somehow passes towards turning-point and receptaculum. I am afraid I have herewith added a new physiological problem to the many unsolved questions, which already exist in relation to the physiology of the pairing in spiders.

The stretching of the functioning atrium, and the axial position of the embolus inside the terminal apophysis of the functioning palp, have only been met with in *Linyphia triangularis*. It is assumed here, that the same phenomena must occur in the other species of the genus, as conceived in the present paper. The assumption seems justified by a number of characters in male palp and female vulva, which are correlated with this way of functioning. The male palps all have a hollow terminal apophysis and a thread-like embolus, which are attached to a small radix. The vulvae have membranous spirally folded atria, which allow a stretching movement during copulation, and which are followed by a few coils of spiral tube to the turning-points.

The species with true spiral grooves in the atria, with the posterior end of which the much shorter embolus is connected during copulation, are transferred from *Linyphia* to a separate genus, for which the old name *Neriene* was available (see p. 74). That nearly all authors unanimously have followed the authoritative paper of Thorell (1870: 45), where he declared *Neriene* to be synonymous with *Linyphia*, we cannot simply ignore. The members of these two genera on first sight look rather homogeneous indeed. All have distinct, often leaf-shaped abdominal patterns, are of medium size, and seem to have similar epigynes with large atria. The male palps, too, suggest a monophyletic origin, all having a conspicuous terminal apophysis, a large lamella, and a comparatively long embolus. The long embolus has always been supposed to enter into the epigyne in all these species, and Wiehle (1956: 6) gives expression to this idea by remarking about the "Linyphieae": "Embolus wird eingeführt". Wiehle (1961) distinguishes between the "Einführungs-Embolus" and the "Anschluss-Embolus",

and though he does not deal with *Linyphia* in his paper of 1961, we must conclude from his remark of 1956, that *Linyphia* is an example of the first type of embolus. In *Neriene* the embolus disappears nearly completely into the functional atrium indeed, but it is not brought into any duct or tube, as is characteristic of Wiehle's "Einführungs-Embolus". Instead it is connected with the entrance of a duct, here a groove, by means of a distinct spermduct-tooth. Comparing the typical "Anschluss-Embolus" of *Lepthyphantes leprosus* (Ohlert) (see Van Helsdingen, 1965) with the supposed "Einführungs-Embolus" of *Neriene montana*, one may conclude they have an analogous way of functioning, though they certainly belong to different tribus. I therefore agree with Merrett (1963: 456), when he doubts about the significance of a long thin embolus alone for grouping the genera in tribus. I am, of course, at variance with him, when he subsequently criticizes the subdividing of *Linyphia* into *Microlinyphia*, *Prolinyphia*, and *Linyphia* proper.

TAXONOMIC PART

Key to the genera

1. Male palp: embolus rather broad and flat at base, bent on half length to lateral side of palp, curved around base of terminal apophysis, tip never thread-like but often with apical appendages; terminal apophysis spirally coiled, always with closed axis. Epigyne: opening large and conspicuous; atria with spirally coiled groove in rigid wall, groove running as far as turning-point, spiral tubes never present, scape simple, never knob-shaped. Spermduct-tooth of embolus connecting with posterior end of spiral groove during functional contact at copulation *Neriene* Blackwall, p. 73
- Male palp: embolus always thread-like, at least on apical half; terminal apophysis lacking, very small, or spirally coiled with hollow axis. Epigyne: very small and inconspicuous; or a smooth median area with slit-like entrances; or atria present with common or separate openings, but then scape knob-shaped or lacking, and walls with spiral fold passing into spiral tube before reaching turning-point; scape lacking, very small, or knob-shaped. During the functional contact at copulation the embolus reaches as far as the turning-point by way of the spiral tube 2
2. Male palp: embolus not conspicuous at the unexpanded palp; terminal apophysis a spirally coiled element with hollow axis, very small in some species; embolic membrane sheath-like. Epigyne: common opening of atria triangular, or two separate openings; atria with spiral folds instead of spiral grooves, folds passing into spiral tubes before reaching the turning-points. Thread-like embolus reaching turning-point of epigyne by way of hollow axis of terminal apophysis and spiral tube, wall of functioning atrium stretched concertina-like during functional contact at copulation. *Linyphia* Latreille, p. 27
- Male palp: embolus conspicuous at the unexpanded palp, forming a large loop or lying in turns and bends around elements of palp (except in species with short embolus, but then lamella with rounded proximal tip); terminal apophysis very small, seemingly lacking, or palp provided with twisted membranous terminal appendages; embolic membrane spatulate, or no distinct membrane present. Epigyne: very small, barely chitinous, with small round or knob-shaped scape; or a smooth, slightly bulging median area with slit-like entrances 3

3. PME on large black tubercles. Chelicerae of male elongate, slanting backwards, a large protrusion proximally on posterior surface. At least femur I with spines. Stridulating files composed of broken ridges or absent. Male palp: paracymbium narrow and curved, U- or V-shaped; embolus lying in a long loop at ventral side of palp; embolic membrane spatulate; proximal tip of flat lamella rounded. Epigyne: a small triangular excision with small scape, or small entrances separated by a median lobe. During functional contact at copulation the embolus disappears into the spiral tube of the epigyne until it is arrested by the embolic apophysis, when the latter is drawn into the entrance of the tube; lamella lying transversely behind the epigyne *Microlinyphia* Gerhardt, p. 287
- PME with narrow black rings. Chelicerae of male not elongate, not slanted backwards, without conspicuous protrusion on posterior surface. Femora spineless. Fine stridulating files present in both sexes. Male palp: paracymbium as long as high; embolus lying in curves and bends along palp, not in a loop; embolic membrane not spatulate; lamella slender and twisted. Epigyne: a smooth median area with slit-like entrances and a small depression in the middle. Embolus disappearing into spiral tube of atrium, lamella freely curving in non-functional direction *Frontinellina* gen. nov., p. 284

Linyphia Latreille, 1804

Linyphia Latreille, 1804b, Nouv. Dict. Hist. nat., 24: 134. Type-species: *Linyphia triangularis* sensu Walckenaer, 1806 [= *Linyphia triangularis* (Clerck)], designated by Dugès & Milne Edwards (1846, pl. 10 fig. 3)¹⁾.

Remarks. — In the third edition of Cuvier's "Règne animale", usually called the "Disciples edition", it is indicated on the title-page that on the plates to this edition are represented "les types de tous les genres". On plate 10 figure 3 we find four small but good pictures, from which we may recognize one of the commonest European Linyphiid spiders, viz., *Linyphia triangularis* (Clerck). The explanation of the plate on the facing page reads: Linyphie montagnarde, *Linyphia montana* [without author]. Elsewhere in the volume on Arachnida, Dugès & Milne Edwards, who are responsible for this part of Cuvier's work, deal with the genus *Linyphia* (p. 50) and mention one species (p. 51, note 1), viz., *Linyphia triangularis* Walckenaer, as described and depicted by Walckenaer in his "Histoire naturelle des Aranéides" in 1806. In 1841 Walckenaer used *Linyphia triangularis* as a senior synonym of *Linyphia marginata* Wider or Koch [= *Neriene radiata* (Walckenaer)], but he then explicitly referred his use of *triangularis* of 1806 to *Linyphia montana* Walckenaer (p. 235), stating that the name *triangularis* in 1806 had been put there erroneously by the engraver, and that the volume concerned had been published without his participation. It is indeed *Linyphia montana* Walckenaer, 1841, or *Linyphia triangularis* sensu Walckenaer, 1806, that is depicted on plate 10 of Cuvier's "Règne animale", mentioned

1) Date of publication according to Sherborn (1922).

above. Consequently, *Linyphia triangularis* sensu Walckenaer, 1806, is to be considered the type-species of the genus *Linyphia* Latreille, 1804, being designated as such by Dugès & Milne Edwards, 1846. *Linyphia montana* Walckenaer, 1841, and *Araneus triangularis* Clerck, 1758, are synonyms of the type-species, junior and senior subjective, respectively.

Blauvelt (1936: 93) attributed the designation of a type-species for *Linyphia* to Thorell (1869: 82). However, Lucas (1868: 135) already stated that "*Linyphia montana* Walck. peut être regardée comme le type de ce genre singulier" [i.e. *Linyphia*]. The designation by Dugès & Milne Edwards, mentioned above, is even of an earlier date, though it probably was not a true designation of a type-species in the present-day sense. Most important is, however, that in all cases the same species was put forward as type-species.

The records of *L. triangularis* by Walckenaer (1806: part 5, pl. 9), and of *L. montana* by Lucas (1868: 134), apparently have been overlooked by Bonnet in his *Bibliographia Araneorum* (1957), while the work of Lucas (1868) is not referred to in Bonnet's list of references (1945).

The name *Linyphia* was put into use by Latreille to cover a group of species, which had already been separated by Walckenaer from the all-embracing genus *Aranea*, viz., "les Napiformes" (1802: 213), later changed into "Napitèles" (1805: 70), characterized by the long legs, by the small anterior median eyes and contiguous lateral eyes, and by the inverted position of the animals below a horizontal web. Thus it included all Linyphiidae, of which family only few species were known at the time. Subsequent authors have steadily reduced the size of the genus.

Infrageneric relationships. — In the present paper one small and two large groups are removed from the genus *Linyphia* sensu Bonnet, viz., the genera *Neriene*, *Microlinyphia*, and *Frontinellina*. The motives for the removal of these three groups as separate taxa are given in the discussion on the genitalia. Excluding a few species provisionally, the size of the genus is now reduced to a mere six species in two species-groups. The *triangularis*-group contains two closely resembling species, *triangularis* and *maura*, and one deviating species, *tenuipalpis*. The latter barely differs in habitus, but the genitalia are very simple in comparison with those of the two other species, though they clearly show *tenuipalpis* to belong in this group. The *hortensis*-group, besides the rather isolated *mimonti*, consists of *hortensis* and its near relative *alpicola*, the existence of the latter being demonstrated in this paper.

Both complexes of closely resembling species, viz., *triangularis-maura* and *hortensis-alpicola*, are considered to consist of distinct species. The differ-

ences in the genitalia are clear-cut in both cases, and it is most unlikely, on mechanical grounds, to expect the two species of either complex to fuse into one, when natural conditions would favour an experiment of this kind. In the case of *triangularis-maura* the geographical ranges of the two species distinctly overlap in Southern France, but intermediate forms have not been found. Ecological or biological differences in this group are not known, with the exception of the (probably) rather late mating-period of *maura*. *L. hortensis* and *alpicola* show different altitude preferences, as far as can be inferred from the material at hand. The subject certainly is worth much more attention in the future.

Description. — Animals of medium size (3.0-7.5 mm). PME on large black tubercles or with narrow black rings. Lateral eyes contiguous. AME small and close together. Chelicerae with broken ridges on lateral surface, or without stridulating files. Hairs often on warts, which are very large in *hortensis*. The chelicerae may be long and diverging (*triangularis*-group), but are never slanting backwards towards the gnathocoxae. Potrusion on posterior surface always low. Number of cheliceral teeth variable.

Legs long and slender, longest in males. Length of tibia I 10-17 diams. in females, 14-21 diams. in males. Femora always with spines. Tibiae with dorsal, lateral, and ventral spines, anterior tibiae with a v_6'' -spine or pair of v_6 -spines (except in ♀ of *mimonti*). Metatarsi with spines. Tm I 0.11-0.30. Metatarsus IV without trichobothrium. Leg II slightly longer than, or as long as, leg IV, leg I always longest. Abdomen always with dorsal leaf-shaped pattern. Abdomina of males cylindrical. Postero-dorsal tubercle not developed.

Male palp. — Tibia with a dorsal spine only, additional lateral spines not present. Paracymbium U-shaped, distal arm narrow and closely following surface of tegular complex, without apical appendages; or paracymbium lacking (*mimonti*). Tegular complex comparatively large, in the *triangularis*-group with conspicuous apical lobe. Median apophysis of tegular complex on meso-apical surface; proximal part rod-shaped with broad base, a depression or pit on widened part; distal part membraneous with curved or lightly hook-shaped chitinous tip; in *mimonti* element replaced by a small round lobe. Radix small, proximal tip knob-shaped; in *mimonti* equally small, but knob barely developed. Embolus long and narrow with fine thread-like tip, shortest in *mimonti*; outer margin of strongly curved base chitinous, a membraneous velum at inner curve; element never conspicuous at the unexpanded palp (cf. *Microlinyphia*). Embolic membrane long, sheath-like, attached to connecting membranes of embolus, radix, and lamella. Terminal apophysis at-

tached to distal tip of radix; a loosely and spirally coiled element, always with hollow axis, very small in *mimonti*. Lamella large, rather flat, proximal tip narrow; dorsal surface with a small projection near mesal margin at transition of narrow proximal part and broader apical part, and with a distinct transverse crest or ridge at base of embolic membrane at mesal margin.

Epigyne. — Comparatively well developed, with large opening or openings of atria, inside of atria visible in posterior view. Scape knob-shaped, but lacking in *mimonti*. Atrium with a spiral fold, apically a spiral tube, the latter leading to the turning-point, a short tube in reversed direction connecting turning-point with receptaculum. Fertilization duct lying axially in spirally coiled tube in apical part, shifting to wall of atrium in posterior part, running parallel with spiral fold there. Walls of atria concertina-like in *triangularis*-group (and proved to function accordingly), but less obviously so in *hortensis*-group.

Distribution and habitat. — Palaearctic region, not in Japan. The webs are simple horizontal sheets, often very large. In trees and in the herbaceous layer.

Key to the species

1. Cephalothorax with a bifurcate median stripe (stripe faint or absent in Asiatic specimens). Chelicerae of male long and divergent, with long and strongly curved fangs. Male palp (fig. 37): lateral projection of lamella widening towards tip, tip of embolus curved backwards, tip of distal part of median apophysis slightly hook-shaped. Epigyne: common opening of atria triangular with knob-shaped scape (fig. 27), or openings broadly separated by broad and short median lobe, which is not knob-shaped (fig. 44). (*triangularis*-group) 2
- Cephalothorax uniformly brown, or brown with narrow black margins. Chelicerae of male not elongate. Male palp (fig. 59): lateral projection of lamella narrow and pointed, tip of embolus never bent backwards; tips of distal part of median apophysis curved but not hook-shaped, or median apophysis a small round lobe. Epigyne: circular openings of atria narrowly separated by a septum, which is fused with the scape, or scape completely lacking (fig. 51, 75) 4
2. Male palp: tibia as long as patella, and never more than half as long as cymbium. Epigyne: common opening of atria triangular, scape with knob 3
- Male palp (fig. 48): tibia distinctly longer than high, one and a half times as long as patella, and 0.8 of length of cymbium. Epigyne (fig. 44): openings of atria separated by a broad median lobe (fig. 45). — Europe and Mediterranean region *tenuipalpis* Simon, p. 48
3. Femur I with 3 or more 1'-spines, usually with additional 1''-spines in males. Tibiae I and II, in addition to basal and apical spines, with two pairs of v-spines; usually more than one 1''-spine present. Male palp (fig. 29): terminal apophysis (fig. 20) comparatively short, with 6 coils. Vulva (fig. 21): 7-8 coils of spiral fold and spiral tube together; width of epigyneal aperture 0.36-0.48 mm. — Eurasia *triangularis* Clerck, p. 31
- Femur I with 3 1'-spines or less, without 1''-spines, spines usually on black spots. Tibiae I and II, in addition to basal and apical spines, with only one pair of v-spines;

- only one 1"-spine present. Male palp (fig. 37): terminal apophysis (fig. 34) comparatively long, with 7 coils; embolus and embolic membrane longer than in *triangularis*, reaching far ventrally; dorsal hook-shaped tip of median apophysis more slender, anterior-most tip of lamella more tapering and situated more laterally. Vulva (fig. 31): 10 coils of spiral fold and spiral tube together; width of epigyneal aperture 0.28-0.34 mm. — Mediterranean region (western part only?) . *maura* Thorell, p. 41
4. Light coloured specimens, abdomen of female with a dark median band, which strongly contrasts with the light surrounding areas. Legs very long and slender, femur I nearly 2 times as long as cephalothorax in male, 1.5 times or more in female. Male palp (fig. 74): paracymbium lacking, median apophysis (fig. 72) a small round lobe, embolus short. Epigyne (fig. 75): width of epigyneal aperture 0.22-0.25 mm, scape lacking. — Mediterranean region (Italy, Greece, Lebanon) *mimonti* Simon, p. 68
- Darker specimens with shorter legs; femur I never more than 1.3 times length of cephalothorax. Male palp: U-shaped paracymbium present, median apophysis well developed, embolus longer. Epigyne: width of epigyneal aperture larger than 0.30 mm, scape always present. (*hortensis*-group) 5
5. Dorsal band of abdomen leaf-shaped with sinuate margins (pl. 2 fig. 1), surrounded by white areas on all sides. Male palp (fig. 59): length of cymbium 0.61-0.75 mm. Epigyne (fig. 51): circular openings of atria narrowly separated, knob-shaped scape partly fused with narrow median septum, width of epigyneal aperture 0.39-0.52 mm, ratio width to length of vulva (fig. 53) about 0.7. — Europe and West Siberia *hortensis* Sundevall, p. 55
- Dorsal leaf-shaped band of abdomen with serrate margins (pl. 2 fig. 2), bordered by white areas laterally and in front, but continuing uninterrupted to spinnerets. Male palp (fig. 64): length of cymbium 0.57-0.64 mm. Epigyne (fig. 67): openings of atria separated by a slightly broader septum, tip of scape less distinctly knob-shaped; width of epigyneal aperture 0.31-0.37 mm, ratio width to length of vulva (fig. 66) about 0.8. — Alpine region of Switzerland, Italy, and Austria, at altitudes of 1200 m and above *alpicola* spec. nov., p. 62

The *Linyphia triangularis* group

Linyphia triangularis (Clerck)

(fig. 19-30, pl. 1)

Araneus triangularis Clerck, (1757) 1758, Aranei Svecici: 71, pl. 3 tab. 2 fig. 1 (p.p.; description and figure of ♂, not of ♀; Sweden).

Aranea triangularis; Martini & Goeze, 1778, Naturgesch. Spinnen: 239 (diagnosis).

Linyphia triangularis; Walckenaer, 1806, Hist. nat. Aranéides, 5: pl. 9 (figure of female) [not in Bonnet, 1957]. — Latreille, 1806, Genera Crust. Ins., 1: 100 (diagnosis). — Osterloh, 1922, Zeitschr. wiss. Zool., 119: 329, 391, 402 (morphology and functioning of genitalia). — Simon, 1929, Arachn. France, 6(3): 633, 742, fig. 968-970 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 124, pl. 8 fig. 60-62, pl. 9 fig. 63, 65 (genitalia). — Locket & Millidge, 1953, British Spid., 2: 397, fig. 237C, 237F, 238A, 240A (British Isles). — Wiehle, 1956, Tierw. Deutschl., 44: 308, fig. 506-513 (key, Germany).

Linyphia triangularis maura; Di Caporiacco, 1951, Ann. Mus. civ. Stor. nat. Genova 64: 69 (Italy); 1953, Mem. Biogeogr. Adriatica, 2: 77 (Italy).

Aranea montana Linnaeus, 1758, Systema Naturae, edit. 10, 1: 621 (diagnosis; binominal combination for *Aranea abdomine albo-cinereoque-variegata* of Fauna Svecica (1746: 357, no. 1242); Sweden).

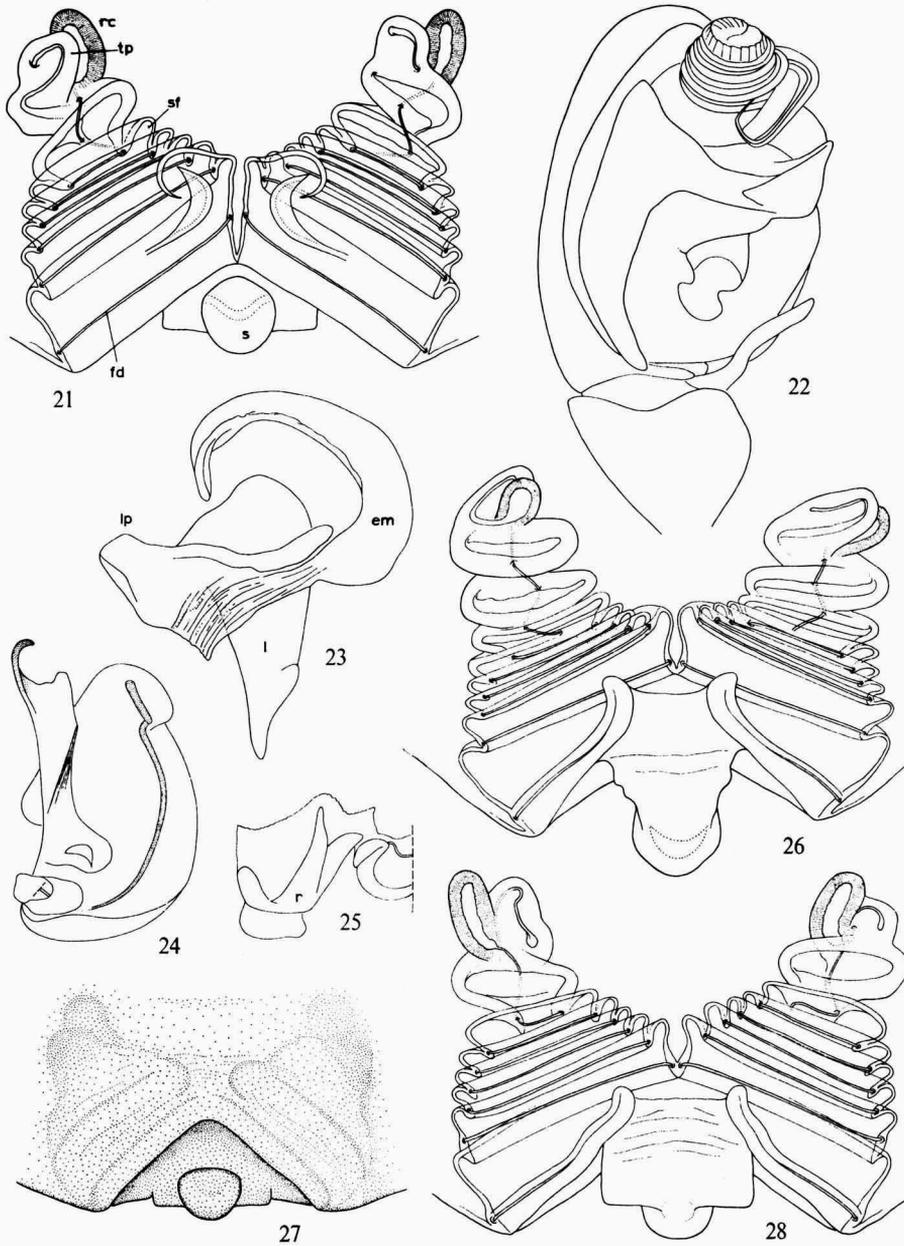


Fig. 21-28. *Linyphia triangularis*. 21, vulva, Europe, ventral aspect; 22, male palp, ventral aspect; 23, lamella (*l*) with lateral projection (*lp*) and embolic membrane (*em*), dorsal aspect; 24, tegulum with median apophysis, mesal aspect; 25, radix (*r*) with base of embolus, dorsal aspect; 26, vulva, China, dorsal aspect; 27, epigyne, Europe; 28, vulva, Europe, dorsal aspect. 21, 26, 28, $\times 89$; 22-25, 27, $\times 67$.

Linyphia montana; Walckenaer, 1841, Hist. nat. Ins., Aptères, 2: 233, pl. 3 fig. 15, pl. 16 fig. 4 (description ♀ ♂, synonymy, France).

Aranea albini Scopoli, 1763, Entom. Carniolica: 396 (diagnosis, Austria).

Aranea pinnata Ström, 1768, Trondh. Selsk. Skrifter, 4: 363 [not seen]; 1770, Schriften kön. norweg. Ges. Wissensch., 4: 303 (short description, translation of original paper of 1768; Norway). — Müller, 1776, Zool. Danicae Prodróm.: 194 (diagnosis; citation of Ström, 1768).

Linyphia pinnata; Strand, 1902, Bergens Mus. Aarb., 1902(6): 8 (Norway).

Aranea resupina sylvestris Degeer, 1778, Mém. servir hist. insectes, 7: 244, pl. 14 fig. 13-22 (description ♀ ♂, note on pairing).

Linyphia macrognatha Menge, 1866, Preuss. Spinnen, 1: 101, pl. 17 fig. 31 (description ♀ ♂, note on pairing; Danzig, now: Gdansk, Poland).

Linyphia micrognatha Menge, 1866, Preuss. Spinnen, 1: 103, pl. 17 fig. 32 (description ♀ ♂, Danzig, now: Gdansk, Poland).

Linyphia hortensis; Saito, 1936, Rep. first sci. Exped. Manchoukuo, 5(1)3(11): 30, 78, fig. 9, pl. 17-18 (China).

For a complete list of references up to 1939, see Bonnet (1957: 2531).

Types. — I have not found the original material of any of the names listed here.

Remarks. — There has been utter confusion as to the names of the two very common species *L. triangularis* and *L. montana*. Two publications are of major importance in this respect, viz., the 10th edition of Systema Naturae of Linnaeus (1758) and Clerck's Aranei Svecici (1758). The main source of confusion seems to be Clerck's description of *Araneus triangularis*, which he illustrated with two figures, depicting two different species. The upper figure (pl. 3 tab. 2 fig. 1) unmistakably shows the male of what is now commonly called *Linyphia triangularis*, the lower figure (pl. 3 tab. 2 fig. 2) shows a female specimen, which usually is held to represent *Neriene radiata* (Walckenaer) (*Linyphia marginata* C. L. Koch). In the description neither the bifurcate median stripe on the cephalothorax, characteristic for *triangularis*, is mentioned, nor the white callous margin, the most striking feature of *radiata*; but as far as the figures are concerned, the male shows a forked median stripe, while the female has the margins of the cephalothorax slightly lighter than the centre, and lacks the forked median stripe.

It now appears that Swedish arachnologists (Sundevall, Westring, Thorell) have used the name *triangularis* in connection with the species with the forked median stripe, as depicted by Clerck in the male specimen (tab. 2 fig. 1), while on the other hand Walckenaer has associated the name *triangularis* with the figure of the female (tab. 2 fig. 2). However, Walckenaer has complicated the matter by referring in his earlier publications (1802:214; 1805: 70) to Degeer in the same sense as the Swedish arachnologists did, and even by depicting (1806: part 5, pl. 9) a "*triangularis*", which unmistakably is a *triangularis* as agreed upon at present (with distinct bifurcate

median stripe), while in his later work on this group (1841: 241) he recants the references to Degeer, as used by him previously, and rejects any responsibility (p. 235) as to the figure of *triangularis* of 1806. He then lists all his earlier references of the species at the end of a lengthy description of *triangularis*, which without doubt is the same species as *Neriene radiata* (Walckenaer) (*Linyphia marginata* C. L. Koch). Clerck's figure of the male with the forked median stripe is also listed among the references of *triangularis* [= *Neriene radiata* (Walckenaer)] with the remark "figure fautive".

The name *montana* was used by Walckenaer (1841: 233) for the species with the forked median stripe (now *triangularis*), certainly not in imitation of Linnaeus, as he did not refer to him in 1802, but taking Clerck's *Araneus montanus* for this species. Again he made his earlier references to *montana* to fit his new conception of the species by crossing out the references to Degeer, and even by denying his own diagnosis of *montana* of 1802! Going through the publications of Walckenaer, one cannot escape the impression that he has tried to demonstrate a consistent use of names in all his works rather than admit a change of view or a mere misunderstanding of the matter in his earlier publications.

Apparently the Swedish view has found general favour in the end, to which certainly have contributed Thorell's detailed analysis (1856) of Clerck's descriptions, and his "Remarks on synonyms of European spiders" (1870). Indeed Clerck's description of *triangularis* fits the present species of this name very well, although the median forked stripe on the cephalothorax is not mentioned, only depicted. His description of the web excludes *Neriene radiata*, and the present species is the only one with a mating-period in September, which is explicitly mentioned. The uniformly coloured legs and the long diverging chelicerae ("retinacula") exclude every doubt. Only the figure of the female (pl. 3 tab. 2 fig. 2) should be excluded on account of its reasonable likeness to *Neriene radiata* (Walckenaer) (*Linyphia marginata* C. L. Koch).

The two names of Clerck were threatened once more, when at the beginning of this century the law of priority was decided to start on January 1, 1758, which day was fixed as the official date of publication of the 10th edition of the *Systema Naturae* of Linnaeus. Consequently Clerck's names (1757) became pre-Linnaean and invalid, although he had used a perfectly binominal nomenclature. As the only name mentioned by Linnaeus of this group is *Aranea montana*, and this species in all probability is not identical with Clerck's *montana*, but with his *triangularis* (♂) instead, a complicated shifting of currently used names was necessary. Confusion prevailed, or rather a nearly unanimous use of Clerck's names despite the Rules. The

attention was focussed on this undesirable situation by a petition of Bonnet (1947), who gave an analysis of the frequencies of use of either publication, and who voiced the opinions of the leading arachnologists at the time. Twelve years later, after many long discussions, the matter was settled in favour of Clerck's *Aranei Svecici* by Direction 104 of the International Commission on Zoological Nomenclature (1959). Since then this work is available and considered to have been published in 1758, and previous to the 10th edition of *Systema Naturae*.

It stands to reason that Bonnet, after all the trouble he had taken to bring the merits of the pre-Linnaean work of Clerck before the International Commission on Zoological Nomenclature, already used the Clerckian names in his *Bibliographia Araneorum* (1957), thus anticipating a decision of the Commission, which was not published before 1959. He used the specific names of Clerck as is done in the present paper, and not as suggested by Walckenaer (1841).

However, Bonnet has not completely succeeded in putting right the chaotic confusion as regards the references, which originated mainly from Walckenaer's dissenting view. As an example, but there are several other cases, I will analyse here his references to Olivier (1789). This author gave a translation of Scopoli's description of *Aranea albini* (p. 237), which is listed by Bonnet under *triangularis*, as I have done in the present paper. Olivier (p. 213) referred to Lister's "*Araneus niger aut castaneus*" under a new name, which one can find under *montana* in Bonnet. I have no objections so far. The two other species which relate to the Linyphiidae (p. 208), were again confused by Bonnet. *Aranea triangularis*, with references to Degeer's *A. resupina sylvestris* and Clerck's *A. triangularis* and, moreover, accompanied by a distinct diagnostic character (black forked median stripe on the cephalothorax), was nevertheless listed under *marginata* by Bonnet. *Aranea montana*, with references to Degeer's *A. resupina domestica* and Clerck's *A. montana*, accompanied by remarks on the annulated legs and the occurrence in corners of walls, was referred to under *triangularis*. This still is the Walckenaer way of confusing the two names, although Walckenaer never referred to Olivier himself!

The diagnosis of *Aranea montana* by Linnaeus is very short and superficial, but as he mentioned pale legs and an occurrence in trees, it cannot be identical with *Araneus montanus* Clerck. It is currently listed as a synonym of the present species, and this seems likely indeed, *triangularis* being a very common species in Sweden, but this view is not indisputable.

Aranea albini Scopoli was considered to be a synonym of *Linyphia marginata* C. L. Koch [= *Neriene radiata* (Walckenaer)] by Walckenaer (1841:

241). Thorell (1870: 52) doubted this, and indeed Walckenaer's opinion seems not to be in accordance with Scopoli's description of the web, which is said to be horizontal. The diagnosis of the species is too superficial to decide upon any species with certainty. As heather is mentioned as a habitat, it seems again likely but not certain, that *albini* is a synonym of the present species. It was listed accordingly by Bonnet (1957: 2532).

The description of *Aranea pinnata* Ström is distinct, and the species undoubtedly belongs here. Müller (1776) himself referred to Ström, and consequently it is illogical to list *pinnata* Ström under *triangularis*, and *pinnata* Müller under *montana*, as is done by Bonnet (1957). This error originates from a wrong reference by Walckenaer (1841: 244), but was already corrected by Thorell (1870: 45).

Saito's (1936) record of *L. hortensis* Sundevall from Jehol in China is listed here, because it is clear from his figures of the epigyne (pl. 18 B) and male palp (fig. 9 B), that the specimens concerned belong to the present species.

Male. — Measurements in mm. Total length 4.0-7.2; cephalothorax, length 1.85-3.35, width 1.4-2.2; abdomen, length 2.3-4.0, width 1.2-1.8, height 1.1-1.7; chelicerae, length 1.0-2.9, width 0.37-0.80.

Cephalothorax. — Yellow-brown to light brown, with a grey median stripe from posterior margin to posterior part of head, bifurcate there. Two broad grey submarginal bands running from posterior margin to PLE. Posterior margin moderately excised, sides evenly rounded, clearly constricted at border of head and thorax; width 0.7-0.75 of length, width of head 0.6-0.65 of width of thorax. From side, rounded posteriorly, level at region of fovea, lightly rising towards eye-region; clypeus straight. Spinehairs behind PME and PLE, clypeus and eye-region with long hairs, curved upwards and forwards.

Eyes. — Eye-region narrower than head, as wide as 0.45 of width of thorax. Both rows of eyes slightly recurved. PME on large black tubercles, bases of lateral eyes blackish. Diameter of PME 0.09-0.11 mm, laterals of same size, diameter of AME 0.8 of PME. PME separated from each other by 2.0-2.5 diams., from PLE by 1.4-1.5 diams., and from AME by 1.5-1.7 diams. of PME. AME separated by less than their own diameter. Height of clypeus 0.19-0.22 of length of cephalothorax.

Chelicerae. — Usually long and divergent, gradually attenuated, in small specimens less divergent; relative length increasing with size of animal: in small specimens length 0.5, in large specimens up to 0.9 of length of cephalothorax (see Locket, 1932, and Locket & Gardiner, 1938). Yellow-brown

as cephalothorax. Basal tubercle very small, latero-dorsal in position. Basal two-thirds of lateral surface bare, without any trace of stridulating file. Cheliceral teeth evenly spaced along apical two-thirds, with four teeth in dorsal row and four to five teeth in ventral row; basal pair of dorsal row very small, others larger. Fang brown, very long, exceeding half length of chelicerae.

Gnathocoxae. — Black-brown on basal halves, apices brown. Labium black-brown, anterior margin light brown. Sternum black-brown; width 0.65-0.7 of length, narrowly produced between coxae IV.

Legs. — Yellow-brown, tips of metatarsi and tarsi narrowly brown. Femora with hairs on small warts. Legs long, length of femur I 1.6-1.9 times length cephalothorax, relatively shortest in largest specimens. Length of tibia I 17-21 diams. of segment. Measurements (of specimen from The Netherlands, Leiden) in mm :

	I	II	III	IV	palp
Fe	4.40	3.80	2.60	3.40	1.20
Pa	0.85	0.75	0.65	0.65	0.29
Ti	4.20	3.30	1.95	2.90	0.27
Mt	5.00	4.00	2.60	3.90	—
Ta	2.60	1.65	1.05	1.45	0.79

Chaetotaxy. — Numbers of spines very variable on femora. Fe I d, 3-8 l', 0-2 l''; II d, 2-6 l', 0-1 l''; III d, 1-2 l', 0-1 l''; IV 2-3 d, 1-4 l', 0-1 l''. Pa I-IV d''d', basal spine weak and short.

Ti	I	v _b '	d''	v'	(v' v'') l'	l''	l' (v' v'') l''	d'	[1 _a ' 1 _a '' v _a ' v _a '']
	II	v _b '	d''		(v' v'') l'		l' (v' v'') l''	d'	[1 _a ' 1 _a '' v _a ' v _a '']
	III		d''		(v' v'')		l' l''	d'	[1 _a ' 1 _a '' v _a ' v _a '']
	IV		d''		v'		l' v' l''	d'	[1 _a ' 1 _a '' v _a ' v _a '']

Mt I - IV d l' l'' l' v v d v_a

Length of d''-spine on tibia I 0.24-0.29 mm, diameter of tibia I at base of d''-spine 0.16-0.22 mm; on tibia IV 0.40-0.50 mm and 0.14-0.19 mm, respectively. Tm I 0.13-0.18. Position of d''-spine on tibia I 0.25-0.28.

Abdomen. — Cylindriform. Leaf-shaped longitudinal dorsal band beige-coloured, on apical half with black pigmented margins or chevrons, followed by a narrow white transverse band, separating the dorsal band from the blackish posterior surface. Dorsal band bordered by white areas, lateral surface with white blotches on beige-coloured background in irregular pattern. Ventral surface light brown, heavily suffused with black. Opercula light brown; spinnerets light brown, suffused with black.

Palp (fig. 22, 29). — All segments light yellow-brown. Femur curved

around chelicerae. Patella short, dorsal spine near apical margin very short and weak. Tibia barely longer, dorsal spine one and a half times as long as segment. Cymbium spineless, but some spinehairs sometimes present along mesal margin. Paracymbium with some hairs at base, proximal arm narrowing towards curved ventral part, circular in cross-section there, widening again into a flat ribbon-shaped distal arm; tip truncated obliquely. Tegulum large, a distinct excision on the ventral side followed by a conspicuous squarish apical lobe. Median apophysis (fig. 24) straight, curved tip of distal part narrow but strong, exceeding in length the membranous tip of the proximal part. Radix (fig. 25, 30, *r*) with distinctly knob-shaped proximal tip. Embolus (fig. 30, *e*) long, base broad and strongly curved with chitinous outer margin, becoming narrow and thread-like towards tip; element bent backwards well before apex; length 1.7 mm in dissected specimen. Embolic membrane (fig. 23, 30, *em*) long and sheath-like. Terminal apophysis (fig. 20) large, cone-shaped, with about six coils with raised anterior margins; apical coil transversely grooved and with serrate apical margin; element loosely coiled and with hollow axis. Lamella (fig. 23, 30, *l*) comparatively small, tapering to a point proximally, mesal margin straight and evenly passing into moderately and irregularly rounded anterior margin; lateral free projection (*lp*) a large blade, widening towards upper margin; crest on dorsal surface at base of embolic membrane near mesal margin pronounced.

Female. — Measurements in mm. Total length 4.5-6.5; cephalothorax, length 2.0-2.5, width 1.5-1.8; abdomen, length 3.0-4.4, width 2.1-3.1, height 2.3-3.4; chelicerae, length 0.9-1.25, width 0.40-0.55.

Cephalothorax. — Colour and pattern as in male. Posterior margin more distinctly excised. Hairs at eye-region and clypeus shorter. Diameter of PME 0.10-0.12 mm; distance between PME 1.7-2.3 diams., between PME and PLE 1.3-1.5 diams., and between PME and AME 1.5-1.7 diams. of PME. Height of clypeus 0.14-0.17 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Never long and divergent as in male, ratio length to length of cephalothorax 0.45-0.50. Lateral surface with broken ridges on basal half. Dorsal row with five to six teeth, evenly spaced, second and third teeth large, basal tooth half as long, sizes gradually diminishing from third to fifth or very small sixth tooth. Ventral row with four to six small equidistant teeth, as small as fifth tooth of dorsal row, basal tooth opposite to gap between second and third teeth of dorsal row.

Legs. — Slightly shorter than in male. Length of femur I 1.4-1.6 times length cephalothorax, length of tibia I 12-13 diams. of segment. Measurements in mm (of specimen from The Netherlands, Leiden):

	I	II	III	IV
Fe	3.45	2.95	2.20	2.95
Pa	0.80	0.75	0.60	0.65
Ti	3.30	2.55	1.55	2.30
Mt	3.40	2.75	2.00	2.90
Ta	1.85	1.45	0.95	1.30

Chaetotaxy. — Very variable as to the femora. Fe I 1-2 d, 3-6 l'; II 1-2 d, 2-4 l'; III d, 1-2 l'; IV 2 d. Pa I-IV d''d', basal spine weak.

Ti I - II v_b'' d'' l' (v' v'') l'' l' (v' v'') l'' d' [$1_a' 1_a'' v_a' v_a''$]
 III - IV d'' l' v' d' [$1_a' 1_a'' v_a' v_a''$]

Mt I-IV d l' l'' v d l' v, and one or more apicals; on metatarsi III the second l'-spine usually not present.

Length of d''-spine on tibia I 0.45-0.52 mm, diameter of tibia I at base of d''-spine 0.25-0.28 mm; on tibia IV 0.57-0.65 mm and 0.21-0.23 mm, respectively. Tm I 0.14-0.17. Position of d''-spine on tibia I 0.20-0.24.

Abdomen. — Rather short and high, dorsal line strongly but evenly curved from base to spinnerets, as seen in profile. Pattern variable. Median leaf-shaped dorsal band half as wide as abdomen, beige-coloured with white blotches at centre, and with blackish serrate margins; on posterior surface whole band blackish with few narrow white chevrons and one clear-white chevron, the latter intersecting the dark band; area above spinnerets uniformly black-brown. Dorsal band bordered by mottled white dorso-lateral bands, clear-white in front. Lateral surface with a white ventro-lateral stripe from dorsal margin of operculum to half length, followed by a short vertical bar, remainder of lateral surface with irregular black streaks on beige-coloured background with many white blotches. Ventral surface, including opercula, spinnerets, and genital region, uniformly blackish with few stray white blotches.

Epigyne (fig. 27). — Opening of epigyne triangular, scape knob-shaped.

Vulva (fig. 19, 21, 28). — Atria completely separated, conical, diverging; spiral folds (*sf*) beginning on dorsal wall, making a double curve at first passage of meso-ventral wall through two semi-covered bends; spiral fold with about five coils, gradually passing into a spirally coiled tube with about two coils towards turning-point (*tp*). Fertilization duct (*fd*) running through wall of cone along the inner wall of the spiral fold, passing to axis of coils at spiral tube. Receptacula (*rs*) pointing in anterior direction from apices of atria. Scape (*s*) arising as a rectangular plate from dorsal wall, broader than long, with knob-like projection on ventral surface curving in ventral direction; anterior surface of knob excavated. Width of epigyneal aperture 0.36-0.48 mm.

Geographical variation. — Specimens from Mongolia and China are comparable in size and chaetotaxy with European specimens, but differ in colour and minor details of the vulva. I have not seen any male specimens from that region. The cephalothorax is brown to dark brown, suffused with black, without or with very faint median stripe and submarginal bands. The abdomen is less white, the latero-dorsal surface and ventro-lateral stripe are light brown or beige-coloured, with scanty white blotches only. General pattern as in European specimens. Vulva (fig. 26) with half a coil, or one, of spiral tube more than in European specimens, and with the basal plate of the scape not rectangular, but with lateral margins converging to knob-like projection. There is no difference in width of epigyneal aperture.

Distribution and habitat. — Palaearctic region, from the Iberian Peninsula, Italy and the Balkans in the south to Scandinavia and Siberia in the north, as far as China in the east. Not recorded from Japan.

The webs of this species are conspicuous from June to late autumn. The last moult takes place at the end of July and in August, and the mating of the species can be very easily observed then in the field. The males disappear soon afterwards, but the female specimens are found until October.

Linyphia triangularis is met with in a variety of situations, usually constructing its web on trees, shrubs and high plants. It can be very abundant on heather and in plantations of conifers in dry areas, but it is not exclusively adapted to this habitat. The webs are found between the upper branches of heather and plants, not between the stalks near the ground. However, the species builds its web also inside tussocks of marram-grass (*Ammophila arenaria* (L.) Link) in the coastal dunes. This probably is an extreme situation. In the dune areas that lie more inland, the webs are still found on the upper branches of the Sea Buckthorn (*Hippophae rhamnoides* L.) and other shrubs, and not in or on the marram-grass. In the true sea dunes the Sea Buckthorn does not occur, and the species appears to find a still suitable niche inside the marram-tussocks, which forms the main element of the vegetation there. It is not abundant in this kind of habitat.

Material examined. — Besides many specimens from Western Europe, this very common species has been examined from the following, geographically more important regions.

Portugal. — 3 ♀, Minho, Serra do Gerez, ix.1929, A. Scabra (MB). — 1 ♀, Tras os Montes, Melgaço, ix.1936, Athias (MB).

Spain. — 2 ♂, Monte Tibidabo N. of Barcelona, 12.ix.1953 (SMF).

France. — 1 ♀, Alpes-Maritimes, Cap Martin, x.1957, P. J. van Helsdingen (ML).
1 ♀, Gorbio, 15.x.1957, P. J. van Helsdingen (ML).

Corsica. — 5 ♀ 2 ♂, Calacuccia, 1200 m, 7.ix.1953, H. Kahmann (SMF). 2 ♀, Corte,

15-16.ix.1953, H. Kahmann (SMF). 7 ♀ 3 ♂, Col de Vizzavona, 1000 m, H. Kahmann (SMF). 3 ♀, Morosaglia, 1600 m, 23.ix.1953, H. Kahmann (SMF). 5 ♀ 1 ♂, Calenzana, Monte Grosso, 1300 m, 11.ix.1953, H. Kahmann (SMF).

Yugoslavia. — 1 ♂, Istria, Rovinj, viii.1956, R. Braun (SMF). — 1 ♀ 1 ♂, Croatia, Gračac, 6.viii.1964, C. L. Deeleman (ML). 1 ♂, Klanac near Lika river, 27.vii.1964, C. L. Deeleman (ML). 1 ♀ 2 ♂, Serbia, Pirot, Vlasi, 5.viii.1967, C. L. Deeleman (ML). Bulgaria. — 1 ♀, 220 km N. of Sofia, 28.ix.1960 (ML).

Linyphia maura Thorell

(fig. 31-39)

Linyphia maura Thorell, 1875c, Kongl. Svenska Vet.-Akad. Handling., 13(5): 18 (description juvenile specimen, Algeria).

Linyphia triangularis maura; Simon, 1884a, Arachn. France, 5(2): 231 (diagnosis ♀ variety of *triangularis*; S. France); 1929, Arachn. France, 6(3): 633, 743 (S. France). — Denis, 1933a, Bull. Soc. Hist. nat. Toulouse, 65: 573 (France, Pyrénées-Orientales); 1933b, Ann. Soc. Hist. nat. Toulon, 17: 95 (France, Var); 1934, Ann. Soc. Hist. nat. Toulon, 18: 152 (France, Var); 1935, Ann. Soc. Hist. nat. Toulon, 19: 121 (France, Var); 1954, Terre et Vie, 1: 92 (France, Camarque); 1962a, Bull. Soc. Etud. Sci. nat. Vaucluse, 1957-1962: 3 (France, Avignon); 1967, Bull. Soc. Hist. nat. Toulouse, 103: 37 (France, Pyrénées-Orientales). — Bristowe, 1935, Proc. Zool. Soc. London, 1934: 733, 759 (Rhodes).

Linyphia lusitanica Kulczyński, 1911b, Bull. int. Acad. Sci. Cracovie, B, 1911: 57, fig. 73 (description ♀, Portugal). — Bacelar, 1928, Bull. Soc. portug. Sci. nat., 10: 189 (catalogue). — Simon, 1929, Arachn. France, 6(3): 743 (= *L. triangularis maura*).

Types. — Lectotype of *Linyphia maura*, by present designation, a juvenile specimen from Algeria (MS). Type (or type-series) of *Linyphia lusitanica*, a female specimen(s) from Portugal, not available, probably at Warsaw.

Remarks. — In his original description of *L. maura*, Thorell (1875c) mentioned two juvenile specimens, but only one specimen could be found in the collection at Stockholm. It was labelled "*Linyphia maura* Thor., Africa, Algier". The specimen is designated as lectotype here. The abdomen bears a dark median dorsal band with white median triangles, the ventral surface is blackish with some white spots behind the epigastric furrow. Although there are no genitalia available in this specimen, it unmistakably belongs to the *triangularis*-like species from the Mediterranean region, which was taken for a subspecies of *triangularis* by Simon (1884a) and subsequent authors.

In the collection of Simon at Paris I found two tubes bearing labels "*L. triangularis maura*". One series, from "Gallia méridionale", indeed consisted of specimens of *maura*. The other tube, from "Bouches-du-Rhône", contained 5 ♀ and 2 ♂ of *L. triangularis* (Clerck), 1 ♀ of *L. tenuipalpis* Simon, and only 2 ♀ of *L. maura*. The diagnosis of Simon (1929) is correct, the remark on the genitalia excepted, which according to him could not be distinguished from *triangularis*.

Kulczyński's (1911b) description of *L. lusitanica* leaves no doubt as to

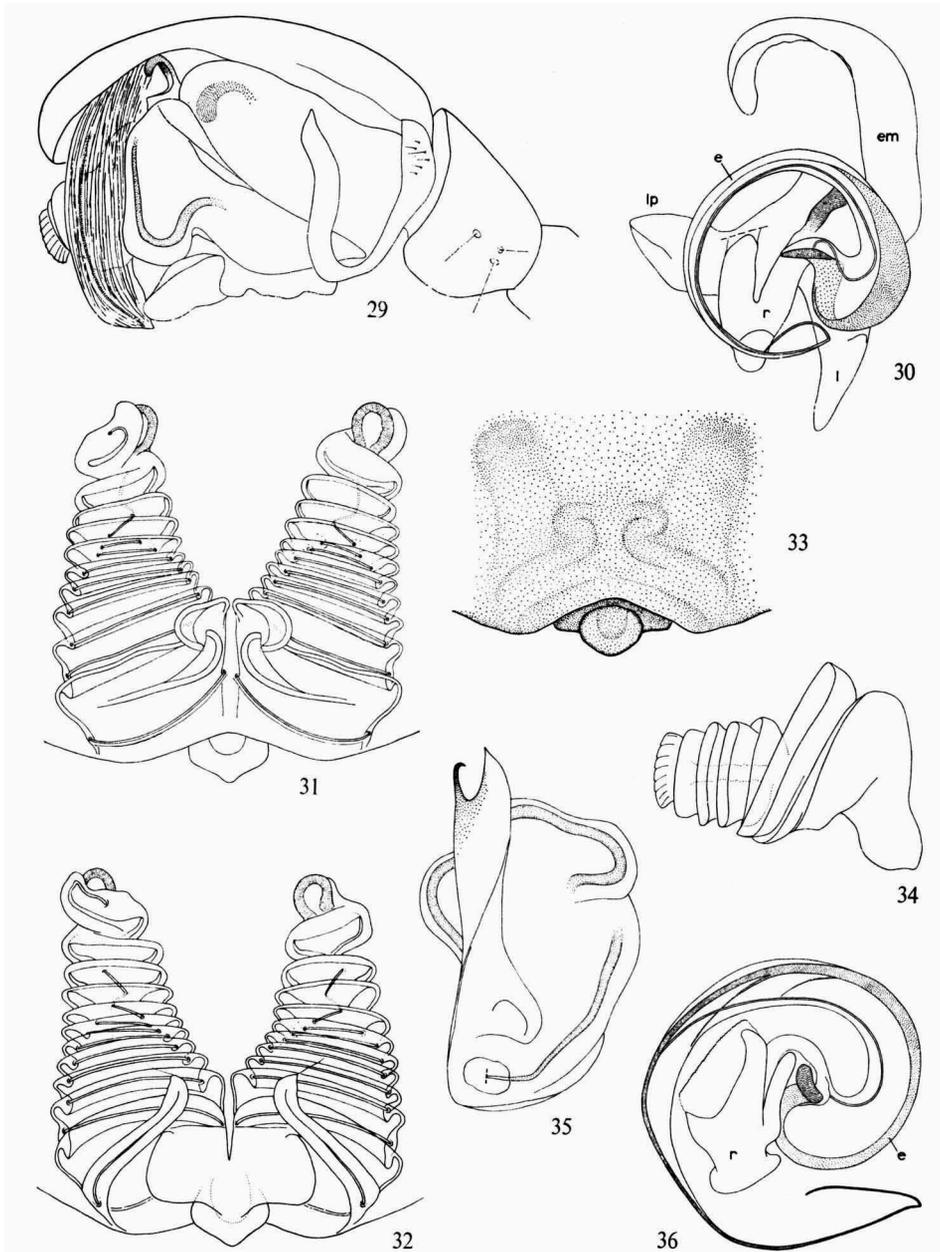


Fig. 29-30. *Linyphia triangularis*. 29, male palp, lateral aspect; 30, radix (*r*) with embolus (*e*), embolic membrane (*em*), and lamella (*l*), dorsal aspect. Fig. 31-36. *L. maura*. 31, vulva, ventral aspect; 32, do., dorsal aspect; 33, epigyne; 34, terminal apophysis; 35, tegulum with median apophysis, mesal aspect; 36, radix (*r*) with embolus (*e*), dorsal aspect. 29, 30, 33, 35, 36, $\times 67$; 31, 32, $\times 89$; 34, $\times 100$.

the identity of that species with *L. maura*. Simon (1929: 743) already suggested this synonymy, and I fully endorse his view here, though I have not had the opportunity to examine Kulczyński's specimens. I have examined some specimens, which have been identified with *lusitanica* by Bacelar, one of them published by her (1934: 133; 1935: 38), but she apparently used this name for specimens of *L. tenuipalpis* Simon. I have listed Bacelar's references of *lusitanica* consequently under that species.

The records of *L. triangularis maura* from Italy by Di Caporiacco (1951: 69; 1953: 77) are erroneous. All specimens mentioned have been re-examined and found to belong to *triangularis*.

Male. — Measurements in mm. Total length 4.1-5.4; cephalothorax, length 1.7-3.0, width 1.2-2.1; abdomen, length 2.1-2.8, width 1.15-1.5, height 1.0-1.3; chelicerae, length 0.9-2.4, width 0.36-0.60.

Cephalothorax. — Light brown to brown, suffused with black on broad submarginal band (not always distinct) from posterior margin to PLE, and with a bifurcate grey median stripe from posterior margin to anterior end of fovea, the arms parallel on posterior part of head; striae usually distinct. Posterior margin excised, sides evenly curved, constricted at border of head and thorax. Width 0.7 of length, width of head 0.6 of width of thorax. Thoracic part rather flat, head slightly raised, clypeus straight. Spine-hairs at eye-region and behind PME and PLE directed forwards and upwards. Clypeus with short hairs.

Eyes. — Eye-region narrower than head, half as wide as thorax. Both rows lightly recurved. PME on black tubercles, the lateral eyes with black bases. Diameter of PME 0.12-0.13 mm, laterals of same size, diameter of AME measuring 0.7 of diam. of PME. PME separated from each other by 2.0-2.2 diams., from PLE by 1.0 diam., and from AME by 1.3 diams. of PME. AME close together. Height of clypeus 0.20-0.22 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Long and divergent, attenuate at tips. Length 0.5-0.85 of length cephalothorax. Basal tubercle small but pronounced on latero-dorsal corner. Lateral surface with broken ridges on basal third. Dorsal and ventral row with four to five teeth, evenly spaced along apical two-thirds of mesal side, dorsal teeth larger than ventral ones.

Gnathocoxae. — Brown, lightly suffused with black near base; lateral margins emarginate, apices truncated. Labium black-brown, lateral and anterior border brown. Sternum dark brown, black-brown at margins; width 0.8 of length, narrowly produced between coxae IV.

Legs. — Yellow-brown to orange-brown, dark specimens with narrow

black apical rings on coxae and femora. Hairs on femora on small warts. Legs long, femur I 1.5-1.6 times as long as cephalothorax, length of tibia I 16 diams. of segment. Measurements in mm (of specimen from "Gallia méridionale"):

	I	II	III	IV	palp
Fe	3.25	2.65	2.45	1.80	0.94
Pa	0.70	0.65	0.50	0.55	0.29
Ti	3.25	2.30	1.35	2.00	0.25
Mt	3.85	2.90	1.80	2.75	—
Ta	1.90	1.35	0.85	1.15	0.84

Chaetotaxy. — Fe I 1-2 d, 2-3 l'; II dl'; III d; IV 2 d. Pa I-IV d''d', basal spine weak and small.

Ti	I - II	v _b '	d''	(v'' v')	l'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III - IV		d''	v'	l'		d'	[l' _a l'' _a v' _a v'' _a]
Mt	I - IV	dl'l''	vdv _a					

Length of d''-spine on tibia I 0.20-0.30 mm, diameter of tibia I at base of d''-spine 0.17-0.27 mm; on tibia IV 0.40-0.49 mm and 0.15-0.18 mm, respectively. Most spines, notably the femoral spines, on small black spots. Tm I 0.14-0.16. Position of d''-spine on tibia I 0.23-0.25.

Abdomen. — Cylindriform. Dorsal surface beige-coloured with white blotches, adorned with blackish transverse bars on posterior half, these bars alternating with white bars or white triangular spots; in dark specimens the anterior half bears black blotches, giving it a mottled appearance. Lateral surface with the same mottled aspect, darkest on posterior half. Ventral surface more or less uniformly black, with few scattered white blotches. Opercula and genital area light brown, spinnerets brown with black suffusion.

Palp (fig. 37, 39). — All segments yellow-brown. Femur slightly curved around base of chelicerae. Patella short and dorsally humped, dorsal spine as long as segment. Tibia short, as long as high, with long latero-dorsal hairs, and with a weak dorsal spine, or rather spinehair, which is about as long as segment. Cymbium spineless or with few weak spines along mesal margin. Paracymbium with bent ventral part narrow and round in cross-section, distal arm flat and narrow, widening towards pointed tip. Tegulum as in *triangularis* with a squarish apical lobe, and with a distinct notch proximally of this lobe, but lobe more pronounced. Median apophysis (fig. 35) long and straight, slightly hook-shaped tip of distal part very slender. Embolus (fig. 36, e) broad and curved at base, with chitinous outer margin, narrowing towards tip; very thin and thread-like on apical third, bent backwards well before tip; element distinctly longer than in *triangularis*, measuring 2.3 mm

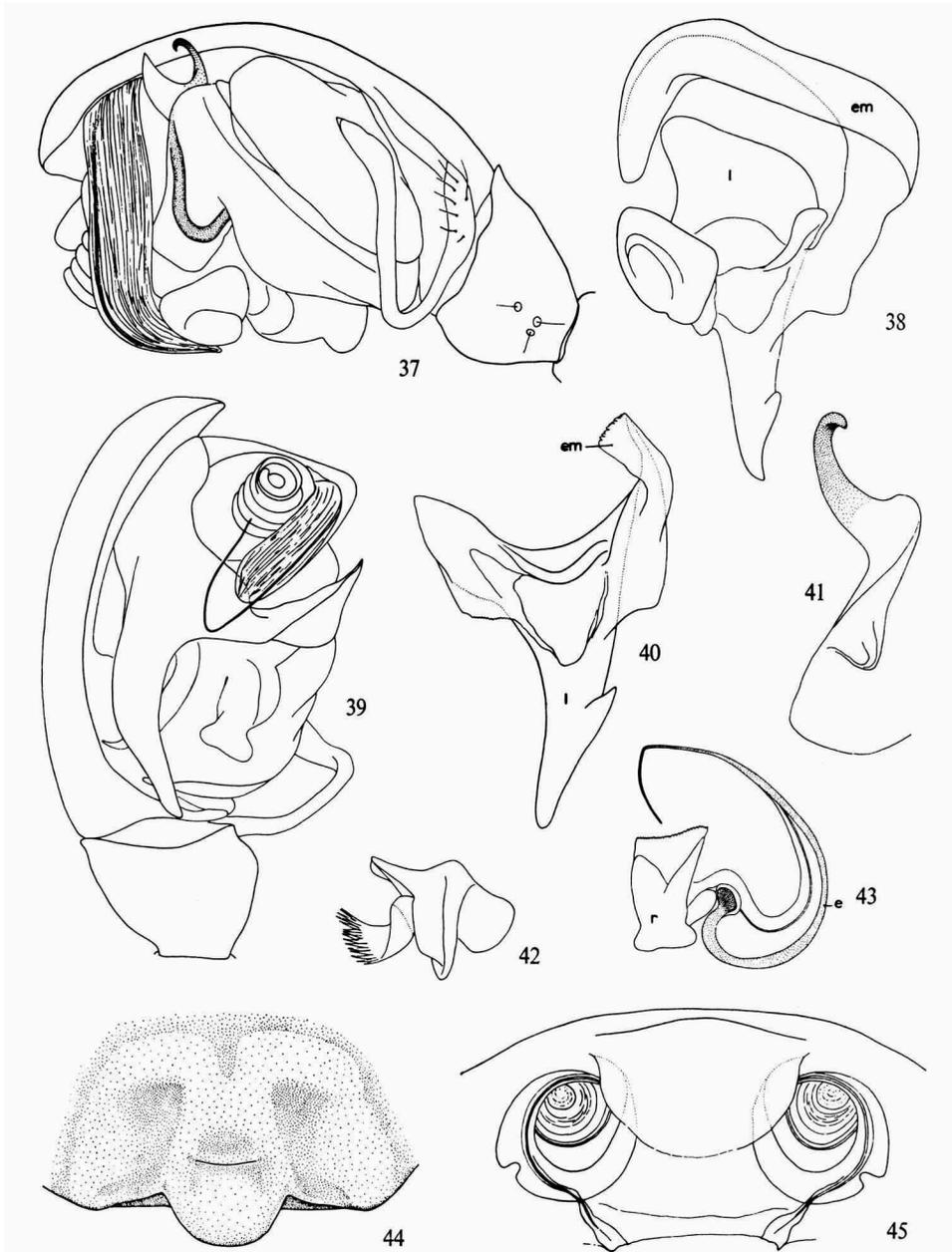


Fig. 37-39. *Linyphia maura*. 37, male palp, lateral aspect; 38, lamella(*l*) with embolic membrane(*em*), dorsal aspect; 39, male palp, ventral aspect. Fig. 40-45. *L. tenuipalpis*. 40, lamella(*l*) with embolic membrane(*em*), dorsal aspect; 41, median apophysis, mesal aspect; 42, terminal apophysis; 43, radix(*r*) with embolus(*e*), dorsal aspect; 44, epigyne; 45, vulva, posterior aspect. 37-39, $\times 67$; 40, 41, 43, $\times 100$; 42, $\times 123$; 44, $\times 80$; 45, $\times 89$.

in dissected specimen. Embolic membrane (fig. 38, *em*) sheath-like, the embolus lying in the fold with only the bent apical part free. Terminal apophysis (fig. 34) with slightly more than seven coils, anterior margins raised and apical coil grooved and serrate as in *triangularis*; axis hollow. Lamella (fig. 38, *l*) with narrow proximal tip, mesal margin passing evenly into straight anterior margin, which runs obliquely forwards to bluntly rounded anterolateral tip; lateral margin lightly emarginate between tip and lateral projection, the latter flat and blade-like as in *triangularis*; a transverse crest present at base of embolic membrane.

Female. — Measurements in mm. Total length 3.9-4.9; cephalothorax, length 1.6-2.1, width 1.05-1.4; abdomen, length 2.6-3.2, width 1.85-2.3, height 1.75-2.8; chelicerae, length 0.8-1.0, width 0.38-0.45.

Cephalothorax. — Colour and pattern as in male, but the submarginal bands broader, occupying one-fourth of width of cephalothorax; clypeus laterally suffused with grey. In dark specimens anterior arms of bifurcate median stripe almost reaching the PME. Posterior margin broadly excised, shape otherwise not differing from male. Hairs behind posterior eyes not spine-like, shorter than in male.

Eyes. — Diameter of PME 0.09-0.12 mm. PME separated from each other by 1.8-2.5 diams., from PLE by about 1.0 diam., and from AME by 1.6-1.8 diams. of PME. AME separated by slightly less than their own diameter, which measures 0.7 of diameter of PME. Height of clypeus 0.14-0.18 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Basal two-thirds of lateral surface with broken ridges. Dorsal row with five evenly spaced teeth, second tooth largest, sizes gradually diminishing towards apical tooth, which is half as large as second tooth and as large as basal tooth opposite to third dorsal tooth.

Legs. — Light brown to brown, tibiae with broad but faint median rings, and with narrow and slightly darker subapical rings; median rings barely visible in light specimens; posterior surface of coxae suffused with grey; femora and patellae usually with narrow blackish apical rings. Length of femur I 1.3-1.4 times of cephalothorax, length of tibia I 10-11 diams. of segment. Measurements in mm (of specimen from "Gallia méridionale"):

	I	II	III	IV
Fe	2.75	2.35	1.70	2.30
Pa	0.70	0.65	0.50	0.55
Ti	2.70	2.05	1.25	1.80
Mt	2.65	2.10	1.50	2.25
Ta	1.65	1.25	0.85	1.15

Chaetotaxy. — Fe I 1 d, 2-3 l'; II-III d; IV 2 d. Other segments with same spines as male, but spines longer. Length of d''-spine on tibia I 0.39-0.44 mm, diameter of tibia I at base of d''-spine 0.24-0.25 mm; on tibia IV 0.52-0.60 mm and 0.17-0.21 mm, respectively. Tm I 0.16-0.25. Position of d''-spine on tibia I 0.22-0.24.

Abdomen. — Shape as in *triangularis*, with evenly curved dorsal surface. Dorsal longitudinal leaf-shaped band nearly as wide as abdomen, comparatively wider than in *triangularis*, with black margins on basal third, with deeply incised black margins on second third, and becoming black with broad but short white median triangles in posterior third; centre of band mottled with white on anterior part. Lateral surface mottled with white on light brown background, with conspicuous white ventro-lateral band from dorsal margin of operculum to half length, ending there with a short vertical streak in dorsal direction; posterior half of lateral surface and area above spinnerets mainly blackish. Ventral surface black, with a few isolated white blotches. Opercula and genital area brown.

Epigyne (fig. 33). — Opening small, triangular, scape knob-shaped. Apical coils of chitinized spiral-tube visible through ventral integument.

Vulva (fig. 31, 32). — As in *triangularis*, but with smaller epigyneal aperture and more coils. Atria conical with about six coils of spiral fold, gradually passing into the spiral tube, which consists of four coils. Spiral fold beginning on dorsal wall, and passing through a double curve as in *triangularis*. Receptacula pointing in anterior direction. Fertilization duct running parallel with spiral fold through wall of atrium, and through axis of coils of spiral tube. Scape rectangular at base, with a much narrower rounded knob on the ventral side continuous with mesal septum between atria. Width of epigyneal aperture 0.28-0.34 mm.

Distribution and habitat. — Judging from the available data, *Linyphia maura* probably is restricted to the western part of the Mediterranean region, viz., the southern coast of France, Portugal (and Spain?), Morocco, and Algeria. The records from Italy (Di Caporiacco, 1951: 69; 1953: 77) were found to be based on false identifications (see under remarks on the present species). The record from Rhodes (Bristowe, 1935: 733) needs confirmation. I have collected the species myself in Morocco, where the webs were found in a hedge and on shrubs. Other data about the habitat of the species are not available.

Adult males have been collected in September and October, adult female specimens from September to December and from March to April. Compared with *triangularis* and *tenuipalpis* the mating period falls late, while adult fe-

males never have been recorded for these species as early as March and April.

Material examined.

France. — 2 ♀, Bouches-du-Rhône, 12.xi.1913 (Simon, 1884a, 1929? (p.p.); MNP). — 5 ♀ 2 ♂, "Gallia méridionale" (Simon, 1884a, 1929; MNP). — 1 ♀ 1 subadult ♂, Var, Port Cros, 24.ix.1934, J. Denis (Denis, 1935; CD). — 2 ♀ 1 ♂, Hérault, Castelnau-le-Lez, 25.x.1962, J. C. Ledoux (CL). — 1 ♀, Pyrénées-Orientales, Banyuls, xii.1908 (MNP).

Portugal. — 1 ♀, Beira Litoral, Serra da Boa Viagem near Figueira da Foz, 1.iv.1942, R. Lopes (MB). 8 ♀ 3 ♂ 3 subadult ♀, Leiria, ix.1928, R. Lopes (MB). — 6 ♂ 13 subadult specimens, Estremadura, Piedade near Alcobaca, ix.1936, F. Frade (MB). — 1 ♂, Ribatejo, São João da Ribeira, 1936, F. Frade (MB).

Morocco. — 3 ♀, Tanger, on shrubs, in hedge, 16.iii.1965, P. J. van Helsdingen (ML).

Algeria. — 1 subadult ♀, Algeria, N. Westring (lectotype of *Linyphia maura* Thorell; MS).

***Linyphia tenuipalpis* Simon**

(fig. 40-49)

Linyphia triangularis tenuipalpis Simon, 1884a, Arachn. France, 5(2): 230 (description of ♂ variety of *L. triangularis*; France); 1929, Arachn. France, 6(3): 633, 743 (description ♀ ♂, key, France).

Linyphia tenuipalpis; Kulczyński, 1913, Faune distr. Walouyki, etc., 10: 10, 21, pl. 1 fig. 6-7 (description ♀ ♂, Russia, Italy). — Lehtinen, 1964, Ann. Zool. Fennici, 1: 305 (Finland and Sweden). — Holm, 1968, Zool. Bidr. Uppsala, 37(2): 199, fig. 23-26 (Sweden).

Linyphia triangularis; Bösenberg, 1901, Zoologica, Stuttgart, 14 (34/35): 65, pl. 5 fig. 63A-C (aberrant ♀ of *triangularis*; Germany). — Von Bochmann, 1942, Kieler Meeresforsch., 4: 54 (Germany).

Linyphia lusitanica; Bacelar, 1934, Arq. Mus. Bocage, 5: 133; 1935, Bull. Soc. portug. Sci. nat., 12: 38 (p.p. at least; Portugal).

Type. — ♂ neotype, by present designation, selected from the only available series in the collection of Simon at the Muséum National d'Histoire naturelle at Paris. The series is of unknown origin, but probably from France. It is deemed necessary to select a type-specimen for this species, and only this series is available for the purpose. As Simon has never given any exact locality with original or subsequent records (only "toute la France"), it is impossible to know whether Simon had the series mentioned before him, when describing the subspecies *tenuipalpis*. Consequently a lectotype cannot be designated. The term "neotype" is not correct either, but it seems to be the only possibility. Locket (1964) has dealt with the material of the O. Pickard-Cambridge collection in a similar way.

Remarks. — The species was described by Simon (1884a) as a male variety of *L. triangularis*, distinguished from the nominate form by the number of V-spines on femur I, and by the greater relative length of the palpal tibia. He did not mention any locality or habitat. In 1929 he still treated it as a male variety, stating in a note the impossibility to find any

useful diagnostic characters in the female. This notwithstanding the detailed description and figure of the epigyne, given by Kulczyński (1913), which paper is referred to by Simon himself (1929: 743). Again he did not mention any definite locality, but only "toute la France (en même temps que le type)".

The aberrant ♀ of *L. montana* (Linnaeus) [= *L. triangularis* (Clerck)], recorded by Bösenberg (1901: 65) from Germany, unmistakably belongs to *tenuipalpis* Simon. Bösenberg suggested it might be a different stage of development of *triangularis*, because of the great resemblance with that species. *L. tenuipalpis* resembles *triangularis* very closely indeed in coloration, size, and habitat, but the genitalia are markedly different, though of related structure. The specimen of Bösenberg was found in the same habitat and at the same time as *L. triangularis*.

Von Bochmann (1942: 54) recorded two female specimens from the Northsea island Amrum, in which he recognized Bösenberg's aberrant form of *triangularis*, again amongst specimens of the true *triangularis*.

Bacelar (1934, 1935) has given a long list of captures of *L. lusitanica* Kulczyński [= *L. maura* Thorell] from Portugal. The only specimen re-examined from this list appears to belong to *L. tenuipalpis* Simon. Several other specimens from the collection at Lisbon have been re-examined, all identified with and labelled as *lusitanica*, apparently by Bacelar, but none of these were mentioned in her publications. All these specimens belong to *tenuipalpis*, and consequently it is presumed that Bacelar's records of *lusitanica* refer, at least pro parte, to the present species. The species appears to be very common in Portugal.

More recently the species has been recorded from Finland (Lehtinen, 1964) and Sweden (Holm, 1968); the latter author has also depicted the genitalia, which according to him are of the same type as those of *Linyphia impigra* O. Pickard-Cambridge [= *Microlinyphia impigra* (O. Pickard-Cambridge)]. In my opinion, the general resemblance of the two species in that respect must be due to convergence.

Male. — Measurements in mm. Total length 4.6-6.3; cephalothorax, length 2.25-2.9, width 1.6-1.95; abdomen, length 2.3-3.0, width 1.3-1.6, height 1.1-1.4; chelicerae, length 1.3-2.25, width 0.45-0.60.

Cephalothorax. — Light brown with faint grey median stripe, which is bifurcate with parallel arms on posterior part of cephalon; broad grey submarginal bands from posterior margin to PLE, sometimes very faint. Posteriorly broadly excised, sides evenly rounded, constricted at border of head and thorax. Width 0.65-0.7 of length, width of head 0.65 of width of thorax.

From side, dorsal line rising evenly from posterior margin to eye-region; clypeus straight. Eye-region and upper two-thirds of clypeus with normal hairs, short in comparison with *triangularis* and *maura*.

Eyes. — Width of eye-region 0.5 of width of thorax. Both rows of eyes slightly recurved. PME on black tubercles. Diameter of PME 0.10-0.12 mm, laterals of same size, AME smaller, their diameter measuring 0.7 of diameter of PME. PME separated from each other by 2.0-2.2 diams., from PLE by 1.1-1.3 diams., and from AME by 1.4-1.5 diams. of PME. Distance between AME less than their own diameter. Height of clypeus 0.14-0.17 of length of cephalothorax.

Chelicerae. — Light brown as cephalothorax. Long and divergent, attenuated apically. Length about 0.65 of length of cephalothorax in small specimens, up to 0.8 in larger specimens. Basal tubercle small, on latero-dorsal corner. Apical half of lateral surface and larger part of dorsal surface covered with small warts with a hair each. Second fifth of lateral surface with broken ridges. Cheliceral teeth on apical two-thirds of mesal margin, four to six teeth in dorsal row, rather evenly spaced, middle tooth largest, others slightly smaller; ventral row with four to five teeth, smaller than dorsal ones. Fang as long as two-thirds of chelicera.

Gnathocoxae. — Light brown, suffused with black at bases; outer margins parallel. Labium black-brown, anterior half lighter. Sternum black-brown, slightly darker at margins; width 0.8 of length, narrowly produced between coxae IV.

Legs. — Yellow-brown to orange-brown. Hairs of femora on small warts. Legs long and slender, femur I 1.7-1.8 times as long as cephalothorax, length of tibia I 18-19 diams. of segment. Measurements (of neotype) in mm:

	I	II	III	IV	palp
Fe	3.95	3.25	2.25	3.10	0.81
Pa	0.80	0.70	0.60	0.65	0.27
Ti	3.90	2.80	1.65	2.50	0.40
Mt	4.55	3.45	2.30	3.55	—
Ta	2.10	1.40	0.95	1.35	0.56

Chaetotaxy. — Fe I d, 3-4 l'; II d, 2-3 l'; III d, 1-3 l'; IV 2 d.
Pa I-IV d''d', basal spine weak and small.

Ti	I - II	v _b '	d''	(v'v')	l'	v'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III - IV		d''		l'	v'		d'	[l' _a l'' _a v' _a v'' _a]
Mt	I - II	dl'	l''	v	v _a				
	III - IV	dl'	l''	vdv _a					

Length of d''-spine on tibia I 0.27-0.29 mm, diameter of tibia I 0.21-0.24 mm; on tibia IV 0.44-0.64 mm and 0.19 mm, respectively. Tm I 0.11-0.15. Position of d''-spine on tibia I 0.23-0.26.

Abdomen. — Cylindriform, genital area sometimes slightly swollen. Dorsal surface light brown, with the exception of a narrow lanceolate median stripe from base to three-fifths of length, with scattered white blotches; on apical third usually some transverse black bars present, at least at sides. Area above spinnerets suffused with black. Lateral surface light brown with scattered white blotches, a few irregular grey streaks usually present. Ventral surface including genital area, opercula and spinnerets light brown, suffused with black; narrow streak along ventral margins of opercula without black suffusion, light brown.

Palp (fig. 48, 49). — Smaller than in *triangularis* and *maura*, but of same structure. All segments light brown. Femur curved along base of chelicera. Patella longer than in *triangularis* and *maura*, not humped dorsally; dorsal spine near apical margin two-thirds of length of segment. Tibia longer than patella, but still shorter than cymbium, widening towards apex; dorso-lateral curved spine two-thirds of length of segment, one or two shorter ventral spines. Cymbium with a number of spines along mesal margin, and with a dorsal or lateral spine on apical half. Paracymbium with narrow round ventral bend, and with flat and slightly broader distal arm. Tegulum with apical lobe rounded, not squarish as in *maura*, more superficially excavated proximally of lobe. Median apophysis (fig. 41) narrow, large and curved distal part forming an angle with the proximal part, which is barely widened at extreme base (cf. *triangularis*); distal tip very conspicuous at the unexpanded palp. Embolic membrane (fig. 40, *em*) short, not distinctly sheath-shaped as in *triangularis*. Embolus (fig. 43, *e*) shorter than in *triangularis*, but of same appearance (0.75 mm in dissected specimen). Terminal apophysis (fig. 42) small and membranous, with about one and a half coil; outer margin of coil ending rather abruptly on dorsal side; a small apical coil with frayed anterior margin visible at apex; axis hollow as in other species of the *triangularis*-group. Lamella (fig. 40, *l*) with narrow proximal tip and conspicuously emarginate anterior margin; lateral projection more rounded with a blunt tip; dorsal crest at base of embolic membrane, less developed than in other species of the group.

Female. — Measurements in mm. Total length 4.0-7.5; cephalothorax, length 1.75-2.9, width 1.2-1.9; abdomen, length 2.4-5.2, width 1.4-3.3, height 1.6-3.8; chelicerae, length 0.81-1.15, width 0.35-0.50.

Cephalothorax. — Colour and pattern as in male, submarginal bands as wide as one-fourth of cephalothorax. Posterior margin superficially excised. In lateral view foveal region rather flat. Eye-region and clypeus shortly haired. Both rows of eyes recurved. Diameter of PME 0.09-0.12 mm, dis-

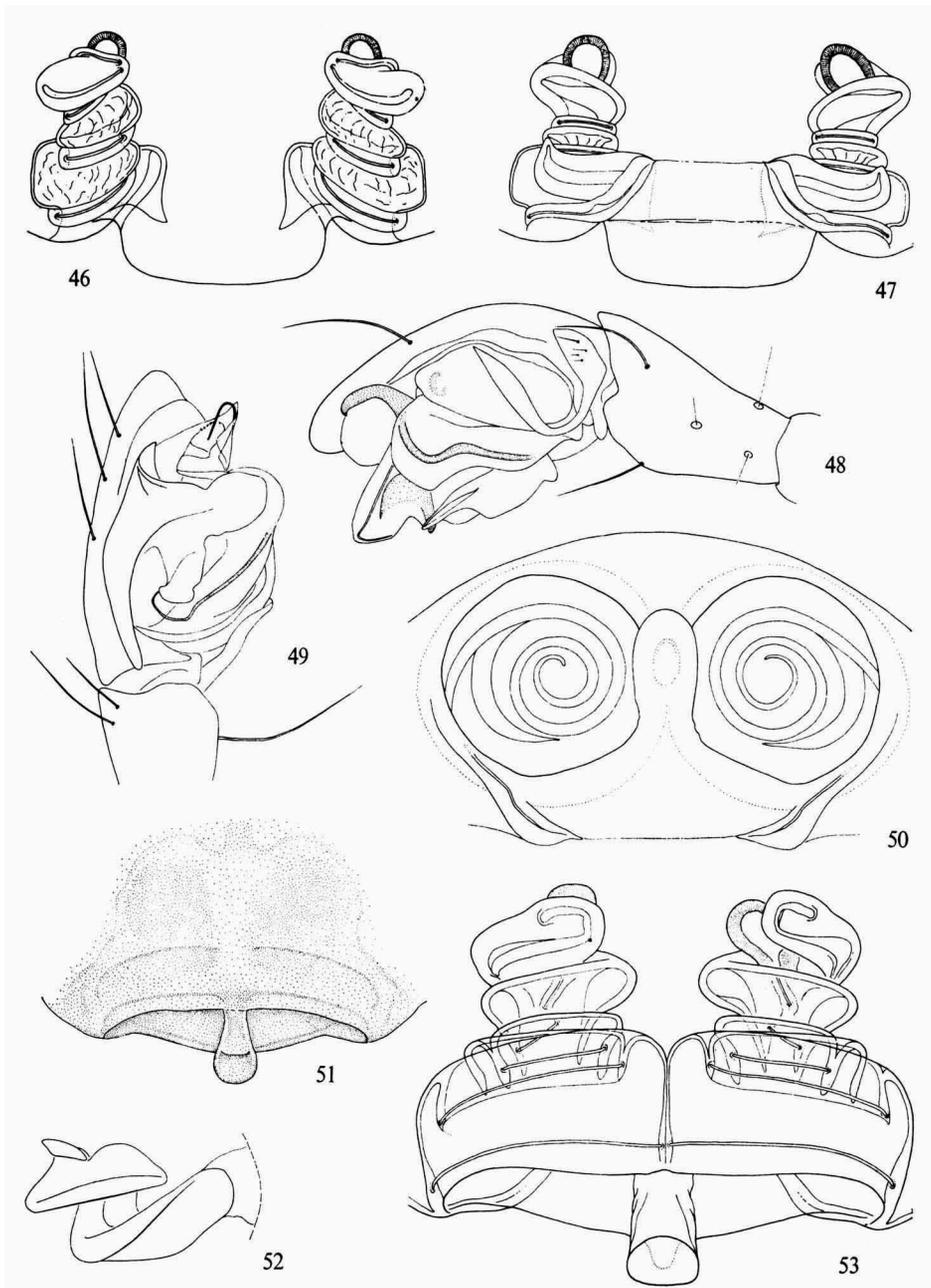


Fig. 46-49. *Linyphia tenuipalpis*. 46, vulva, ventral aspect; 47, do., dorsal aspect; 48, male palp, lateral aspect; 49, do., ventral aspect. Fig. 50-53. *L. hortensis*. 50, vulva, posterior aspect; 51, epigyne; 52, terminal apophysis; 53, vulva, ventral aspect. 46, 47, $\times 89$; 48, 49, $\times 67$; 50, 53, $\times 123$; 51, $\times 80$; 52, $\times 100$.

tance between PME mutually 2.1-2.4 diams., between PME and PLE 1.3 diams.; PME separated from AME by 1.8-2.0 diams. of PME. Height of clypeus 0.14-0.18 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax, often with an oblique grey streak from mesally at base to laterally at apex. Dorsal row with four to six teeth, evenly spaced, second and third teeth large, basal and fourth teeth half as long, apicals, if present, very small and close together. Ventral row with four to five small teeth, gradually diminishing in size from basal to apical tooth, basal tooth opposite to gap between second and third teeth of dorsal row.

Legs. — Light brown to brown, posterior surface of coxae IV usually heavily suffused with black. Metatarsi and tarsi darkened at apices. Spines on small black spots. Length of femur I 1.3-1.6 times length cephalothorax, length of tibia I 11-12 diams. of segment. Measurements in mm (of specimen from Germany, Bremen):

	I	II	III	IV
Fe	2.85	2.40	1.70	2.45
Pa	0.70	0.65	0.55	0.55
Ti	2.75	2.05	1.30	1.95
Mt	2.80	2.25	1.55	2.45
Ta	1.55	1.20	0.85	1.05

Chaetotaxy. — Fe I d, 2-3 l', rarely 4 l'; II-III d, l' sometimes present; IV 2-3 d. Pa I-IV d''d', basal spine weak and half as long as apical spine.

Ti I - II v''_b d'' (v'' v') l' v' l'' d' [_a l''_a v''_a v''_a]
 III - IV d'' l' v' d' [_a l''_a v''_a v''_a]

Mt I - IV dl' l'' vdv_a

Tibia I usually with an additional v''-spine proximally of l'-spine. Tibia IV often with a l''-spine. A v''-spine sometimes present on tibia III. Length of d''-spine on tibia I 0.42-0.49 mm, diameter of tibia I at base of d''-spine 0.24-0.34 mm; on tibia IV 0.45-0.50 mm and 0.21 mm, respectively. Tm I 0.15-0.17. Position of d''-spine on tibia I 0.21-0.23.

Abdomen. — Strongly resembling *triangularis*, and as variable, but with lighter ventral surface. Leaf-shaped dorsal band with white blotches on beige-coloured background, and with black serrate margins and chevrons, notably on posterior half. Posterior surface blackish, separated from dorsal surface by a clear white chevron or narrow transverse band. Surrounding area white anteriorly, blackish or white posteriorly in dark or light specimens, respectively; lateral surface with clear white ventro-lateral streak from dorsal margin of operculum to half length of abdomen, followed by a short white vertical bar. Ventral surface greyish or black with many white blotches, a

white spot behind operculum on either side usually well developed. Opercula and genital area brown.

Epigyne (fig. 44). — In posterior view two small round openings visible, separated by a median lobe. Lobe broader than long, width 0.16-0.25 mm, with slightly bulging posterior surface standing perpendicularly to the ventral surface of the epigyne, which is depressed in the middle.

Vulva (fig. 45-47). — Atria separated by a median lobe, which probably is the homologue of the scape in *triangularis* and *maura*. Spiral folds and spiral tubes with three coils, transition of fold into tube not discernible, the double curve in the spiral fold situated dorso-laterally at the first coil (ventrally near median plane in *triangularis* and *maura*). Coils of fertilization duct narrower than coils of fold and tube. Receptacula pointing in anterior direction.

Distribution and habitat. — *Linyphia tenuipalpis* has a wide distribution in Western Europe. The northern limit of its range, as far as known, lies in Southern Sweden (Holm, 1968) and Southern Finland (Lehtinen, 1964). The earlier records are from Russia (Kulczyński, 1913), Germany (Bösenberg, 1901; Von Bochmann, 1942), France (Simon, 1884a, 1929), and Italy (Kulczyński, 1913). The species has been proved now to occur also in The Netherlands, Belgium, Spain, and Portugal. In Portugal it seems to be the common representative of the *triangularis*-group, while *maura* and *triangularis* are rather rare in this region. In general appearance this species so much resembles *triangularis*, that it may have been overlooked in many collections. It certainly is much rarer than *triangularis* in North-Western Europe.

Linyphia tenuipalpis becomes adult in late July and August, resembling *triangularis* in that respect. Adult males, which are the best indicators of a mating period, have been collected from July 16th onwards, and not later than August. Female specimens have been collected as late as November. Bösenberg (1901: 14) stated that his aberrant female of *L. montana* (Clerck) [= *L. triangularis* (Clerck)] was collected together with normal specimens of that species, all adult, at the end of May, but this is very early, in my opinion, for *triangularis* or *tenuipalpis*.

The habitat of the present species does not seem to differ from the habitat of *triangularis*. The data available from literature point to an occurrence in similar situations as *triangularis* (Bösenberg, Von Bochmann). Data concerning the habitat are known in a few cases only of the specimens recorded here for the first time; all mention *Erica* as a substratum for the webs of this species. A similar habitat was mentioned by Holm (1968: 199) for Sweden.

Material examined.

Finland. — 1 ♂, Turku ja Pori, Korpoo Åvenser, between limestone blocks, 29.vii.1966, M. Saaristo (ML); 2 ♀, do., 26.viii.1968, P. Lehtinen (ML).

Germany. — 1 ♀, Holstein (NMB). 1 ♀, Riepe near Bremen, from tussocks of *Erica*, 23.viii.1962, W. Rabeler (SMF); 1 ♀, do., 12.ix.1963 (SMF). 1 ♀, Bremen, park, C. F. Roewer (SMF).

Netherlands. — 1 ♀, Groningen, Sellingen, 14.viii.1960 (ML).

Belgium. — 1 ♀, Antwerpen, Kalmthout, on *Erica*, 13.xi.1956, J. Kekenbosch (ISNB).

France. — 2 ♀ 6 ♂ 3 juvs., locality unknown (Simon, 1929?; ♂ neotype taken from this series; MNP). — 1 ♂, Drôme, Col de la Chaudière N. of Bourdeaux, 1000 m, 16.vii.1968, P. J. van Helsdingen (ML). — 1 ♀, Hautes-Alpes, Aspremont, ix.1948, M. Thomas (ISNB). — 1 ♀, Bouches-du-Rhône, 12.xi.1913 (*L. triangularis maura*; Simon, 1929 (p.p.); MNP). — 2 ♀, Gard, Les Angles, 12.ix.1959, J. C. Ledoux (CL). — 5 ♀, Hérault, Castelnan-le-Lez, 25.x.1962, J. C. Ledoux (CL). 21 ♀ 9 ♂, between Montpellier and Grabels, on vegetation, 1.viii.1968 (subadult), J. C. Ledoux, all moulted before 14.viii.1968 (ML). — 7 ♂, Pyrénées-Orientales, Banyuls, 23.vii.1963, J. C. Ledoux (CL).

Portugal. — 3 ♀, Minho, Serra do Gerez, ix.1941 (MB). 1 ♀, Minho, ix.1932, F. Frade (MB). 2 ♀ 4 ♂, Melgaço, ix.1929, Athias (ML). — 1 ♀, Douro Litoral, Santo Tirso, ix.1927, A. Bacelar (*L. lusitanica*; Bacelar, 1934?; MB). 1 ♂, Fagilde, 25 km S. of Porto, viii.1928, F. Frade (MB); 1 ♂, do. (MB). 1 ♀, Porto, ix.1927, F. Frade (MB). 6 ♀, Gondomar, x.1940, R. Lopes (MB). 13 ♀, Areinho (Porto), ix.1942, R. Lopes (MB). 11 ♀, Margens Rio Leça, ix.1942, R. Lopes (MB). — 1 ♀, Alto Douro, Pedras Salgadas, ix.1929 (MB). 7 ♀, Vila Flor, ix.1940 (MB). — 2 ♀, Beira Alta, Viseu, 17.ix.1942, R. Lopes (MB). 2 ♀, Vimieiro near Santa Comba Dão, ix.1942, R. Lopes (MB). 1 ♀, Moledo (Castro Daire), ix.1942, R. Lopes (MB). — 1 ♀ 1 ♂, Estremadura, Pincanceira, 36 km NW. of Lisboa, viii.1940, F. Frade (MB). 1 ♀, Piedade near Alcobaca, ix.1936, F. Frade (MB).

Spain. — 1 ♀, Monte Tibidabo N. of Barcelona, 12.ix.1953 (SMF).

The *Linyphia hortensis* group***Linyphia hortensis* Sundevall**

(fig. 50-61, 65, pl. 2 fig. 1)

Linyphia hortensis Sundevall, 1829, Kongl. Svenska Vet.-Acad. Handling., 1829: 213 (description ♀ ♂, "Scaniae"). — Simon, 1929, Arachn. France, 6(3): 637, 745, fig. 982-984 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 125, pl. 9 fig. 64, 66-69 (genitalia). — Locket & Millidge, 1953, British Spid., 2: 401, fig. 237G, 239C, 240E (British Isles). — Wiehle, 1956, Tierw. Deutschl., 44: 320, fig. 527-533 (key, Germany).

Linyphia sylvatica Blackwall, 1841, Trans. Linn. Soc. London, 18: 659 (description ♀ ♂, England); 1851, Ann. Mag. Nat. Hist., (2)8: 449 (= *L. pratensis* Wider). — Walckenaer, 1847, Hist. nat. Ins., Aptères, 4: 499 (= *L. pratensis* Wider). — Thorell, 1870, Rem. syn. Europ. spid., 48 (= *L. hortensis* Sundevall).

Linyphia frutetorum; C. L. Koch, 1845, Die Arachniden, 12: pl. 424 fig. 1046 (p.p.; figure of ♂). — Simon, 1929, Arachn. France, 6(3): 745 (= *L. hortensis* Sundevall).

Linyphia albicincta O. Pickard-Cambridge, 1863, Zoologist, 21: 8577 (description of subadult ♂; England); 1879, Proc. Dorset Nat. Hist. Antiquar. Fld. Cl., 1: 230 (= *L. hortensis* Sundevall). — Thorell, 1870, Rem. syn. Europ. spid.: 48 (= *L. hortensis* Sundevall).

For a complete list of references up to 1939, see Bonnet (1957: 2504).

Types. — As far as known, there is no original material in existence of any of the names listed here.

Remarks. — Sundevall's (1829) description is sufficiently detailed to recognize the species. This is also the case with *L. sylvatica* of Blackwall (1841). This species was placed into the synonymy of *L. pratensis* Wider [= *Microlinyphia pusilla* (Sundevall)] by Walckenaer (1847: 499) and by Blackwall himself (1851: 449), but this is not in accordance with the description. Thorell had the opportunity to examine specimens of *L. pratensis* sensu Blackwall, which he had received from Pickard-Cambridge, and he identified the species with *L. hortensis* Sundevall. He was also able to list *L. albicincta* O. Pickard-Cambridge as a synonym of *hortensis* on the authority of Pickard-Cambridge himself.

Koch (1845) mentioned a male variety of *Linyphia frutetorum* C. L. Koch, which he depicted on one of his excellently coloured plates. According to him, the variety can be distinguished from the main form by its darker colour, and by the two white antero-dorsal spots of the abdomen; the palp is said to lack the thread-like spirally coiled apophysis (= embolus). Notably this last character is an indication of its belonging to *hortensis*. It was recognized as such by Simon (1929).

The species has been recorded from Jehol in China by Saito (1936), but I have to contradict this here. Saito's figures of the genitalia (fig. 9, pl. 18b) correspond in detail with *L. triangularis* (Clerck). The other figures (pl. 17, 18a) clearly show the habitus of the Asiatic form of that species, which lacks the bifurcate median stripe on the cephalothorax. As this is the only record of *hortensis* from East Asia, the eastern limit of its range is brought back to Russia and Turkestan.

A near relative of *L. hortensis* has been found in the Alps in Switzerland, Italy, and Austria. It was not recognized by some authors who had the species before them (Di Caporiacco, 1922, 1927; Denis, 1963; under *hortensis*). It is described as *Linyphia alpicola* in this paper.

Male. — Measurements in mm. Total length 3.1-4.7; cephalothorax, length 1.45-2.25, width 1.05-1.4; abdomen, length 1.65-2.4, width 0.95-1.3, height 0.9-1.2; chelicerae, length 0.81-1.25, width 0.35-0.55.

Cephalothorax. — Orange-brown to brown, cephalon dark brown. Posterior margin broadly but superficially excised, sides evenly curved and lightly constricted at border of head and thorax; width 0.65 of length, width of head 0.55 of width of thorax. In lateral view, dorsal line rising evenly from posterior margin to fovea, level in front of fovea, slowly declining to eye-region; clypeus straight. Very short hairs on striae; posterior part of head,

eye-region, and clypeus shortly haired; a few spinehairs behind PLE at either side, and between eyes.

Eyes. — Eye-region occupying whole width of head. Both rows slightly recurved. PME on distinct black tubercles. Diameter of PME 0.08-0.10 mm, lateral eyes of same size, diameter of AME 0.7 of PME. PME separated from each other by 1.7-2.2 diams., from PLE by 1.3-1.6 diams., and from AME by 1.4 diams. of PME. AME separated by about their own diameter. Height of clypeus 0.15-0.16 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Rather massive, slightly diverging, apical slant slightly concave. Basal tubercle small on latero-dorsal corner. Hairs on distinct warts on dorsal surface, and on apical half of lateral and ventral surfaces. Stridulating files composed of faint broken ridges on basal half of lateral surface. There is a large tooth, rather dorsal in position, at the proximal end of the apical slant, followed by a more ventrally placed row of three small equidistant teeth.

Gnathocoxae. — Dark brown with lighter apices; lateral margins emarginate, broadly truncated anteriorly. Labium black-brown, anterior margin lighter. Sternum brown to dark brown, slightly darker at margins; width 0.8 of length.

Legs. — Yellow-brown to orange-brown, not annulated. Length of femur I 1.0-1.2 times length cephalothorax, length tibia I 14-17 diams. of segment. Measurements in mm (of specimen from The Netherlands, Valkenburg):

	I	II	III	IV	palp
Fe	2.35	2.20	1.80	2.35	0.75
Pa	0.55	0.55	0.45	0.50	0.23
Ti	2.45	2.10	1.45	2.00	0.25
Mt	2.60	2.25	1.70	2.35	—
Ta	1.45	1.20	0.80	1.05	0.75

Chaetotaxy. — Fe I $d'l'$; II-IV d. Pa I-IV $d''d'$, basal spine weak and small.

Ti	I - II	$(v'_b v'_b)$	d''	$(v' v'')$	l'	$(v' v'')$	l''	d'	$[l'_a l'_a v'_a v'_a]$
	III - IV	v'_b	d''		l'	v'	l''	d'	$[l'_a l'_a v'_a v'_a]$
Mt	I - IV		$d'l'v$						

The v'_b -spine is not always present on tibia I and II. Length of d'' -spine on tibia I 0.21-0.27 mm, diameter of tibia I near base of d'' -spine 0.12-0.16 mm; on tibia IV 0.24-0.35 mm and 0.11-0.15 mm, respectively. Tm I 0.17-0.21. Position of d'' -spine on tibia I 0.25-0.27.

Abdomen. — Cylindriciform. Dorsal pattern resembling that of female but less distinct, chocolate-brown on lighter background. Ventral half of lateral

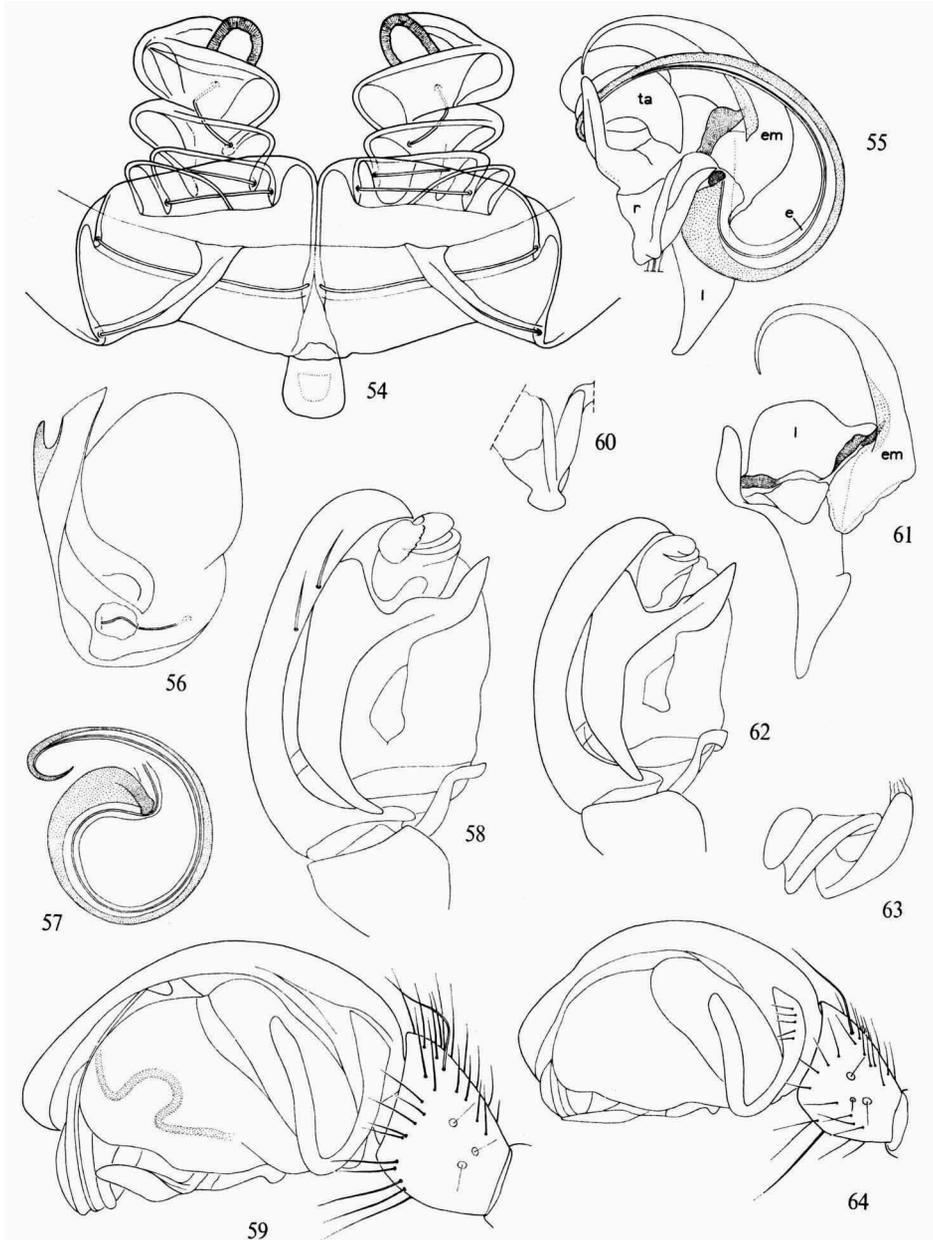


Fig. 54-61. *Linyphia hortensis*. 54, vulva, dorsal aspect; 55, embolic section, showing radix(*r*), embolus(*e*), embolic membrane(*em*), lamella(*l*), and terminal apophysis(*ta*), dorsal aspect; 56, tegulum with median apophysis, mesal aspect; 57, embolus; 58, male palp, ventral aspect; 59, do., lateral aspect; 60, radix, dorsal aspect; 61, lamella(*l*) with embolic membrane(*em*), dorsal aspect. Fig. 62-64. *L. alpicola*. 62, male palp, ventral aspect; 63, terminal apophysis; 64, male palp, lateral aspect. 54, $\times 123$; 55-62, 64, $\times 67$; 63, $\times 100$.

surface and ventral surface uniformly chocolate-brown, opercula and spinnerets brown. Dorsal surface with a pair of white spots on one-fourth of length, separated by their own diameter.

Palp (fig. 58, 59). — All segments brown, cymbium suffused with black. Patella short, dorsal surface curved evenly, not humped, dorsal spine about half as long as segment. Tibia about as long as patella; dorsal spine as long as segment or slightly longer, usually curved; hairs on dorsal and lateral surface rather long near distal margin. Cymbium (fig. 58) with a few short spines along mesal margin. Paracymbium U-shaped, narrow but flat distal arm with rounded apex. Tegulum large, reaching nearly as far as tip of cymbium in the unexpanded palp, round and globular in lateral view. Median apophysis (fig. 56) not visible in lateral view of the unexpanded palp, concealed between cymbium and tegulum; element straight and robust, tip of distal part only very lightly curved, not hook-shaped, shorter than membranous tip of proximal part. Radix (fig. 55, 60, *r*) with knob-shaped proximal tip, as in *triangularis*. Embolus (fig. 55, 57, *e*) long, relatively broad at strongly curved base, outer margin chitinous, narrowing towards tip; element curved backwards shortly before tip, not bent as in *triangularis*-group. Embolic membrane (fig. 55, 61, *em*) long and sheath-like, enveloping the embolus at the unexpanded palp. Terminal apophysis (fig. 52, 55, *ta*) loosely coiled, with two coils, axial parts free of membranes. Lamella (fig. 55, 61, *l*) relatively small, proximal tip narrow as usual; mesal margin projecting in mesal direction at base of embolic membrane, anterior margin bluntly rounded; lateral free projection distinct, lightly curved forwards and inwards on distal half; a subtriangular crest, standing perpendicularly to the dorsal surface, present at base of embolic membrane, a narrow ridge visible at the base of the lateral projection.

Female. — Measurements in mm. Total length 3.5-5.8; cephalothorax, length 1.5-2.1, width 1.05-1.45; abdomen, length 1.9-3.8, width 1.35-2.8, height 1.25-2.8; chelicerae, length 0.75-1.05, width 0.35-0.47.

Cephalothorax. — Colour, shape, and presence of hairs as in male. Sizes and spacing of eyes barely differing from male. Diameter of PME 0.09-0.11 mm, separated from each other by 1.6-2.1 diams., and from PLE by 1.2-1.3 diams. Height of clypeus 0.12-0.14 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax, with an oblique dorsal streak of black suffusion from mesally at base towards laterally at apex. Hairs on warts, which are less conspicuous than in male. Stridulating file with broken ridges. Dorsal row with three equidistant teeth, second tooth largest. Ventral row with three to five, usually four teeth, rather close together, half as large

as basal tooth of dorsal row, apical tooth slightly larger; basal tooth opposite to interstice of second and third dorsal teeth. Lateral margins of gnathocoxae parallel.

Legs. — Femur I 1.2-1.3 times as long as cephalothorax, length of tibia I 12-13 diams. of segment. Measurements in mm (of specimen from The Netherlands, Valkenburg):

	I	II	III	IV
Fe	2.15	2.00	1.55	2.05
Pa	0.50	0.50	0.45	0.50
Ti	2.15	1.80	1.25	1.70
Mt	2.10	1.85	1.40	1.90
Ta	1.25	1.05	0.70	0.90

Chaetotaxy. — Barely differing from male. The subapical pair of ($v'v''$)-spines often represented by a single v' -spine on tibia I and II. A v_b' -spine on tibia IV not present. Length of d'' -spine on tibia I 0.34-0.45 mm, diameter of segment at base of d'' -spine 0.15-0.20 mm; on tibia IV 0.41-0.54 mm and 0.13-0.17 mm, respectively. Tm I 0.17-0.24. Position of d'' -spine on tibia I 0.24-0.28.

Abdomen (pl. 2 fig. 1). — Rather high and globular, without postero-dorsal tubercle. Dorsal surface with leaf-shaped band, on broadest point half as wide as abdomen or slightly more; margins sinuate, rounded posteriorly. Leaf-shaped band light brown suffused with grey, most densely at margins and on posterior half, in live specimens whole dorsal band chocolate-brown. Posterior half of dorsal surface with two successive incisions on either side usually rather deep, exceptionally (in light specimens) the light mesal area and incisions of either side connected with each other, thus broadly interrupting the dorsal band, and leaving the dark lateral lobes between the incisions as a pair of round dark isolated spots. Posterior surface always dark behind the incisions. Dorsal band surrounded by white areas, lateral surface also white on dorsal half, except on a horizontal brown streak from dorsal margin of operculum to half length of abdomen; white lateral areas connected posteriorly behind dorsal band. Ventral half of lateral surface and ventral surface, opercula and spinnerets inclusive, uniformly brown, chocolate-brown in live specimens. Genital region blackish-brown.

Epigyne (fig. 51). — Slightly protruding ventrally. The two large circular openings of the atria permitting a broad view of the interior when looked at from behind. Openings separated by a narrow wall, which is fused with the knob-like scape on basal half.

Vulva (fig. 50, 53, 54). — Wider than long, ratio width to length about 0.7. Atria large and separated from each other by the joined mesal walls of

the first coils. Spiral fold for one and a fourth coil from mesal wall near base of scape a wide open gutter, becoming a deeper fold suddenly in the middle of the dorsal wall of either atrium, and gradually passing into a spiral tube, with a total of five coils from beginning of fold to turning-point. Fertilization duct in outer wall of atrium and fold, shifting to axis when the fold passes into the tube. Receptacula pointing in anterior direction. Scape pointing in ventral direction, deeply excavated anteriorly on knob-shaped tip. Width of epigyneal aperture 0.39-0.52 mm.

Distribution and habitat. — The species has been recorded from most European countries, including the British Isles, Portugal, Spain, and Italy, but not from North Africa. The eastern-most record is from Turkestan (= Turkmenia).

The typical habitat of *hortensis* is the undergrowth of woods and shady places, e.g., along the borders of woods. The webs are constructed between the plants, not necessarily near the ground. I have never found it in other habitats, but Wiehle (1956: 324) mentioned its occurrence on shrubs, while Engelhardt (1958: 5) recorded a capture from the top of a tree (*Picea excelsea* Link [= *Picea abies* (L.) Karsten]). Adults of both sexes are found from April to June, the females remain present throughout the summer.

From recent observations in Switzerland it has become evident that in the Alps the species is restricted to the lower parts, up to about 700 m, while *L. alpicola* lives on higher altitudes, approximately between 1000 and 2000 m. However, this difference in distribution was only roughly determined in the region of Glarus, and it should be subjected to a more detailed investigation.

Material examined.

Netherlands. — 1 ♂, Limburg, Mheer, between low plants at border of wood, 3.vi.1962, P. J. van Helsdingen (ML); 4 ♀, do., 8.vi.1962 (ML). 1 ♀, Epen, Bovenste Bos, 4.vi.1962, P. J. van Helsdingen (ML). 6 ♀ 4 ♂, Gerendal near Schin op Geul, between low plants on border of meadow and forest, 5.vi.1962, P. J. van Helsdingen (ML); 50 ♀ 16 ♂, do., 29.v.1963 (ML). 9 ♀ 1 ♂, Bemelen, forest, 7.vi.1962, P. J. van Helsdingen (ML). 7 ♀ 1 ♂, Maastricht, 28.v.1963, P. J. van Helsdingen (ML).

Belgium. — 4 ♀ 1 ♂, Brabant, Uccle, 21.iv.1961, J. Kekenbosch (ISNB); 2 ♀, do., 17.v.1961 (ISNB); 2 ♀, do., 31.v.1963 (ISNB). 3 ♀, Forêt de Soignes, Rouge-Cloître, 21.vi.1956, V. Hendrickx (ISNB). 4 ♀ 1 ♂, Tervuren, Coolenshoek, 2.v.1966, P. J. van Helsdingen (ML). 1 ♀, Limelette, 24.v.1961, J. Kekenbosch (ISNB); 1 ♀, do., 7.vi.1962 (ISNB). 1 ♀, Limal, 24.v.1961, J. Kekenbosch (ISNB). 1 ♀, Rhode-Saint Genèse, 5.v.1944, J. Verschuren (ISNB). — 1 ♂, Hainaut, Marcinelle, on heather, 12.iv.1961, J. Doucet (ISNB). 1 ♀, Howardries, 14.v.1957, J. Kekenbosch (ISNB). 1 ♀, Barbençon, 23.iv.1961, A. & J. Doucet (ISNB). — 3 ♀, Namur, Malonné, 26.v.1963, R. Damoiseau (ISNB). 9 ♀ 3 ♂, Rivière, 7.v.1959, G. Hoevenaghel (ISNB). 1 ♂, Hermeton-sur-Meuse, Bois les Anges, 7.v.1954, J. Kekenbosch (ISNB). 5 ♀, Clermont-lez-Walcourt,

on spruce-fir, 20.v.1960, A. & J. Doucet (ISNB); 1 ♂, do., 1.iv.1961, J. Doucet (ISNB). — 1 ♀, Luxembourg, Torgny, 13.vi.1956, E. Derenne (ISNB); 2 ♀ 1 ♂, do., 23.v.1958 (ISNB); 4 ♀, do., 27.v.1958 (ISNB); 3 ♀, do., 4-5.vii.1958 (ISNB); 1 ♀, do., 24.vii.1958 (ISNB); 2 ♀, do., 19-20.vi.1957, J. Kekenbosch (ISNB). 1 ♀, Orval, 7.vi.1963, E. Derenne (ISNB). 1 ♀, Lamorteau, 21.vi.1957, J. Kekenbosch (ISNB).

Luxemburg. — 2 ♀, Diekirch, 5.vi.1960, P. J. van Helsdingen (ML).

France. — 2 ♀ 1 ♂, Pyrénées-Orientales, Sorède (MNP).

Germany. — 1 ♀, Hessen, Vogels Berg, Gederner See, 14.v.1961, O. Kraus (SMF). — 15 ♀ 1 ♂, Bayern, Muggendorf (MNP). — 8 ♀ 1 ♂, Sachsen-Anhalt, Ballenstedt, viii.1924, C. F. Roewer (SMF).

Switzerland. — 1 ♂, Glarus, Linthal, 660 m, between low plants, 8.vi.1968, P. J. van Helsdingen (ML); 4 ♀, do., 20.vi.1968 (ML). 1 ♀, Luchsingen, 640 m, 11.vi.1968 (ML). — 1 ♀, Graubünden, Zerner, ix.1958, M. Grasshoff (SMF).

Austria. — 2 ♀, Vorarlberg, between Lochau and Eichenberg, 18.vi.1960, H. Janetschek (SMF). — 1 ♂, Ober-Österreich, Scharfling, 500 m, 5.v.1961, K. Thaler (ZII).

Italy. — 2 ♂, Trentino, Lago di Garda, Bezzacca, St. Lucia, 700 m, 28.v.1963, K. Thaler (ZII). 2 ♀ 1 ♂, Mt. Tremalzo, 29.v.1959, P. J. van Helsdingen (ML). — 1 ♀, Toscana, Arezzo, Camaldoli, 18.vi.1967, S. Ruffo (MV). — 12 ♀, Umbria, Valico di Bocca Trabaria, vi.1967, S. Ruffo (MV). — 1 ♀, Campania, Mt. Picentini, Piano Acernese, 1160 m, 11.vi.1956, S. Ruffo; 1 ♀, do., Piano di Vertiglia, 1180 m, 20.vi.1956, S. Ruffo; 2 ♀, do., Vallepiana, 1200-1350 m, 12.vi.1956, S. Ruffo (all Kritscher, 1958; MV). — 16 ♀, Puglia, Gargano, Foresta Umbra, v.1950, S. Ruffo (Di Caporiacco, 1953 (p.p.); MV). — 5 ♀, Calabria, Aspromonte, Gambarie, 1.vi.1958, S. Ruffo; 5 ♀ 2 ♂, do., 8.v.1957 and 26.vii.1957, Conci (both Kritscher, 1960; MV). 2 ♀, La Sila, Loricca, 22.vi.1960, S. Ruffo (MV); 1 ♀, do., Fago del Soldato near Camigliatello, 20.vi.1960, S. Ruffo (MV).

***Linyphia alpicola* spec. nov.**

(fig. 62-70, pl. 2 fig. 2)

Linyphia hortensis; Di Caporiacco, 1922, Mem. Soc. ent. Ital., 1: 81 (p.p.; record from the Karnische Alpen). — Denis, 1963, Atti Ist. Veneto sci. lett. arti, 121: 264 (Dolomites).

Linyphia clathrata; Di Caporiacco, 1927, Mem. Soc. ent. Ital., 5: 99 (p.p.; Karnische Alpen).

Type. — ♂ holotype from Switzerland, Canton of Glarus, between Kies (or Chis) and Mettmen below Stausee Garichti, 1200-1800 m, 20-22.vi.1968 in the subadult stage, last moult in captivity before 10.vii.1968, P. J. van Helsdingen (ML). All other specimens from Glarus (Mettmen, Linthal, and Tierfehd) are paratypes.

I had already found a few specimens of this apparently new species under various names in several collections, before I had the opportunity to do any collecting in the Alps. A large number of specimens have now been found in Switzerland in three different localities, all on comparatively high altitudes. This is in accordance with the older specimens, which came from 1200-2000 m.

The species has the general appearance of *hortensis*, but the median dorsal band is darker, and has serrate instead of sinuate margins. The white dorso-

lateral bands are clear white and remain separated posteriorly. It can therefore easily be confounded with *Neriene peltata* (Wider), but it is at once distinguished by the genitalia, which, though smaller, are of the same type as those of *hortensis*. The differences in size between the genital organs of *hortensis* and *alpicola* are shown in figure 65 A and B.

Male. — Measurements in mm. Total length 3.4-4.4; cephalothorax, length 1.55-2.0, width 1.15-1.35; abdomen, length 1.95-2.4, width 1.0-1.2, height 1.05-1.25; chelicerae, length 0.81-1.02, width 0.35-0.41.

Cephalothorax. — Brown, suffused with grey at margins and on striae, head slightly darker. Posterior margin distinctly excised, constriction at border of head and thorax very slight; width 0.70-0.75 of length, width of head 0.5 of width of thorax. Dorsal line, when looked at from side, evenly curved from posterior margin to level region behind PME; clypeus straight. Eye-region and clypeus shortly haired, a spinehair behind PLE.

Eyes. — Eye-region as wide as head. Both rows straight. PME on large black tubercles, region of median eyes suffused with black. Measurements of eyes: diameter of PME 0.09-0.10 mm, of PLE and ALE 0.08-0.09 mm, of AME 0.06-0.07 mm. PME separated from each other by 1.4-1.8 diams.,

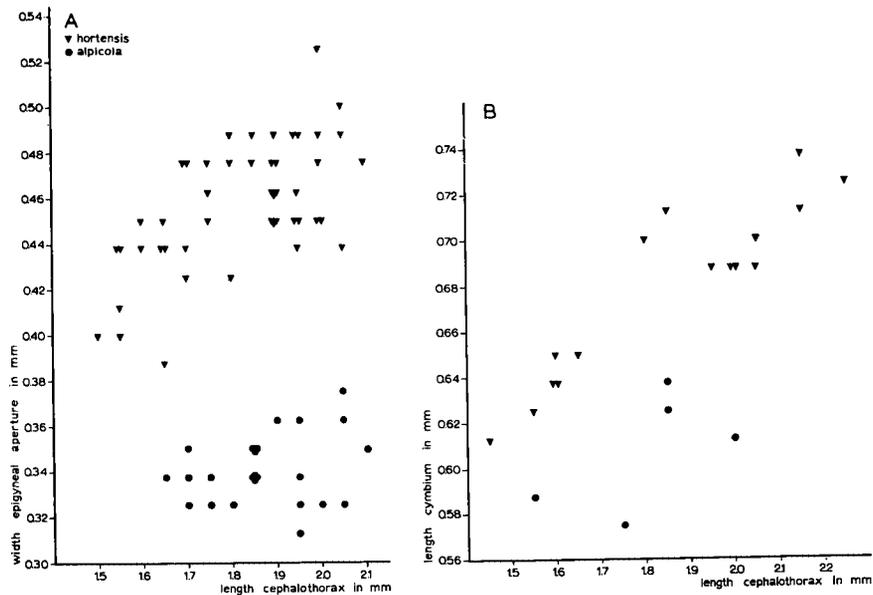


Fig. 65. Diagram, showing correlation between length of cephalothorax and width of epigynal aperture (A), and between length of cephalothorax and length of male palpal cymbium (B) in *Linyphia hortensis* and *L. alpicola*.

from PLE by 1.6-1.8 diams., and from AME by 1.3-1.4 diams. of PME. AME separated by their diameter or slightly less. Height of clypeus 0.14-0.17 of length of cephalothorax.

Chelicerae. — Blackish-brown. Shape as in *hortensis*, with many small but conspicuous warts with a hair each. Basal tubercle very small. Stridulating files with broken ridges. Cheliceral teeth consisting of one large tooth (but smaller than in *hortensis*), followed by a curved row of four very small teeth, which are rather ventral in position. Gnathocoxae, sternum, and labium darkly coloured, as in *hortensis*.

Legs. — Light orange-brown, without annulations. Femur I 1.2-1.3 times as long as cephalothorax, length of tibia I 15-16 diams. of segment. Measurements in mm (of holotype):

	I	II	III	IV	palp
Fe	2.55	2.35	1.85	2.40	0.70
Pa	0.55	0.55	0.50	0.50	0.20
Ti	2.55	2.30	1.45	2.00	0.31
Mt	2.85	2.55	1.80	2.40	—
Ta	1.45	1.25	0.80	0.95	0.61

Chaetotaxy.—Fe I 1-2d, 2-3l'; II-IV 1-2d. Pa I-IV d''d', basal spine weak.

Ti	I - II	v _b ''	d''	(v'v')	l'	(v'v'')	l''	d'	[l _a ' l _a '' v _a ' v _a '']
	III - IV		d''	v'	l'		l''	d'	[l _a ' l _a '' v _a ' v _a '']
Mt	I - IV	dl' l' v	v _a						

Length of d''-spine on tibia I 0.35-0.38 mm, diameter at base of d''-spine 0.12-0.16 mm; on tibia IV 0.32-0.46 mm and 0.11-0.15 mm, respectively. Tm I 0.17-0.20. Position of d''-spine on tibia I 0.22-0.25.

Abdomen. — Cylindriform. Pattern as in female, with broad dorsal leaf-shaped band and clear white dorso-lateral bands. Margins of median band less distinctly serrate than in female. Ventral surface and ventral half of lateral surface uniformly black-brown.

Palp (fig. 62, 64). — Segments yellow to light orange-brown, cymbium suffused with black. Elements not differing in shape from *hortensis*, only in size. Length of cymbium 0.57-0.64 mm (*hortensis* 0.61-0.75 mm), length of lamella 0.39-0.44 mm (*hortensis* 0.52-0.59 mm).

Female. — Measurements in mm. Total length 3.9-5.7; cephalothorax, length 1.65-2.1, width 1.2-1.35; abdomen, length 2.6-3.8, width 1.6-2.7, height 1.8-2.9; chelicerae, length 0.84-0.95, width 0.42-0.46.

Cephalothorax. — Colour as in male. Sides evenly rounded from distinct

posterior excision to constriction at border of head and thorax, sides of head parallel. Eye-region and clypeus shortly haired. Posterior row of eyes slightly recurved. Sizes of eyes as in male. Distance between PME mutually 1.6-1.8 diams., between PME and PLE 1.2-1.3 diams., and between PME and AME 1.1-1.3 diams. of PME. Height of clypeus 0.13-0.15 of length of cephalothorax.

Chelicerae. — Colour and shape as in male. Warts present, but less conspicuous. Broken ridges of stridulating files very faint. Dorsal row of cheliceral teeth consisting of three large equidistant teeth, middle tooth largest. Ventral row with four smaller equidistant teeth, all of about equal size, basal tooth opposite to interstice of second and third dorsal teeth. Gnathocoxae, labium, and sternum as in male.

Legs. — Shorter and less slender than in male. Femur I 1.1-1.2 times as long as cephalothorax, length of tibia I 10-11 diams. of segment. Measurements in mm (of specimen from Glarus, Switzerland):

	I	II	III	IV
Fe	2.15	1.95	1.60	2.05
Pa	0.55	0.55	0.45	0.50
Ti	2.05	1.85	1.20	1.60
Mt	2.05	1.85	1.40	1.85
Ta	1.20	1.00	0.65	0.85

Chaetotaxy. — As in male, but tibia I as a rule and tibia II often with a pair of ($v_b'v_b''$)-spines. Spines about as long as in male. Length of d'' -spine on tibia I 0.31-0.37 mm, diameter of segment 0.17-0.20 mm; on tibia IV 0.35-0.45 mm and 0.15-0.17 mm, respectively. Tm I 0.19-0.21. Position of d'' -spine on tibia I 0.20-0.25.

Abdomen (pl. 2 fig. 2). — General appearance of *hortensis*, but margins of leaf-shaped dorsal band serrate instead of sinuate; band comparatively broader, occupying 0.7 of width of abdomen. Dorsal band brown, black-brown at margins, surrounding area clear white, contrasting strongly with dark median band and remaining broadly separated posteriorly. Whole ventral surface and ventral half of lateral surface black-brown.

Epigyne (fig. 67). — The two circular openings of the atria smaller than in *hortensis* and separated by a comparatively wider septum. Epigyne barely protruding.

Vulva (fig. 66, 70). — Resembling *hortensis* in structure, but atria narrower, and spiral tube making half a coil less; turning-points curved at sides. Scape differing from *hortensis* by the less knob-shaped tip. Epigyneal aper-

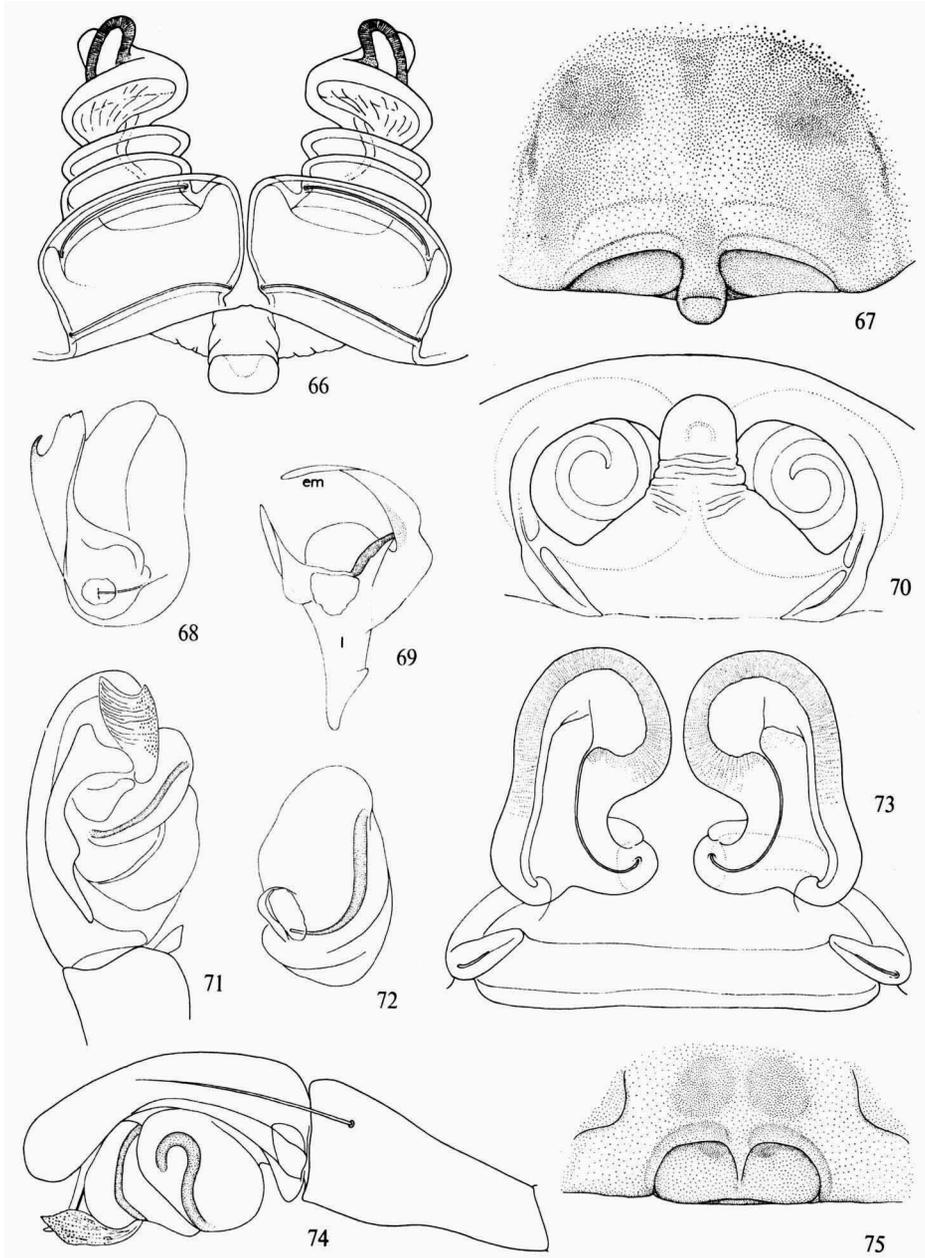


Fig. 66-70. *Linyphia alpicola*. 66, vulva, ventral aspect; 67, epigyne; 68, tegulum with median apophysis, mesal aspect; 69, lamella(*l*) with embolic membrane(*em*), dorsal aspect; 70, vulva, posterior aspect. Fig. 71-75. *L. mimonti*. 71, male palp, ventral aspect; 72, tegulum with median apophysis, mesal aspect; 73, vulva, dorsal aspect; 74, male palp, lateral aspect; 75, epigyne. 66, 70, $\times 123$; 67, 72, $\times 100$; 68, 69, $\times 67$; 71, 74, $\times 80$; 73, $\times 213$; 75, $\times 95$.

ture 0.31-0.37 mm (*hortensis*: 0.39-0.52 mm). Ratio length to width of vulva slightly more than 0.8 (*hortensis*: 0.7).

Distribution and habitat. — Up to the present, the species has been found in the Alps only. The type-locality lies on the north side of the massif (Canton Glarus), the other localities are in the Italian Alps (Alpi Orobie north of Bergamo), the Dolomites, and the Karnische Alpen on the Italian-Austrian frontier, all on the south side of the chain. In this region it seems to be restricted to the higher zones, roughly between 1000 and 2000 m, while *hortensis* probably does not occur at this altitude. In the environments of Glarus this ecological difference has been investigated, be it superficially. It was found that *hortensis* occurs there in the valleys, building its web between plants along roads and in the groves bordering the small streams, but not above 700 m. *L. alpicola* was found on the slopes of the mountains between 1000 and 2000 m, and the webs were met with on small conifers, on *Vaccinium myrtillus* L., and, above the timber-line, on *Rhododendron hirsutum* L. The webs were large, and the spiders often hung concealed below a leaf at the web's margin. It is certainly worth while to investigate the Swiss and Austrian Alps more thoroughly, in order to determine the distribution and ecological requirements of the two species in the whole area.

The mating-period of the species undoubtedly falls before the middle of June. Only adult females were found at that time, apart from four subadult males, which probably were abnormally late. Many females were kept alive for some time, and without exception they constructed within two weeks a small white cocoon with eggs, the young spiderlings hatching some ten days afterwards. We may therefore expect a mating-period somewhere in May, the species then resembling *hortensis* in this respect.

Material examined.

Switzerland. — 58 ♀, Glarus, between Chis (Kies) and Mettmen near Stausee Garichti, 1200-1800 m, on *Rhododendron hirsutum* L., *Vaccinium myrtillus* L., and on conifers, 20-22.vi.1968, P. J. van Helsdingen (paratypes; ML); 4 ♂, do., collected in subadult stage, last moult before 10.vii.1968 (holotype and paratypes; ML). 3 ♀, above Linthal, 1200 m, 23.vi.1968, P. J. van Helsdingen (paratypes; ML). 2 ♀, above Tierfehd near Linthal, 1050 m, 10.vi.1968, P. J. van Helsdingen (paratypes; ML).

Austria. — 1 ♀, Rattendorfer Alps, Rattendorf, Caliuirio, 1560-1600 m, 26.vii.1923 (*Linyphia clathrata*; Di Caporiacco, 1927; MZF).

Italy. — 1 ♀, Bergamo, Roncobello, Val Secca, 1300 m, 10.vi.1956, A. Valle (MECB). — 2 ♀ 1 ♂, Dolomites, Passo Cereda SW. of Agordo, 1370 m, ix.1947, J. Denis (*Linyphia hortensis*; Denis, 1963; MNP). 1 ♀, Fedaia N. of Mt. Marmolata, 2000 m, vii-viii.1952, J. Denis (*Linyphia hortensis*; Denis, 1963; MNP). — 1 ♀, Udine, Sauris above Lago Maina, 1200 m, 16.ix.1921 (*Linyphia hortensis*; Di Caporiacco, 1922; MZF).

Provisionally included species

***Linyphia mimonti* Simon**

(fig. 71-78)

Linyphia mimonti Simon, 1884b, Ann. Soc. ent. France, (6)4: 334 (description ♀, Greece). — Bristowe, 1935, Proc. Zool. Soc. London, 1934: 759 (catalogue, reference to Simon, 1884b). — Drensky, 1936, Spis. búlgarskata Akad. Nauk, 32: 84 (catalogue) [not seen].

Linyphia pulchra Kulczyński, 1911a, Bull. int. Acad. Sci. Cracovie, B, 1911: 28, fig. 27-29 (description ♂, Lebanon). [new synonymy].

Linyphia hortensis; Di Caporiacco, 1953, Mem. Biogeogr. Adriatica, 2: 77 (p.p.; Italy).

Types. — ♀ holotype of *Linyphia mimonti* Simon from Steni on Euboea, Greece (MNP). ♂ holotype of *Linyphia pulchra* Kulczyński from Lebanon, Beirut (IZW).

Remarks. — *Linyphia pulchra* is listed as a synonym of *L. mimonti* here, on account of the general resemblance of the specimens and their agreement in size. The equally simple structures of epigyne and male palp support this view, as do the geographical distributions of the species.

Its position within the genus *Linyphia* is much less convincing. It does not fit in one of the species-groups, and, if correctly placed in the genus, represents a separate entity. It is placed here mainly on account of the thread-like embolus and the sheath-like embolic membrane, the small radix, and the shape of the lamella, which possesses a distinct transverse ridge dorsally as in *triangularis* and *hortensis*. Other characters deviate considerably from the *triangularis*-type, e.g., the terminal apophysis, which is rather membranous and of an unusual shape, and the median apophysis, which is a mere round lobe in this species (corresponding with a scape-less epigyne).

Though deviating in these respects from the other species of the now very small genus *Linyphia*, *Linyphia mimonti* is maintained in the original combination here.

Male. — Only the rather bleached holotype of *L. pulchra* is available. Measurements in mm. Total length 4.2; cephalothorax, length 1.8, width 1.25; abdomen, length 2.4, width 1.1, height 0.9; chelicerae, length 0.95, width 0.43.

Cephalothorax. — Light yellow-brown with a narrow blackish submarginal band. Posterior excision and constriction at border of head and thorax barely discernible; width 0.7 of length, width of head 0.65 of width of thorax. In lateral view, posterior margin rounded, foveal region level, head slightly raised; clypeus slightly concave below AME. Short hairs along margins and striae, clypeus and eye-region apparently hairy, but hairs fallen out, only scars visible.

Eyes. — Eye-region barely narrower than head. Anterior row very lightly recurved, posterior row about straight. PME with black rings, but tubercles not developed, AME on a common black spot, bases of lateral eyes blackish. Diameter of PME 0.075 mm, laterals of same size, diameter of AME measuring also 0.075 mm. PME separated from each other by 1.5 diams., from PLE by 2.0 diams., and from AME by 1.7 diams. of PME. Height of clypeus 0.16 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Strong and heavy, slightly diverging. Lateral surface slightly bulging on apical third. Stridulating file and basal tubercle not present. Three teeth in dorsal row, large and equidistant, basal tooth smaller. Ventral row with four teeth as large as basal dorsal tooth, with the exception of the very large apical tooth, which is about three times as large (apical tooth bifurcate on left chelicera); basal tooth opposite to apical dorsal tooth. Fang long and curved.

Gnathocoxae. — Light brown, lateral margins very lightly emarginate. Labium light brown with grey suffusion, anterior margin raised and lighter. Sternum yellow-brown, grey at margins; narrowly produced between coxae IV, width 0.8 of length.

Legs. — Yellow-brown with dark rings; patellae faintly grey, tibiae with a faint median ring; tibiae, metatarsi, and tarsi with distinct apical rings. Legs long and slender, length of femur I 1.9 times cephalothorax, length of tibia I 20 diams. of segment. Measurements in mm (of holotype of *L. pulchra*):

	I	II	III	IV	palp
Fe	3.35	2.75	1.85	2.50	0.71
Pa	0.60	0.55	0.45	0.45	0.25
Ti	3.85	2.85	1.60	2.25	0.42
Mt	4.35	3.20	1.65	2.75	—
Ta	1.95	1.40	0.70	1.00	0.48

Chaetotaxy. — Fe I dl'l'; II-IV d. Pa I-IV d''d'.

Ti	I - II	v _b '	d''	(v' v'')	l'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III - IV		d''	v'	l'	l''	d'	[l' _a l'' _a v' _a v'' _a]
Mt	I - IV	dl' l''	vv _a					

Diameter of tibia I at base of d''-spine 0.19 mm, of tibia IV 0.15 mm; spines broken off. Tm I 0.14. Position of d''-spine on tibia I 0.28.

Abdomen. — Long and narrow, compressed dorso-ventrally in the middle. Abdomen very light (bleached specimen?) beige-coloured, latero-dorsal bands with white blotches on whole length. Posterior third of dorsal surface with faint traces of grey chevrons. Laterally a row of four small oblong

black spots at either side, reaching from dorsal margin of operculum to posterior quarter of abdomen. Lateral and ventral surface with few stray white blotches. Opercula and spinnerets yellow-brown.

Palp (fig. 71, 74). — All segments yellow-brown, patella and tibia with narrow grey apical margins. Femur curved with concave ventral side. Patella longer than high, dorsal spine broken off. Tibia 1.7 times as long as patella, about twice as long as high, broadest on apical half and slightly fusiform; latero-dorsal spine not much shorter than segment. Cymbium but slightly longer than tibia, tip broadly rounded, spineless. Cymbium lightly swollen proximally at lateral margin; this small excrescence possibly representing the basal part of the paracymbium, which is more or less fused with the cymbium; distal arm of paracymbium not present. Tegulum reaching rather far distally, ventral surface lightly excavated before rounded tip. Median apophysis (fig. 72) a mere round lobe, very small, on meso-apical surface of tegulum. Embolus (fig. 77, 78, *e*) rather broad at base, falcate in outline, tip slowly tapering; element short in comparison with *triangularis* and *hortensis*. Radix (fig. 77, 78, *r*) very small, a knob-shaped proximal tip not discernible. Embolic membrane (fig. 77, 78, *em*) long and sheath-shaped (as in *hortensis*). Terminal apophysis (fig. 77, 78, *ta*) attached to lateral arm of lamella and to anterior tip of radix; element a curved plate, open on meso-dorsal side, the convex lateral and ventral surface with fine transverse ridges and some small villi; element with two anterior tips, mesal tip sharp, lateral tip rounded. Lamella (fig. 77, 78, *l*) with narrow and sharply pointed proximal tip, mesal side reaching as far distally as small rounded median tip, which lies close to the base of the distinct lateral arm; transverse ridge dorsally between the lateral arm and base of embolic membrane (fig. 77, *xx*) conspicuous.

Female. — Measurements in mm. Total length 3.9-4.7; cephalothorax, length 1.3-1.7, width 0.95-1.02; abdomen, length 2.8-3.5, width 1.7-2.2, height 1.6-2.5; chelicerae, length 0.61-0.75, width 0.27-0.37.

Cephalothorax. — Colour as in male. Specimen from the Lebanon with a brown median band from posterior margin to eye-region, broadest on cephalic part and there half as wide as eye-region. Posterior margin with distinct excision, lateral constrictions very slight. Width 0.6-0.7 of length. In lateral view dorsal line level from high posterior margin to eye-region. Eye-region and clypeus distinctly haired.

Eyes. — PME with black rings but without black tubercles, as in male. Diameter of PME 0.07-0.08 mm, laterals and AME of about the same size. PME separated from each other by 1.2-1.4 diams., from PLE by 1.3-1.5

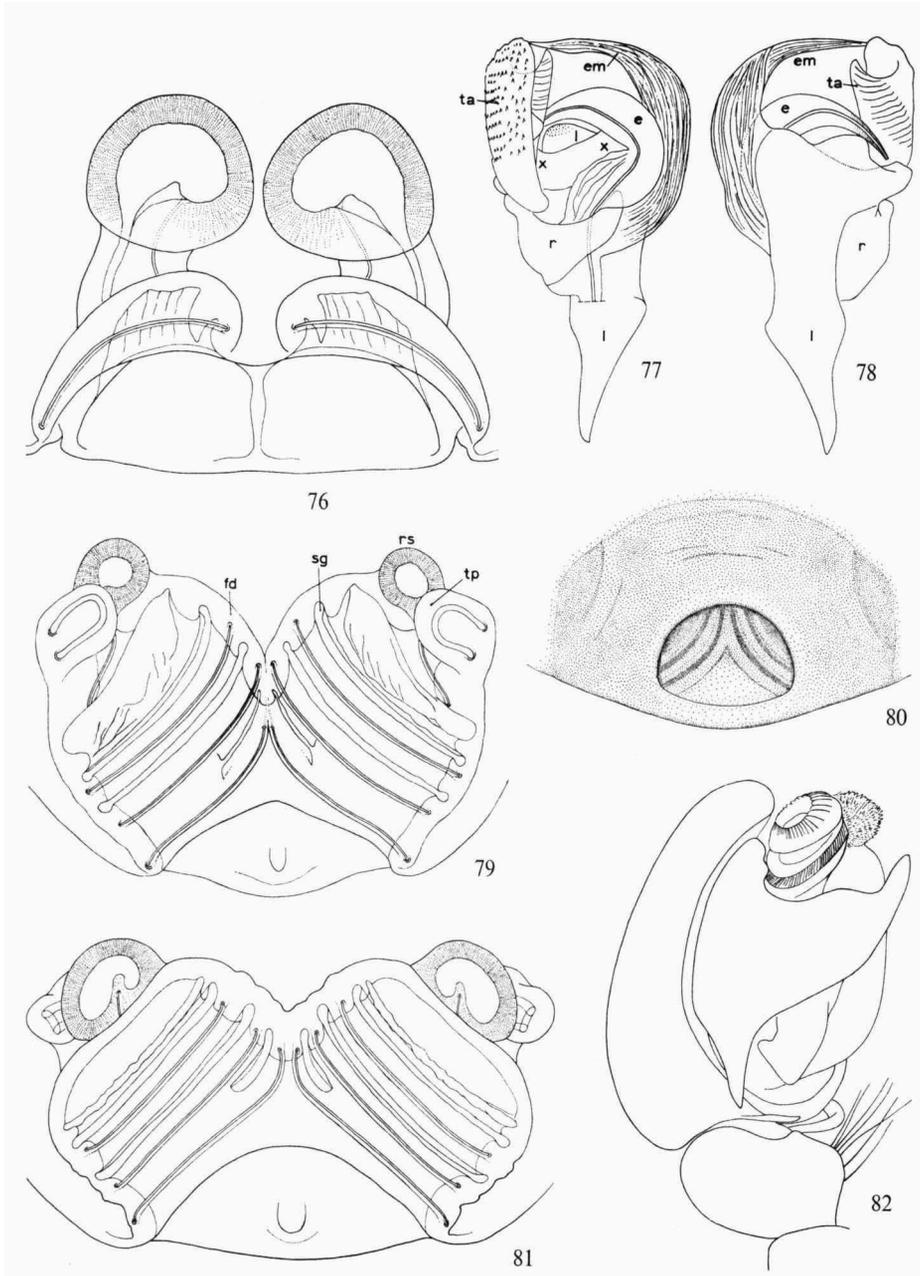


Fig. 76-78. *Linyphia mimonti*. 76, vulva, ventral aspect; 77, embolic section, showing radix(*r*), embolus(*e*), embolic membrane(*em*), lamella(*l*), and terminal apophysis(*ta*), dorsal aspect; 78, do., ventral aspect. Fig. 79-82. *Neriene clathrata*. 79, vulva, Europe, ventral aspect; 80, epigyne; 81, vulva, Japan, ventral aspect; 82, male palp, ventral aspect. 76, $\times 213$; 77-79, 81, $\times 123$; 80, $\times 80$; 82, $\times 67$.

diams., and from AME by 1.5 diams. of PME. Height of clypeus 0.13-0.16 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. More slender than in male, slightly diverging, lateral surface straight. Stridulating file absent. A dorsal row of three equidistant teeth, basal tooth half as long as others. Ventral row with four very small teeth and a larger apical tooth, all equidistant; small teeth half as long as basal dorsal tooth, apical tooth as large as second dorsal tooth, much less conspicuous than in male; basal tooth opposite to interstice of second and third dorsal teeth. Fang much shorter than in male. Gnathocoxae squarish, lateral margins parallel.

Legs. — Long and slender, colour and annulation as in male. Length of femur I 1.5-1.6 times length cephalothorax, length of tibia I 16-17 diams. of segment. Measurements in mm (of specimen from Qartaba, Lebanon):

	I	II	III	IV
Fe	2.50	2.00	1.35	1.90
Pa	0.50	0.45	0.35	0.40
Ti	2.75	2.05	1.05	1.65
Mt	—	2.20	1.25	1.95
Ta	—	1.10	0.60	0.85

Chaetotaxy. — Differing from male in the absence of a v_5'' -spine on tibia I and II. Dorsal spine on femur IV not always present. Length of d'' -spine on tibia I 0.32 mm, diameter of segment 0.16 mm; on tibia IV 0.46 mm and 0.12-0.14 mm, respectively. Position of d'' -spine on tibia I 0.27.

Abdomen. — Rather high, dorsal surface evenly curved from base to spinnerets. Dorsal pattern much more distinct than in the bleached ♂ holotype of *L. pulchra*, but from Kulczyński's description and figure (fig. 29) it is apparent that his male specimen, too, once had a purple median dorsal band of about the same outline as in the females at hand. Dorsal band purple-brown from base of abdomen to spinnerets, connected at both ends with the uniform purple-brown ventral and ventro-lateral surfaces; band with sinuate and serrate margins, forming a rounded lobe on anterior quarter and an angular tooth on half length, becoming narrow on posterior half and running, slightly widening again, in posterior direction; band on broadest point (at angular teeth) as wide as cephalothorax and occupying 0.7 of width of abdomen. Dorsal half of lateral surface and dorsal surface around median band clear white, these areas remaining distinctly separated from each other and from the spinnerets.

Epigyne (fig. 75). — Very small, scape not developed. The dark fertilization ducts visible as brown arcs around the entrances of the atria. Receptacula discernible through the integument as grey spots.

Vulva (fig. 73, 76). — Wider than long. Atria very short, with less than one coil of groove from dorsal side towards "turning-points", which lie latero-dorsally. A nearly straight tube visible from turning-point to globular receptaculum, fertilization duct running backwards, and ending with an arc along ventral side of entrance. Ventral surface of dorsal plate very lightly depressed at either side, posterior margin straight with a barely developed ridge at posterior margin. Width of epigyneal aperture 0.22-0.25 mm.

Distribution and habitat. — The few specimens that have been found up to the present originate from Italy, Greece, and the Lebanon. As far as known from three dated specimens, they have been collected in May and June. One specimen (Lebanon, Qartaba) comes from an altitude of 1200 m.

Material examined.

Italy. — 1 ♀, Puglia, Gargano, Foresta Umbra, v.1950, S. Ruffo (*L. hortensis*; Di Caporiacco, 1953, p.p.; MV). — 1 ♀, Campania, Benevento, Matese, Sassinoro, 12.vi. 1962, S. Ruffo (MV).

Greece. — 1 ♀, Euboea, Steni (holotype of *Linyphia mimonti* Simon; MNP).

Lebanon. — 1 ♂, Beirut, P. Bovier-Lapierre (holotype of *Linyphia pulchra* Kulczyński; IZW). 1 ♀, Qartaba, oak-wood on mountain, 1200 m, v.1964, G. Fagel (ISNB).

Neriene Blackwall

Neriene Blackwall, 1833a, London & Edinburgh Phil. Mag. Journ. Sci., (3)3: 187. Type-species: *Neriene marginata* Blackwall [= *N. clathrata* (Sundevall)], by subsequent designation (Thorell, 1870: 45).

Linyphiella Homann, 1951, Zool. Jahrb., Anat., 71: 131 (*Linyphia* species "mit kahnförmiges Tapetum"); 1953, Trans. IXth Int. Congr. Ent., 2: 359. No type-species indicated.

Prolinyphia Homann, 1952, Zool. Jahrb., Anat., 72: 349 (replacement name for *Linyphiella* Homann non Banks). Wiehle, 1956, Tierw. Deutschl., 44: 298. Type-species: *Linyphia emphana* Walckenaer, by original designation.

Neolinyphia Oi, 1960, Journ. Inst. Polyt., D, 11: 223. Type-species: *Neolinyphia japonica* Oi, by original designation.

Remarks. — The genus *Neriene* was created by Blackwall without indication of a type-species. Thorell (1869: 82) criticized the merits of the new genus, "which appears to me [Thorell] to include elements to[!] different to be natural". This was the case indeed, judging from the three new species included in the genus with the original description, viz., *Neriene marginata* [= *N. clathrata* (Sundevall)], *Neriene rubens* [= *Gonatium rubens* (Blackwall)], and *Neriene cornuta* [= *Hypomma cornuta* (Blackwall)]. The second species, *N. rubens*, appeared to be synonymous with *Theridion cheliferum* Wider (sec. Thorell, 1870: 129), for the reception of which Menge (1868: 180) had created the new genus *Gonatium*. The species *N. cornuta* was recognized as a senior synonym of *Dicyphus cilunculus* (Menge) by

Thorell (1870: 105). *Dicyphus* happened to be preoccupied, and was replaced later by *Hypomma*, to which *cornuta* still belongs. The only remaining species, being also the first species described in the genus, viz., *Neriene marginata*, thus became the type-species by elimination, and it was indicated as such for the first time by Thorell (1870: 45).

Curiously enough, Blackwall (1833b: 346) shortly afterwards described a new species *Linyphia marginata* [= *Neriene montana* (Clerck)], which in my opinion is closely related to his *Neriene marginata*, but apparently could not belong to the same genus in Blackwall's opinion. Subsequently many other species have been included in *Neriene* by Blackwall and others, distributed now among many different genera of the Erigonidae and Linyphiidae.

Thorell (1870: 45) established the synonymy of *Neriene marginata* Blackwall with *Linyphia clathrata* Sundevall, the latter having priority. He also considered the type-species of *Neriene* to be congeneric with *Linyphia triangularis* (Clerck), and consequently brought the two genera into synonymy. This decision has been generally accepted, although the name *Neriene* was used again by F. O. Pickard-Cambridge (1902: 416) for some Central American species, and by a few American authors (Chamberlin and others) for Nearctic species.

For reasons stated elsewhere in this paper (p. 25) *Linyphia triangularis* (Clerck) is considered to be non-congeneric with *Linyphia clathrata* Sundevall, and consequently the genus *Linyphia* has to be split up again. *L. triangularis* and a few related species have been kept together within *Linyphia*. Of the removed species the group containing *clathrata* must again bear the old generic name *Neriene*, as *clathrata* is the oldest, be it subjective, synonym of *Neriene marginata* Blackwall.

This procedure may not look recommendable to everyone, but it is in full accordance with the International Code. Of the 186 specific names listed by Bonnet (1958: 3087) as having been described in, or at one time having been transferred to *Neriene*, 25 belonged to *Linyphia* as conceived by him, while the remaining 161 names appeared to have been divided subsequently among 2 genera of the Theridiidae and 52 genera (and subgenera) of the Erigonidae and Linyphiidae. This is the situation as it was at the end of 1939, and it gives a clear impression of the heterogeneity of the genus in the past. However that may be, *Neriene* still is a subjective synonym of *Linyphia*, and has to be used again now I consider *clathrata* to be non-congeneric with *triangularis*.

The transfer of many species from *Linyphia* to *Neriene* has nomenclatorial consequences. The new combination *Neriene montana* (Clerck) is a senior homonym of *Neriene montana* Blackwall, but the latter does not have

to be changed, as it has been removed already to another genus, be it provisionally. *Neriene marginata* (C. L. Koch or Wider) represents another case of homonymy. It is a junior homonym of *Neriene marginata* Blackwall [= *Neriene clathrata* (Sundevall)], and consequently must be replaced. It is called *N. radiata* (Walckenaer) in the present paper, and the choice of this name is motivated under that species.

The genus *Neriene*, as it is re-established here, contains all species the females of which have a vulva with spirally coiled grooves in the atria for the transport of sperm towards the receptacula. The males have spirally coiled terminal apophyses, and curved and narrow emboli, which are never thread-like. In all these species the spermduct-tooth of the embolus is fitted into the posterior opening of the groove of the corresponding atrium of the vulva during copulation (see descriptions of functional positions on p. 15). The type-species of *Prolinyphia* Homann and *Neolinyphia* Oi answer to this definition, and both genera are consequently listed as synonyms of *Neriene* here. These two groups certainly have taxonomic value (they approximately correspond to two of the species-groups of *Neriene*), but still I prefer not to use them. Subdividing the genus into smaller genera or subgenera at the present state would mean the recognition of not less than five different taxa, probably even more, which are not clearly definable at the moment. At a later time, when many more species have turned up from relatively poorly explored regions, it may be necessary to split the genus up again. The arrangement of the species into species-groups may facilitate a subsequent subdividing in the future.

Infrageneric affinities. — In the species-groups are brought together the species with similar genitalia and, usually, with some other common characters. The differences between the groups are small but clear-cut in most cases. The major differences are given in the key to the species (p. 77). There are a few species that do not fit entirely into any of the groups, or rather represent intermediate forms between two groups. For instance *N. herbosa* and *N. brongersmai* have characters in common with the *clathrata*- and *hammeni*-group, and their present position in the latter group is mainly based on the shape and structure of the male terminal apophysis. Another example we find in *N. japonica* and *N. fusca*, which differ to some degree from the other species of the *peltata*-group they are now placed in, but which do agree less with any of the other groups.

Within the species-groups smaller sub-groups of closely resembling species are sometimes recognizable. The two East Asiatic complexes of *herbosa-brongersmai* and *japonica-fusca*, in the *hammeni*-group and the *peltata*-group, respectively, have already been mentioned above. The complex of *macella-*

sundaica-beccarii is another example; the three species form a distinct subgroup within the *hammeni*-group in the Oriental region. In some cases the differences between the species of a group appear to be very slight (e.g., between *hammeni* and *oidedicata*), or are only convincing when presented in a diagram (*kibonotensis* and *helsdingeni*).

Data about habitat are unfortunately unknown for many of the species of *Neriene*. It is therefore impossible to determine whether the species of a species-group show agreement in type of habitat. From the available data one may infer that the species of the *hammeni*-group are found close to the ground, e.g., among plants and under stones. This equally holds for the *clathrata*-group, with the exception of *N. montana*, which is also found in houses and on trees. As regards the *peltata*-group, we only know that *N. peltata* and *N. japonica* build their webs on trees and shrubs. From the other species the habitats have never been recorded. *N. emphana* and *N. litigiosa*, together forming the *emphana*-group, also occur on trees and shrubs in woods. The members of the *radiata*-group build very characteristic dome-shaped webs between branches of trees and the ground or in similar spaces, but here the web of *N. strandia* is unknown.

Summarizing I should say that the species-groups do not clearly correspond with different ecological niches, and that there are only slight discontinuities between the different groups, as far as I can infer at the moment from the available material and data. East Asia and the Indo-Malayan region, among others, I expect to yield many additional species when properly looked for, and with the aid of these the species-groups, as proposed here, can be tested and corrected.

Description. — Small to medium sized animals (2-8.5 mm). PME on black tubercles or with narrow black rings. Cephalothorax not conspicuously elongate, and without conspicuous triangular extensions ventrally on border of head and thorax. Chelicerae with or without stridulating files. Posterior surface of chelicerae with protrusion on posterior surface very low (cf. *Microlinyphia*). Number of cheliceral teeth variable. Chelicerae never elongate or slanting backwards.

Legs as a rule slender, but some species have shorter legs; femur I usually longer than cephalothorax, sometimes more than twice as long. Ratio length to width of tibia I variable, ranging from 7 to 29. Femora with or without spines. Tibiae with dorsal, lateral, and ventral spines, in smaller species with dorsal spines only. Metatarsi usually with spines, but spineless in smaller species. Tm I ranging from 0.09-0.29. Metatarsus IV without trichobothrium. Leg II sometimes distinctly shorter than leg IV, in long-legged species

slightly longer than leg IV. Abdomina of most males cylindrical, females often with a postero-dorsal tubercle. Dorsal abdominal pattern nearly always present.

Male palp. — Tibia with many lateral and latero-dorsal spines or spine-hairs. Cymbium with rounded tip, never truncate (cf. *Bathyphantes*). Median apophysis of tegular complex on antero-mesal surface of the latter; distal part membranous with chitinous and hook-shaped tip, proximal part rod-like with a cavity or depression on widened base. Radix comparatively large, proximal tip slightly knob-shaped and excavated at meso-ventral side, distal end bluntly truncate; embolus attached to an embolic arm, which branches off at ventral side near base. Embolus flat at broad base, bent to lateral side of palp on half length or less, distal half curved around terminal apophysis; element never thread-like. Embolic membrane attached to membranous connection between radix and lamella at mesal side, with frayed apical margin; element covering tip of embolus at the unexpanded palp. Terminal apophysis of variable shape and size, but always a spirally coiled chitinous element with a closed axis (cf. *Linyphia*). Lamella large, not much shorter than cymbium and sometimes even longer; proximal tip narrow, distal part broad with flat or concave dorsal and convex ventral surfaces; a small marginal tooth, meso-dorsally at transition of proximal narrow part into broad apical part, always present; lateral arm of varying length, with or without free lateral projection. A terminal sclerite present in some species-groups between embolus and terminal apophysis. Transversal sclerite small, if present.

Epigyne. — Comparatively simple, consisting of a chitinous ventral surface, a common opening of the atria, usually large, and a short scape. Two atria of vulva fused to a varying degree. Either atrium with a spirally coiled groove from posterior side towards an anterior turning-point, where the groove becomes a duct, which runs in reversed direction to the receptaculum. Receptaculum thick-walled, round or oval. Fertilization duct parallel with spiral groove, from receptaculum to posterior side of dorsal surface, ending as an open gutter there. Atria rigid, of constant shape, not concertina-like as in *Linyphia*. Scape never very long, always provided with a small depression or pit near tip.

Key to the species (*kimyongkii* and *multidentata* not included)

1. Cephalothorax with callous brims. PME with narrow black rings and small black triangles in front and behind, distance between PME smaller than between PME and PLE. Chelicerae with fine stridulating files, ridges parallel and close together. All femora spineless. Position of *d*'-spine on tibia I lower than 0.10. Abdomen with clear white ventro-lateral bands or series of white spots, never with a lanceolate white spot in front of spinnerets. Male palp: distal arm of paracymbium narrow

- and apically rounded; median apophysis broad, pointing forwards; embolus without apical lobes; terminal apophysis a conspicuously grooved and shining black element; lamella without free lateral projection; transversal sclerite absent; terminal sclerite large, at mesal side of terminal apophysis. Epigyne: opening much broader than high; scape pointing in posterior direction, not curved to ventral side; lateral translucent areas not present; atria touching mesally for most of their length. (*radiata*-group) 27
- Cephalothorax without any trace of callous brims. PME either on black tubercles, and then distance between PME mutually larger than between PME and PLE, or PME with narrow black rings and small triangles, and PME closer to each other than to PLE. Stridulating files present or absent. At least some of the femora with d-spines. Position of d"-spine on tibia I 0.10 or more. Abdomen ventrally without clear white ventro-lateral bands or series of spots, or if so, with a lanceolate spot in front of spinnerets. Epigyne and male palp not as described above, notably terminal apophysis of different shape 2
2. PME on black tubercles, distance between PME larger than between PME and PLE. Stridulating files composed of broken ridges. Position of d"-spine on tibia I 0.19-0.30. Ventral surface of abdomen uniformly black, or with pairs of white spots 3
- PME with narrow black rings and triangles only, distance between PME smaller than between PME and PLE. Stridulating files absent or with fine parallel ridges. Position of d"-spine on tibia I 0.10-0.20. Ventral surface of abdomen with a clear white spot in front of spinnerets, and with many smaller white blotches, usually rather light as a whole 4
3. Ventral surface of abdomen often with pairs of white spots. Male palp: distal arm of paracymbium directed sideways and tapering to a sharp point; median apophysis directed forwards; terminal apophysis with disk-shaped and heavily chitinized basal coil, apical coil with small lappets at tip; lamella always with strong free lateral projection, anterior margin of lamella straight or emarginate, never evenly rounded; transversal sclerite not present. Epigyne: often protruding, large opening not much broader than high; scape short, depression at tip not semi-covered; atria rather cylindrical or spherical. (*clathrata*-group) 5
- Ventral surface of abdomen uniformly dark, without paired white ventral spots (except in *hammeni*, where pairs of light, but never white spots are present in males). Male palp: distal arm of paracymbium broad and flat, usually provided with apical appendages, arm closely following curve of lateral surface of tegular complex; dorsal tip of median apophysis curved in dorsal direction and backwards (except in *brongersmaei* and *herbosa*); terminal apophysis with rather membranous saucer-shaped basal coil lying close against posterior part of axial body of second coil; lamella with or without free lateral projection, which if present, is never strongly chitinized, but rather membranous; anterior margin of lamella never straight or emarginate, but more or less rounded; transversal sclerite always present. Epigyne: opening broad but low, tip of scape curved in ventral direction; large translucent lateral areas present, where the spiral grooves and fertilization ducts are discernible through the integument (in *herbosa* and *brongersmaei* the epigyne rather bulging and the opening more triangular, the translucent areas lacking). (*hammeni*-group) 10
4. Stridulating files absent. Position of d"-spine on tibia I 0.11-0.12. Tm I 0.11-0.16. Male palp: tibia fusiform, with long spines dorsally and ventrally; distal arm of paracymbium slightly widening towards apex and curved forwards; median apophysis straight, hook-shaped dorsal tip pointing in dorsal direction; transversal and terminal sclerites both present. Epigyne: conspicuous antero-lateral depressions. (*emphana*-group) 26
- Stridulating files with faint parallel ridges or absent. Position of d"-spine on tibia I 0.15-0.20. Tm I 0.16-0.27. Male palp: tibia not fusiform, with few spines; para-

- cymbium with narrow distal arm tapering to a sharp tip; hook-shaped tip of distal part of median apophysis curved in ventral direction, sometimes extended; transversal and terminal sclerites never present. Epigyne: lateral depressions small and superficial, if any at all. (*peltata*-group) 30
5. Larger specimens (4-8 mm), which have at least a pair of v-spines in the middle of anterior tibiae; if smaller (*clathrata*: 3-5 mm), then femur I with 2 d-spines. Genitalia comparatively large: length of cymbium 0.7-1.3 mm, width of epigyneal aperture 0.20-0.50 mm 6
- Smaller specimens (1.9-3.3 mm). Anterior tibiae always without v-spines in the middle. Genitalia smaller; length of cymbium smaller than 0.6 mm, width of epigyneal aperture not exceeding 0.20 mm 9
6. Anterior tibiae with a v_b'' -spine or pair of v_b'' -spines, and with two pairs of v-spines apart from basal and apical spines. Male palp: length of cymbium 1.0 mm or more. Epigyne: width of epigyneal aperture 0.40-0.50 mm 7
- Anterior tibiae usually without a v_b'' -spine, and never with more than one pair of v-spines in the middle. Male palp: length of cymbium smaller than 1.0 mm. Epigyne: width of epigyneal aperture smaller than 0.40 mm 8
7. Large specimens (δ 6-7 mm, ♀ 4.8-7.7 mm). Tibia I and II with a pair of v_b'' -spines. Male palp: coils of terminal apophysis (fig. 99) parallel; embolus (fig. 95, *e*) evenly curved. Vulva (fig. 94): coils of spiral grooves of atria parallel from entrances to turning-points. — Palaearctic region *montana* Clerck, p. 93
- Smaller specimens (δ 3.8-5.2 mm, ♀ 3.5-4.6 mm). Tibia I and II with a single v_b'' -spine. Male palp: last coil of terminal apophysis (fig. 102, 108) reversed; embolus (fig. 109, *e*) with a sharp bend on three-fifths of length. Vulva (fig. 104): direction of spiral grooves in atria reversed after two coils, describing S-shaped curves on lateral walls. — Western North America *digna* Keyserling, p. 100
8. Femur I with 2 d-spines and 1 or 2 l'-spines. Anterior tibiae often with a v_b'' -spine. Male palp: tegulum not tapering to a sharp tip anteriorly. Epigyne: not conspicuously protruding, width of epigyneal aperture 0.21-0.31 mm. — Palaearctic region and Eastern North America *clathrata* Sundevall, p. 84
- Femur I with a single d-spine and with only one l'-spine. Anterior tibiae never with a v_b'' -spine. Male palp: tegulum (fig. 122) tapering to a sharp tip anteriorly. Epigyne (fig. 117, 118): conspicuously protruding, epigyneal aperture measuring 0.29-0.36 mm. — Europe and Mediterranean region *furtiva* O. Pickard-Cambridge, p. 106
9. Ventral surface of abdomen with one pair of white spots behind epigastric furrow. Cephalothorax without contrasting pattern. Tibia I with a l'-spine. Male palp (fig. 124): lamella with bump-like thickening dorsally at base of free lateral projection. Epigyne: epigyneal aperture measuring 0.18 mm. — South-eastern North America *redacta* Chamberlin, p. 112
- Ventral surface of abdomen uniformly grey or blackish. Cephalothorax without contrasting pattern. Tibia I without lateral spines. Epigyne: epigyneal aperture measuring 0.12 mm. — Central Africa *obtusa* Locket, p. 118
- Ventral surface of abdomen with three pairs of white spots between epigastric furrow and spinnerets. Cephalothorax with blackish median and lateral bands, contrasting strongly with yellow-brown integument. Tibia I with one l'-spine and one l''-spine. — Transvaal Tentatively placed as male with *obtusa* Locket
10. Length of tibia I 13 diams. or less in males, 10 diams. or less in females. Male palp: tip of proximal part of median apophysis straight and membranous, tip of distal part curved and chitinous; free lateral projection of lamella curved outwards. Epigyne: translucent lateral areas absent; posterior margin strongly excised mesally 11
- Length of tibia I 15 diams. or more in male specimens, more than 10 diams. in females. Male palp: median apophysis curved backwards shortly before tip; lamella

- with or without lateral free projection, if present, curved in anterior direction, not outwards. Epigyne: translucent lateral areas present, posterior margin only superficially excised mesally 12
11. Male palp: terminal apophysis (fig. 281) small, tip pointing in anterior direction. Vulva (fig. 284): atria divergent. — Japan *herbosa* Oi, p. 201
- Male palp: terminal apophysis (fig. 288) larger, extreme tip curved in ventral direction. Vulva (fig. 286): atria of vulva parallel, touching mesally. — Japan *brongersmai* spec. nov., p. 205
12. Small specimens (2.5-3.5 mm). Legs long and thin, length of tibia I 22 diams. in males, 15 diams. in females. Femur I about two times as long as cephalothorax in males, more than one and a half times in females. — Java *amiculata* Simon, p. 196
- Larger specimens, with legs more robust, though still slender. Length of femur I one and a half times length cephalothorax or less, length of tibia I of male always less than 20 diams 13
13. Male palp: paracymbium often with a triangular subapical appendage on distal arm (fig. 194), pointing backwards, apical appendage pointing forwards; if small or absent, then lamella with a distinct free lateral projection. Epigyne: translucent lateral areas not reaching the posterior margin, which is excised mesally (fig. 189) 14
- Male palp: distal arm of paracymbium (fig. 270) without posterior subapical appendage; lamella without free lateral projection. Epigyne: translucent lateral areas large and reaching or nearly reaching posterior margin (fig. 272); posterior margin straight, slightly depressed mesally, but not excised 24
14. Male palp: lamella with free lateral projection (fig. 146), if small, then terminal apophysis very long, with 5 coils. Vulva (fig. 142): entrances of spiral grooves lying laterally in ventral walls of atria 15
- Male palp: lamella without free lateral projection (fig. 209). Vulva (fig. 205): entrances of spiral grooves lying in the middle of the ventral wall of each atrium 20
15. Male palp: free lateral projection of lamella very short; terminal apophysis (fig. 201, 203) very long, with 5 coils. Female unknown. — East Asia *cavaleriei* Schenkel, p. 153
- Male palp: free lateral projection of lamella large, curved or straight; terminal apophysis shorter, with 4 coils or less 16
16. Male palp: posterior appendage just below tip of distal arm of paracymbium blunt and short (fig. 183, 184); terminal apophysis (fig. 182) short with blunt tip, higher than long. Vulva (fig. 179): spiral grooves with 2 coils; much wider than long, ratio length to width 0.7 or less. — Japan *albolimbata* Karsch, p. 141
- Male palp: posterior appendage of distal arm of paracymbium triangular (fig. 146), tapering to a point, or appendage absent (fig. 175); terminal apophysis longer than high. Vulva: 2½-3 coils of spiral groove; ratio length to width 0.8 or more 17
17. Male palp: distal arm of paracymbium without posterior appendage, but posterior margin sometimes projecting on lower part; free lateral projection of lamella straight (fig. 175). Vulva (fig. 167): turning-points situated laterally of receptacula 18
- Male palp: distal arm of paracymbium with posterior appendage; free lateral projection of lamella curved or straight. Vulva (fig. 142): turning-points dorsally or mesally of receptacula 19
18. Male palp: straight posterior margin of distal arm of paracymbium (fig. 160, 165) interrupted, lower part projecting to variable extent, but always narrowly; pointed tip of terminal apophysis (fig. 158) curved in ventral direction towards antero-lateral tip of lamella. Epigyne: width of epigyneal aperture 0.49-0.57 mm; vulva wider than long, ratio length to width 0.8; sides markedly constricted in the middle (fig. 157). — North-eastern North America *variabilis* Banks, p. 130
- Male palp: distal arm of paracymbium without posterior appendage or projecting parts (fig. 168, 175); terminal apophysis (fig. 177) about straight. Epigyne: width

- of epigyneal aperture 0.42-0.46 mm; vulva slightly wider than long, ratio length to width 0.95 or more; sides only slightly constricted in the middle (fig. 167). — South-eastern North America *coosa* Gertsch, p. 136
19. Male palp: free lateral projection of lamella (fig. 199) only slightly curved; axis of last coil of terminal apophysis (fig. 193) perpendicular to axis of penultimate coil. Epigyne: width of epigyneal aperture 0.46-0.50 mm; vulva bell-shaped (fig. 190), wider than long, ratio length to width 0.85 approximately. — Korea, Japan *oidedicata* spec. nov., p. 146
- Male palp: free lateral projection of lamella (fig. 147) distinctly curved in anterior direction; all coils of terminal apophysis (fig. 148) parallel. Epigyne: width of epigyneal aperture 0.32-0.40 mm; vulva (fig. 142) not bell-shaped, but with evenly curved lateral sides. — Western Europe *hammeni* Van Helsdingen, p. 124
20. Abdomen with a large postero-dorsal tubercle, conspicuously protruding behind spinnerets. Anterior tibiae usually with a v_b "-spine. Male palp: terminal apophysis (fig. 245) short with bluntly rounded tip. Epigyne: width of epigyneal aperture small, 0.38 mm. — Central Africa *conica* Locket, p. 176
- Postero-dorsal tubercle of abdomen present, but not conspicuously protruding behind spinnerets. Male palp: terminal apophysis longer, or, when shorter, pointed distally. Epigyne: width of epigyneal aperture usually larger, if small, then anterior tibiae without v_b "-spines. 21
21. Anterior tibiae usually without v_b "-spine. Male palp: terminal apophysis with three coils, last coil as long as second coil, or, if shorter, then sharp extreme tip of element not perpendicular to axis of element. Vulva: spiral grooves with three coils between entrances and turning-points; receptacula curved in mesal direction; width of epigyneal aperture 0.39-0.54 mm 22
- Anterior tibiae with a v_b "-spine. Male palp: terminal apophysis with 2-3 coils, second coil comparatively long, third coil, if present, with sharp extreme tip perpendicular to axis of element. Vulva: spiral grooves with slightly more than two coils between entrances and turning-points; receptacula curved outwards; width of epigyneal aperture 0.55-0.56 mm 23
22. Male palp: terminal apophysis rather slender, length 0.37-0.42 mm, second and third coils of approximately same length (fig. 213). Vulva (fig. 205): ratio length to width larger than 0.9. — Central Africa *kibonotensis* Tullgren, p. 156
- Male palp: terminal apophysis (fig. 223) more compact; third coil half as long as second coil, with sharp tip; length of element 0.31-0.34 mm. Vulva (fig. 214): ratio length to width smaller than 0.9. — Central Africa . *helsdingeni* Locket, p. 162
23. Cephalothorax brown, suffused with grey. Abdomen with paired black spots on dorsal surface, and with uniformly black pigmented ventral surface. Male palp: terminal apophysis (fig. 234) with two coils or slightly more, second coil very long without sharp tip. Vulva (fig. 232): spiral grooves with slightly more than two coils between entrances and turning-points. — Natal *natalensis* spec. nov., p. 168
- Cephalothorax light orange, without any trace of suffusion. Abdomen light cream-coloured, with pairs of comparatively small latero-dorsal grey spots, ventral surface only lightly pigmented on posterior half. Male palp: terminal apophysis (fig. 241) with three coils, last coil with sharp tip parallel to other coils and perpendicular to axis of element. Female unknown. — South Africa *flammea* spec. nov., p. 173
24. Male palp: last coil of terminal apophysis (fig. 251) emerging nearly parallel with penultimate coil, when viewed from side. Vulva (fig. 254): receptacula situated near tips of atria, pointing outwards (fig. 255); turning-points at ventral side of tips of atria, pointing inwards. — Sumatra *beccarii* Thorell, p. 181
- Male palp: last coil of terminal apophysis emerging at an angle from penultimate coil, when viewed from side. Vulva: receptacula and turning-points situated laterally of rounded tips of atria 25

25. Male palp: length of terminal apophysis (fig. 262) 0.34 mm. Epigyne: width of epigyneal aperture 0.50-0.53 mm; vulva (fig. 258) broader than long, ratio length to width larger than 0.8. — Burma, Malay Peninsula . . . *macella* Thorell, p. 186
- Male palp: length of terminal apophysis (fig. 265) 0.39-0.42 mm. Epigyne: width of epigyneal aperture 0.64-0.68 mm; vulva (fig. 266) much broader than long, ratio length to width smaller than 0.75. — Java, Lombok . . . *sundaica* Simon, p. 191
26. Comparatively small specimens: length of cephalothorax 1.75-2.25 mm in females, 1.6-2.4 mm in males. Chelicerae of male with a conspicuous latero-dorsal tooth on two-thirds of length; dorsal row with 3-4 teeth, which are not in one line. Femur I 1.7-1.9 times as long as cephalothorax in males, 1.4-1.6 times in females. Length of tibia I 18-21 diams. in males, 12-14 diams. in females. Femur I with d- and l'-spines. Tibia I with v_b "-spine and with two pairs of v-spines. — Palaearctic region . . . *emphana* Walckenaer, p. 210
- Comparatively large specimens: length of cephalothorax 2.15-2.6 mm in females, 2.4-3.0 mm in males. Chelicerae of male bulging on basal two-thirds, but without tooth on dorsal surface; dorsal row with one large tooth. Femur I 2.2-2.4 times length cephalothorax in males, 1.8-2.0 times in females. Length of tibia I 24-28 diams. in males, 15-17 diams. in females. Femur I spineless. Tibia I without v_b "-spine, but with 3-4 pairs of v-spines. — Western North America . . . *litigiosa* Keyserling, p. 217
27. Tibia I and II with a l'- and l"-spine, and usually with more than 4 pairs of v-spines. Male palp: median apophysis (fig. 324, 332) distinctly bifurcate. Vulva (fig. 316, 326): as long as wide; receptacula and turning-points situated mesally between tips of atria . . . 28
- Tibia I and II with a l"-spine only, or without lateral spines, usually with 3 pairs of v-spines or less. Male palp (fig. 340, 345): median apophysis not bifurcate, ventral margin serrate at the most. Vulva: wider than long; in *marginella* about as long as wide, and receptacula and turning-points situated dorsally and laterally of atria . . . 29
28. Chelicerae with 3 dorsal and 3 ventral teeth. Callous brims of cephalothorax of female with white pigment below integument. Femur I 2 times as long as cephalothorax or less in females, 1.5-1.7 times in males. Male palp (fig. 324): lamella not conspicuously protruding distally of cymbium and terminal apophysis. — Holarctic region . . . *radiata* Walckenaer, p. 222
- Chelicerae usually with 5 teeth in both rows, rarely 4 or 6. Callous brims of cephalothorax never with white pigment below integument. Femur I 2.0 times as long as cephalothorax or more in females, more than 1.9 times in males. Male palp (fig. 332): lamella conspicuously protruding in front of cymbium and terminal apophysis. — East Asian mainland and Japan . . . *longipedella* Bösenberg & Strand, p. 235
29. Tibia I and II with a l"-spine. Callous brims on cephalothorax narrow, one-twelfth of width of cephalothorax. Male palp (fig. 340): ventral margin of median apophysis not serrate; anterior margin of lamella (fig. 337, 338) evenly rounded. Vulva (fig. 336, 339): receptacula and turning-points latero-dorsally of tips of atria. — Japan . . . *marginella* Oi, p. 242
- Tibia I and II without lateral spines. Callous brims of cephalothorax occupying one-sixth of width of thorax. Male palp (fig. 345): ventral margin of median apophysis serrate; anterior margin of lamella slightly angular. Vulva (fig. 343, 344): much wider than long; receptacula and turning-points mesally; atria semi-spherical. — Borneo . . . *strandia* Blauvelt, p. 246
30. Cephalothorax with a grey or black median stripe and margins. Abdomen light, with or without parallel grey or black lines on dorsal and posterior surfaces. Legs very long and slender, femur I 2.0-2.4 times as long as cephalothorax in males, 1.6-1.7 times in females. Male palp (fig. 393): lamella with an additional conical

- tooth in front of long and pointed lateral projection. Epigyne: distinctly protruding from ventral surface, opening large (0.29-0.36 mm). — East Asian mainland and Japan *limbatinella* Bösenberg & Strand, p. 278
- Cephalothorax without median stripe. Abdomen with other pattern. Legs less long. Male palp: lamella without additional tooth in front of lateral projection (fig. 349). Epigyne never protruding 31
31. Males 32
- Females 35
32. Lateral projection of lamella curved or broadly conical, always heavy and solid 33
- Lateral projection of lamella straight and slender, always with sharp tip, never heavy 34
33. Distal arm of paracymbium very thin, nearly thread-like; anterior surface of tegulum protruding angularly, not excavated; median apophysis protruding in front of cymbium (fig. 374); embolus (fig. 373) with sharp tip; terminal apophysis (fig. 375) long and slender, with knob-shaped tip; lateral projection of lamella straight. — Korea and Japan *japonica* Oi, p. 270
- Distal arm of paracymbium slender, but not thread-like; anterior surface of tegulum lightly excavated; median apophysis not protruding in front of cymbium (fig. 385); embolus (fig. 381) with apical appendages; terminal apophysis (fig. 380) more compact and with blunt tip; lateral projection of lamella curved forwards with broad tip. — Japan *fusca* Oi, p. 275
34. Femur I 1.4-1.6 times as long as cephalothorax. Tibia I 15-17 diams. long. Palp: anterior surface of tegulum distinctly excavated; free lateral projection of lamella long and slender, more than three times as long as broad at base (fig. 353). — Europe, Greenland, North Africa(?) *peltata* Wider, p. 251
- Femur I slightly shorter than cephalothorax. Length of tibia I 12 diams. or less. Palp: anterior surface of tegulum rather straight, not excavated (fig. 359). — Kashmir *kashmirica* Di Caporiacco, p. 261
35. Vulva, scape inclusive, longer than wide, ratio length to width 1.3 or more . . . 36
- Vulva broader than long, square, or barely longer than wide, ratio length to width less than 1.1 37
36. Smaller specimens (2.9-3.5 mm). Abdomen with oblique dorso-lateral streaks. Legs rather stout, length of tibia I 7.5-8.5 diams. of segment. Epigyne (fig. 368): posterior margin broadly and distinctly emarginate; atria separated on more than anterior half, though touching there at places; turning-points situated laterally of apices (fig. 369); width of epigyneal aperture 0.25-0.29 mm. — Korea and Japan *japonica* Oi, p. 270
- Larger specimens (4-5 mm). Abdomen without oblique dorsal streaks. Legs more slender, length of tibia I 12-13 diams. of segment. Epigyne (fig. 377): posterior margin shallowly emarginate; atria fused for the larger part; turning-points lying anteriorly of tips of atria (fig. 378); width of epigyneal aperture 0.31-0.33 mm. — Japan *fusca* Oi, p. 275
37. Abdomen light, with faint dorsal band on anterior three-fourths with two pairs of small brown spots. Epigyne (fig. 364): width of epigyneal aperture 0.28 mm; turning-points and receptacula touching in mesal plane (fig. 365, 366). — Ceylon *katyae* spec. nov., p. 267
- Vulva: turning-points and receptacula never touching in mesal plane, but wide apart at anterior tips of atria 38
38. Latero-dorsal white bands reaching as far as spinnerets. Vulva (fig. 347): atria conical, diverging; spiral grooves with two coils; width of epigyneal aperture 0.20-0.22 mm. — Europe, Greenland, North Africa(?) *peltata* Wider, p. 251
- Latero-dorsal bands not reaching as far as spinnerets, but broken off on three-fourths of length of abdomen, posterior fourth blackish. Vulva: atria more globular,

- with barely more than one coil of spiral groove; width of epigyneal aperture smaller or larger 39
39. Epigyne (fig. 361): opening distinctly trapezoid, scape short; width of epigyneal aperture 0.15-0.17 mm. — India, Burma *birmanica* Thorell, p. 265
- Epigyne (fig. 356): anterior corners of opening more rounded, opening consequently less trapezoid; scape more prolonged; width of epigyneal aperture 0.29 mm. — East Asian mainland and Japan *angulifera* Schenkel, p. 258

The *Neriene clathrata* group

Neriene clathrata (Sundevall) comb. nov.

(fig. 79-91)

Linyphia clathrata Sundevall, 1829, Kongl. Svenska Vet.-Acad. Handling., 1829: 218 (description ♀, Sweden). — Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 62, pl. 18 fig. 3a-d (description, U.S.A.). — Simon, 1929, Arachn. France, 6(3): 636, 744, fig. 976-978 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 96, pl. 1 fig. 1-7, pl. 2 fig. 8-10 (genitalia). — Schenkel, 1937, Ark. Zool., 29A(1): 78 (China). — Locket & Millidge, 1953, British Spid., 2: 399, fig. 238C, 240D (British Isles). — Wiehle, 1956, Tierw. Deutschl., 44: 316, fig. 520-526 (key, Germany). — Yaginuma, 1958, Misc. Rep. Res. Inst. Natur. Resources, 46/47: 71 (Japan); 1960, Spid. Japan Colour: 42, pl. 13 fig. 77, textfig. 40-5; 1962a, Spid. fauna Japan: 18 (catalogue). — Oi, 1960, Journ. Inst. Polyt., D, 11: 230, pl. 26 fig. 363-364 (Japan). — Paik, 1965a, Educ. Journ., 3: 70, fig. 28-29 (Korea).

Frontina clathrata; Keyserling, 1886, Spinnen Amerikas, 2(2): 98, pl. 14 fig. 187 (description ♀, U.S.A.).

Floronia clathrata; Banks, 1895a, Journ. New York Ent. Soc., 3: 87 (U.S.A., New York); 1895b, Ent. News, 6: 205 (U.S.A., Missouri).

Neriene marginata Blackwall, 1833a, London & Edinburgh Phil. Mag. Journ. Sci., (3)3: 188 (description ♀ ♂, England). — Thorell, 1870, Rem. syn. Europ. spid.: 45 (= *Linyphia clathrata* Sundevall).

Linyphia multiguttata Wider, 1834, Mus. Senckenb., 1: 248, pl. 17 fig. 6 (description ♀ ♂, Germany). — Thorell, 1856, Nov. Act. Reg. Soc. Sci. Upsaliensis, (3)2(1): 167 (= *Linyphia clathrata* Sundevall).

?*Linyphia luctuosa* C. L. Koch, 1837, Übers. Arachnidensyst., 1: 10 (diagnosis, Germany). — Thorell, 1870, Rem. syn. Europ. spid.: 45 (= *Linyphia clathrata* Sundevall).

Linyphia amurensis Strand, 1907b, Abh. naturf. Ges. Görlitz, 25: 145 (description subadult ♀, East Siberia). [new synonymy].

*Linyphia waldea*¹⁾ Chamberlin & Ivie, 1943, Bull. Univ. Utah, 33(10): 27 (Connecticut, U.S.A.; is different from European *L. clathrata*). — Hackman, 1954, Acta Zool. Fennica, 79: 5, 10, 50 (New Foundland). [new synonymy].

For a complete list of references up to 1939, see Bonnet (1957: 2493).

Types. — The holotype of *Linyphia amurensis* is a subadult ♀ from Siberia, Amur River (ZMH). Of *Linyphia waldea* I have examined the holotype only, a ♀ specimen from Connecticut, Norwalk (UUC); a male paratype from Ohio in the same collection, not examined.

1) Although they have correctly designated a holotype for *L. waldea*, the authors have erroneously called it a "new name" instead of a new species.

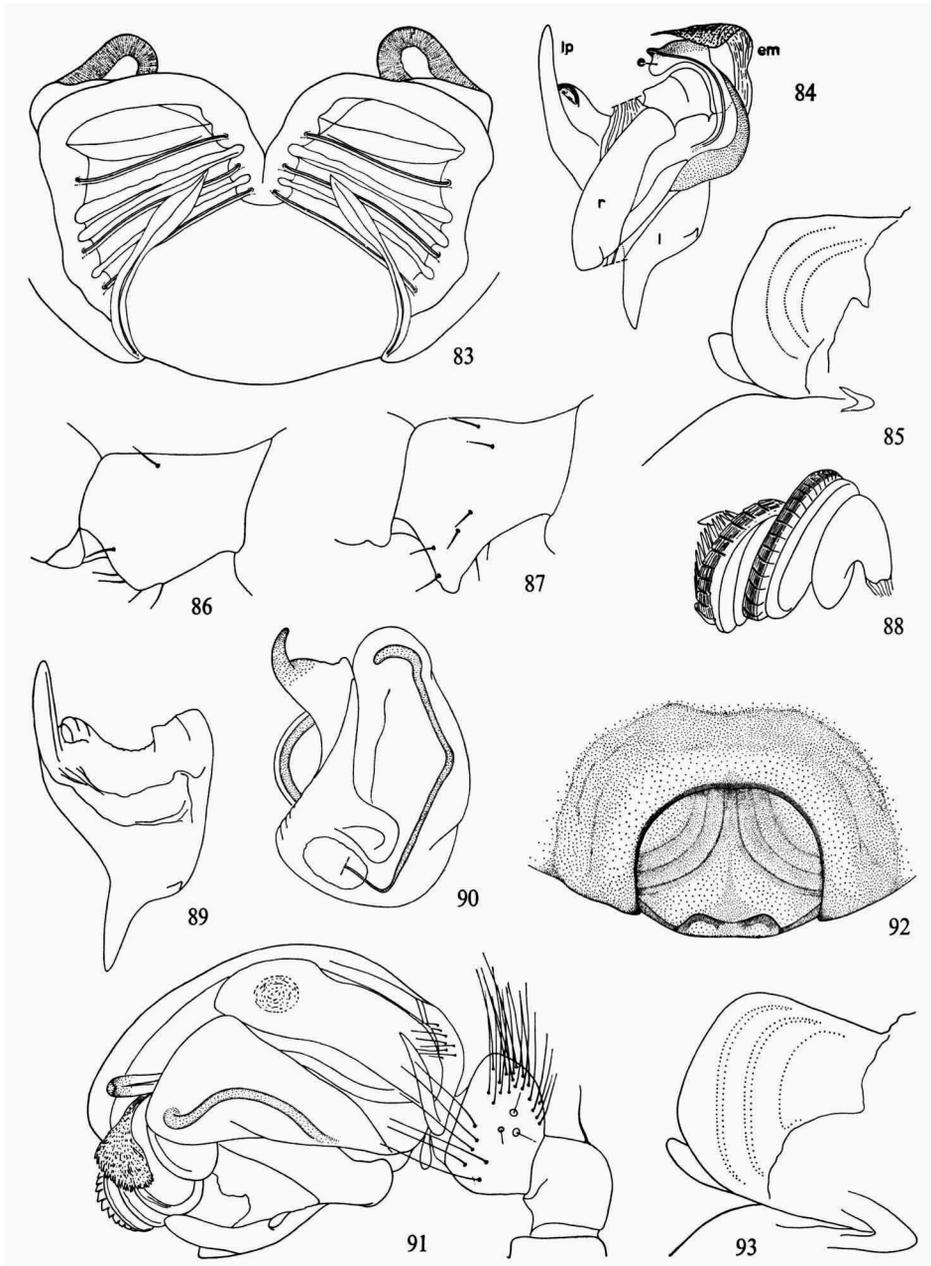


Fig. 83-91. *Neriene clathrata*. 83, vulva, Europe, dorsal aspect; 84, radix (*r*) with embolus (*e*), embolic membrane (*em*), and lamella (*l*), dorsal aspect; 85, epigyne, lateral aspect; 86, male palpal trochanter, Japan, lateral aspect; 87, do., Europe; 88, terminal apophysis; 89, lamella, dorsal aspect; 90, tegulum with median apophysis, mesal aspect; 91, male palp, lateral aspect. Fig. 92-93. *N. montana*. 92, epigyne; 93, epigyne, lateral aspect 83, $\times 213$; 84, 89-91, $\times 67$; 85, $\times 80$; 86-88, $\times 95$; 92-93, $\times 50$.

Remarks. — The present species was described for the first time by Sundevall (1829), who placed it in *Linyphia*. A few years later it was described again by Blackwall (1833a) as the first species of his new genus *Nerienne*, receiving the specific name *marginata*. The synonymy of the two species was recognized by Thorell (1870), who had the opportunity to compare Swedish specimens of *clathrata* (from Sundevall's collection?) with specimens of Blackwall's *marginata*, which he had received from O. Pickard-Cambridge. The specimens in question may well have come from the collection of Blackwall himself, which was accessible to Pickard-Cambridge. The original collections of Sundevall and Blackwall are not preserved as separate entities, but have been fused with other collections. Blackwall's collection, for example, has been incorporated into the collection of O. Pickard-Cambridge. This collection consists of only one sample of each species, as was the practice in those days, when "duplicates" were used for the purpose of exchange, or merely thrown away. Thus it is impossible to recover Blackwall's specimens of *Nerienne marginata*, not to mention the type-specimens.

Thorell, considering *marginata* to be the type-species of *Nerienne* (see p. 74), consequently synonymized the genus with *Linyphia* Latreille. The combination *Nerienne clathrata* was used again for this species at the beginning of this century by some American authors, correctly in my opinion.

Linyphia multiguttata Wider is easily recognized from the description to be synonymous with *clathrata*. It was already listed as such by Thorell (1856: 167; 1870: 45). When Strand (1916: 17) revised Wider's collection he could confirm this synonymy from a specimen of *multiguttata*, which was still present at the time. I have not succeeded in finding it in the collection of the Senckenberg Museum.

Koch's description of *Linyphia luctuosa* is much too superficial to recognize it to belong to any of the common European Linyphiids. Thorell (1870: 45) listed it as a synonym of *clathrata*, but he does not give any motives. It is entered here with a question-mark.

The present species has been mentioned from North America by Emerton (1882) and subsequent authors, who considered the Nearctic specimens to be conspecific with the Palaearctic *clathrata*. Chamberlin & Ivie (1943) held different views, and published the new species *Linyphia waldea* for the North American *clathrata* as described by Emerton. They have been followed by few, most authors preferring to use the old name. I agree with the general opinion, as I cannot find differences of any importance between the Old and New World populations. However, I have never seen *L. waldea* listed as a synonym of *clathrata* before.

Male. — Measurements in mm. Total length 3.4-4.8; cephalothorax, length 1.8-2.4, width 1.15-1.45; abdomen, length 1.65-2.1, width 0.95-1.2, height 0.7-1.2; chelicerae, length 0.8-1.0, width 0.31-0.40.

Cephalothorax. — Orange-brown to brown, lightly suffused with grey, and with a narrow grey margin. Posterior margin straight, sides very lightly curved and nearly continuous with sides of head. Rather long and narrow, width 0.6-0.65 of length, width of head 0.55-0.6 of width of thorax. From side, posterior margin rather high, dorsal line rising gradually from posterior margin to fovea, nearly parallel with lower margin of cephalothorax from fovea to eye-region; clypeus straight. Hairs along margins and on striae very short, hairs at eye-region and clypeus stubbly.

Eyes. — Eye-region occupying nearly whole width of head. Anterior row recurved, posterior row straight. PME on large black tubercles. Diameter of PME 0.08-0.09 mm, laterals of same size, diameter of AME 0.7 of PME. PME separated from each other by 1.9-2.1 diams., from PLE by 1.1-1.3 diams., and from AME by 1.6 diams. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.15-0.17 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax, lightly suffused with black. Two basal tubercles, meso-dorsally and latero-dorsally in position, the latter small (very small in Nearctic specimens, absent in Japanese specimen), the former slightly larger and always present (small in Japanese specimen). Stridulating file on lateral surface barely visible, consisting of broken ridges. Three dorsal cheliceral teeth, forming a triangle, one tooth being placed rather ventrally; the latter tooth large, wedge-shaped, the others half as large. Ventral row with four small teeth, close together near base of fang, the apical three fused into a serrate ridge. Fang dark brown, curved, with an excrescence mesally near its base.

Gnathocoxae. — Brown, suffused with black; lateral margins rather convex, apices truncated obliquely. Labium black-brown, raised anterior margin brown. Sternum brown, suffused with black; width 0.7 of length.

Legs. — Light brown to orange-brown, with variable degree of annulation, sometimes without any trace of rings; if present, most conspicuous on ventral side of femora and apices of tibiae; coxae with narrow apical grey margins; femora with broad median and narrow apical rings, tibiae with submedian and apical rings, metatarsi at the most with faint median and apical rings; rings blackish-brown. Legs short, leg IV longer than I. Length of femur I 0.8-0.9 of length of cephalothorax, length of tibia I 9-11 diams. of segment. Measurements (of specimen from The Netherlands, Gerendal) in mm:

	I	II	III	IV	palp
Fe	1.70	1.60	1.40	1.85	0.67
Pa	0.45	0.45	0.45	0.45	0.20
Ti	1.55	1.40	1.10	1.60	0.25
Mt	1.75	1.55	1.30	1.90	—
Ta	0.95	0.80	0.60	0.80	0.71

Chaetotaxy. — Fe I 2d, 1-2 l'; II 2d, 1-2 l'; III 1d, 0-1 l'; IV 2-3d.
Pa I-IV d''d'.

Ti	I - II	v'' _b	d''	v'	v''	l'	l''	d'	[l'' _a l'' _a v'' _a v'' _a]
	III	v'' _b	d''	v'	v''	l'		d'	[l'' _a l'' _a v'' _a v'' _a]
	IV	v'' _b	d''	v'	v''	l'	l''	d'	[l'' _a l'' _a v'' _a v'' _a]
Mt	I - II	d v'' _a ; III - IV d l' v' v'' v'' _a v'' _a							

Length of d''-spine on tibia I 0.06-0.17 mm, diameter of segment at base of d''-spine 0.14-0.18 mm; on tibia IV 0.06-0.16 mm and 0.11-0.16 mm, respectively. Tm I 0.19-0.24. Position of d''-spine on tibia I 0.21-0.24.

Abdomen. — Rather cylindrical. Abdomen either black-brown with a pair of dorsal white spots on basal fourth, or dorsal surface with a broad leaf-shaped band with irregularly excised or sinuous margins; band beige-coloured with black margins and black V- or W-shaped markings posteriorly; band flanked by beige-coloured dorso-lateral bands with white blotches, forming a pair of clear white spots on basal fourth; bands reduced to this pair of spots in dark specimens. Ventral half of lateral surface and ventral surface blackish, with some irregular light patches laterally, and with four light or white spots on ventral surface, anterior pair just behind opercula, posterior pair between epigastric furrow and spinnerets, slightly nearer to spinnerets than to furrow, closer to each other than to anterior pair. Opercula, spinnerets and genital area black-brown.

Palp (fig. 82, 91). — Segments brown with black suffusion, cymbium black-brown. Trochanter (fig. 87) with a retro-ventral tooth or boss (small in Japanese specimen (fig. 86), a larger bump in Nearctic specimens). Femur cylindrical. Patella short, with dorsal spine shorter than segment and slightly twisted. Tibia higher than long, with about 25 spines or spinehairs on dorso-lateral and ventro-lateral surfaces, spines as long as segment. Cymbium spineless. Paracymbium sticking out laterally, narrow distal arm tapering to a point; short hairs on basal half directed forwards. Tegulum excavated latero-ventrally. Median apophysis (fig. 90) with hook-shaped tip of dorsal arm curving outwards. Embolus (fig. 84, e) widened subapically on the outside of the curved element, and with a small rounded apical lobe on the inside. Terminal apophysis (fig. 88) with three or slightly more transversely grooved coils, basal coil disk-shaped; apical coil with many lappets

anteriorly. Lamella (fig. 84, 89, *l*) longer than broad, with proximal tip tapering to a point, widening on one-third of length, mesal margin straight, anterior margin irregularly emarginate with a few ridge-like teeth, and with a large blunt protrusion at base of free lateral projection (*lp*); projection straight and slender, with blunt tip. Transversal sclerite absent.

Female. — Measurements in mm. Total length 3.1-5.0; cephalothorax, length 1.55-2.0, width 1.05-1.3; abdomen, length 1.9-2.8, width 1.3-1.85, height 1.3-1.9; chelicerae, length 0.70-0.90, width 0.31-0.37.

Cephalothorax. — Colour as in male. Posterior margin barely excised, sides evenly rounded, superficially constricted at border of head and thorax. From side, dorsal line rising rather steeply from posterior margin to foveal region, nearly level on cephalic part; clypeus straight, shortly haired. Both rows of eyes straight; sizes and spacing as in male. Height of clypeus 0.14-0.15 of length of cephalothorax.

Chelicerae. — Without basal tubercle. Dorsal row with three cheliceral teeth, basal tooth small, second tooth twice as large, apical tooth slightly larger and stronger than second tooth, all nearly equidistant. Ventral row with five to six teeth, small and close together, basal pair opposite to apical dorsal tooth, third and fourth teeth slightly larger than others; whole row close to base of fang. Lateral margins of gnathocoxae slightly diverging, apices rounded.

Legs. — Colour and annulation as in male. Short and stout, leg IV longer than leg I. Length of femur I 0.9 of length of cephalothorax; length of tibia I 7-8 diams. of segment. Measurements (of specimen from The Netherlands, Gerendal) in mm:

	I	II	III	IV
Fe	1.65	1.55	1.30	1.75
Pa	0.45	0.45	0.45	0.45
Ti	1.50	1.30	0.95	1.45
Mt	1.60	1.45	1.20	1.75
Ta	0.95	0.85	0.60	0.80

Chaetotaxy. — Fe I 2 d, 1-2 l'; II 1-2 d; III d; IV 2-3 d. Pa I-IV d''d'. Spines on tibiae and metatarsi as in male. Length of d''-spine on tibia I 0.29-0.34 mm, diameter of segment at base of d''-spine 0.18-0.22 mm; on tibia IV 0.36-0.41 mm and 0.15-0.18 mm, respectively. Tm I 0.20-0.25. Position of d''-spine on tibia I 0.23-0.26.

Abdomen. — Dorsal surface moderately curved, descending rather sud-

denly to spinnerets. Dorsal surface with a leaf-shaped band, as wide as abdomen; leaf-shaped band with heavy black-brown margins irregularly excised or sinuous; centre light with white blotches, and with some median black-brown spots on anterior half, becoming chevrons on posterior half. Leaf-shaped band flanked by a white dorso-lateral band, continuous with a narrow white transverse band on posterior surface; the latter band well separated from spinnerets by a black-brown area; dorso-lateral white band usually intersected on posterior half of abdomen by narrow black-brown streaks, connecting dorsal leaf-shaped band with dark ventral half of lateral surface, which usually bears some white spots. Ventral surface black-brown with four white spots as in male. Spinnerets and opercula blackish.

Epigyne (fig. 80, 85). — Black-brown, moderately protruding in ventral direction. Common opening of atria small when compared with *N. furtiva* (O. Pickard-Cambridge). There is a dark, smooth, slightly depressed area at either side.

Vulva (fig. 79, 81, 83). — Atria semi-spherical, diverging, with a common opening. About three coils of spiral groove (*sg*) from opening to turning point (*tp*); entrances on ventral walls of atria, slightly mesally in the middle of either atrium. Fertilization duct (*fd*) running parallel with spiral groove. Turning-point and receptaculum (*rs*) at apex of atrium, turning-point at the outside or rather ventrally. Dorsal wall not prolonged into a scape, posterior margin nearly straight; ventral surface with a small mesal pit near posterior margin. Width of epigyneal aperture 0.21-0.31 mm.

Geographic variation. — There are no differences in size between European, Asiatic, and North American specimens. The epigyneal aperture, however, measures 0.21-0.25 mm in European specimens, but in the females examined from North America it measures 0.29-0.31 mm. I have seen one specimen from China (0.23 mm), and one (fig. 81) from Japan (0.27 mm). The retro-ventral tooth on the trochanter of the male palp, as found in European specimens, is present as a small bump in the only male from Japan I could examine, thanks to the kindness of Prof. Dr. R. Oi from Osaka. In North American specimens it is present, not tooth-like, but as a bump, which is slightly larger than in Japanese specimens.

Distribution and habitat. — North America East of 100° W and North of 35° N; Europe, including the British Isles and the Iberian Peninsula; Siberia, China, and Japan.

The webs of this species are found near the ground between plants and low shrubs (heather, etc.). The web is flat and without retreat. Adult specimens can be found from April onwards, and the mating-period certainly

falls in this month and the first half of May, when one can observe the pairing everywhere in the field. The males apparently remain alive during summer and autumn, as both sexes are commonly collected during most of the year. This habit, mentioned by most authors, is exceptional for *Linyphia* and *Neriene*, where as a rule the larger part of the males disappear at the end of the mating-period, in fact are very difficult to collect afterwards. I do not know whether this prolonged activity of *clathrata* males points to a prolonged sexual activity.

Material examined.

Netherlands. — Very common in all provinces. — 11 ♀ 9 ♂, Zuid-Holland, Hoogmade, in tussocks of sedge in marshy area, 25.iv.1966, P. J. van Helsdingen (ML). 1 ♂, Nieuwkoopse Plassen, wet meadow, 26.iv.1968, P. J. van Helsdingen (ML). — 19 ♀ 13 ♂, Limburg, Gerendal near Schin op Geul, between low plants, 29.v.1963, P. J. van Helsdingen (ML). 5 ♀ 3 ♂, Brunssum near Heerlen, heath, 4.v.1966, P. J. van Helsdingen (ML).

Belgium. — 1 ♀, West-Vlaanderen, De Panne, 17.iv.1962, J. Kekenbosch (ISNB); 2 ♀ 2 ♂, do., 22.v.1962 (ISNB); 1 ♀ 2 ♂, do., Westhoek, 13.vi.1962 (ISNB). 1 ♂, Blankenberge, ix.1956-iii.1957, J. Bequaert (ISNB). 1 ♀ 3 ♂, Knokke, 8.vi.1961, J. Kekenbosch (ISNB). — 2 ♀ 5 ♂, Brabant, Forêt de Soignes, Groenendael, 25.x.1962, J. Kekenbosch (ISNB); 3 ♀ 3 ♂, do., x.1962 (ISNB). 1 ♂, Tervuren, 1.iv.1915, A. Koller (*L. montana*; Denis, 1959; ISNB). 13 ♀ 5 ♂, Tervuren, Coolenshoek, 2.v.1966, P. J. van Helsdingen (ML). 3 ♀ 4 ♂, Limelette, heath, 4.v.1966, P. J. van Helsdingen (ML). 1 ♂, Uccle, 29.x.1960, J. Kekenbosch (ISNB); 3 ♀ 1 ♂, do., 10.iv.1961 (ISNB); 1 ♂, do., 5.v.1963 (ISNB). 1 ♂, Auderghem, 11.v.1957, A. Collart (ISNB); 1 ♂, do., 29.x.1960 (ISNB); 1 ♂, do., 12.v.1963 (ISNB). 1 ♂, Eppeghem, 3.vii.1957, A. Verlinden (ISNB). 1 ♀, Hofstade, 13.x.1943, J. Verschuren (ISNB). — 1 ♂, Limburg, St. Pietersberg, 22.v.1964, J. Kekenbosch (ISNB). — 3 ♀ 2 ♂, Hainaut, Montigny-le-Tilleul, 30.iv.1961, A. & J. Doucet (ISNB); 1 ♀, do., 2.v.1961, J. Doucet (ISNB). 2 ♀, Marcinelle, heath, 12.iv.1961, J. Doucet (ISNB). 1 ♀, Froid-Chapelle, 12.iii.1961, J. Doucet (ISNB). 1 ♀ 1 ♂, Basècles, 15.iv.1963, J. Kekenbosch (ISNB). 1 ♀, Couillet, 17.iii.1961, J. Doucet (ISNB). 1 ♂, Ellezelles, 24.iv.1956, J. M. Vrydagh (ISNB). — 1 ♀, Namur, Clermont, 8.iv.1961, J. & A. Doucet (ISNB). 1 ♀, Vitruval, under dead leaves, 16.iv.1961, J. Doucet (ISNB). 1 ♀, Couvin, 18.ix.1963, J. Kekenbosch (ISNB). — 1 ♀, Luxembourg, Torgny, 20.viii.1962, E. Derenne (ISNB). 1 ♀, Ethe, 12-13.vi.1958, J. M. Vrydagh (ISNB).

Luxemburg. — 2 ♀, Diekirch, 4-5.vi.1960, P. J. van Helsdingen (ML).

Germany. — 1 ♂, Westfalen, Versmold, v.1960, H. Felten (SMF). — 3 ♀, Niedersachsen, Feldberg in Weserbergland, 22.ix.1961 (SMF). — 1 ♂, Hessen, Schlitz, 1959, W. Tobias (SMF). 1 ♀, Heppenheim, Ried, vi.1959, M. Grasshoff (SMF). 1 ♂ Ebersgöns, Grube Johanna, 16.xi.1960, O. Kraus (SMF). — 1 ♂, Bayern, Pflöchsbad near Lohr a. Main, 8.vi.1961, A. Zilch (SMF). — 1 ♂, Sachsen-Anhalt, Harz, Elbingerode, 280 m, 9.v.1961, F. Teucher (SMF).

France. — 3 ♀, Hautes-Pyrénées, Bagnères-de-Bigorre (MNP).

Corsica. — 1 ♀, Etang de Biguglia, 26.iv.1953, H. Kahmann (SMF).

Portugal. — 1 ♀ 1 ♂, Douro Litoral, Afurada near Gaia, 9.iv.1942, R. Lopes (MB). 1 ♀, Porto (MNP).

Sardinia. — 3 ♀, Scala di Giocca, 30.iii.1955, H. Kahmann (SMF).

Italy. — 2 ♀, Bergamo, Longuelo, Astino, 270 m, 24.vii.1956, leg. Valle-Bonino

(MECB). — 1 ♀, Toscana, 4 km W. of Pisa, mixed forest, 23.v.1962, H. Levi (MCZ).

Yugoslavia. — 1 ♀, Slovenia, Julian Alps, Bled, 500-700 m, 6-8.vii.1962, H. & L. Levi (MCZ).

U.S.S.R., Siberia. — 1 subadult ♀, Amurskaya Distr., Blagoveshchensk at Amur river, xi.1891, Cordes (holotype of *Linyphia amurensis* Strand; ZMH).

China. — 1 ♀, South Kansu, Gahoba, 2100-2500 m, 23.x.1930, D. Hummel (Schenkel, 1937; MS).

Japan. — 1 ♀ 1 ♂, Honshu, Wakayama Pref., Mt. Koya, 11.iv.1962, R. Oi (ML).

U.S.A. — 1 ♀, Connecticut, Norwalk, 3.vii.1933, W. Ivie (holotype of *Linyphia waldea* Chamberlin & Ivie; UUC). — 1 ♀ 1 ♂, New York, Long Island, Sea Cliff, N. Banks (MCZ). — 1 ♂, New Jersey, Lambertville, viii.1953, W. Ivie (ML). — 1 ♂, Minnesota, Clearwater Co., Itasca State Park, 17.v.1966, B. Cutler (ML). 1 ♂, Ramsey Co., St. Paul, 9.vi.1966, B. Cutler (ML).

***Neriene kimyongkii* (Paik) comb. nov.**

Linyphia kimyongkii Paik, 1965b, Kyungpook Univ. Theses Coll., 9: 29, fig. 3, 18-22 (description ♀, Korea).

Types. — ♀ holotype from Korea, Mt. Jii, 10.viii.1959, Y. K. Kim; ♀ paratype, also from Korea, Taegu, 15.ix.1963, K. Y. Paik (National Kyungpook University Collection; not examined).

The species was described from two females from Korea. Paik points out that the main differences with *Linyphia clathrata* Sundevall [= *Neriene clathrata* (Sundevall)] lie in the shape and pattern of the abdomen, which bears a conspicuous postero-dorsal tubercle, in the number of cheliceral teeth, and in the structure of the genital organ. However, the number of cheliceral teeth mentioned by him corresponds exactly with *clathrata*, while his figure of the vulva resembles that species quite closely too. Unfortunately there is no indication as to the magnification of his figures, making it impossible to compare the size of the epigyne with that of *clathrata*. The abdomen has a marked postero-dorsal tubercle indeed (fig. 22), and the abdomen as a whole is rather dark; the light ventral spots are lacking. In *clathrata* there are, as a rule, two pairs of white ventral spots.

An analysis of Paik's description yields a few more characters by which this species might be distinguished from *clathrata*. The total length falls within the range of the latter, but cephalothorax and legs seem to be shorter. All tibiae are said to lack v-spines, while a l'-spine is only present on legs I and II (in *clathrata* a pair of v-spines on anterior tibiae, and a l'-spine on all tibiae). The metatarsi, too, are less spinose in *kimyongkii*.

All characters considered, *kimyongkii* certainly closely resembles *clathrata*, and without doubt they belong in the same species-group. I have not had the opportunity to examine Paik's material of the species, but I hope to do so in the future.

Neriene montana (Clerck, non Blackwall) comb. nov.

(fig. 92-101)

Araneus montanus Clerck, (1757)1758, *Aranei Svecici*: 64, pl. 3 tab. 1 fig. 1-3 (description ♀ ♂, Sweden).

Aranea montana; Olivier, 1789, *Encycl. méthod., Hist. nat.*, 4: 208 (diagnosis). — Walckenaer, 1802, *Faune parisienne, Ins.*, 2: 215 (diagnosis and references point to *Araneus montanus* Clerck; contradicted by Walckenaer himself in 1841). — Guérin, 1818, *Encycl. méthod., Hist. nat.*, 18: 131, pl. 258 fig. 9 (copy of plate 3 tab. 1 of Clerck, 1758).

Linyphia montana; Walckenaer, 1805, *Tableau Aranéides*: 71 (according to references listed this is *Araneus montanus* Clerck; contradicted by Walckenaer himself in 1841). — Latreille, 1817b, *Nouv. Dict. Hist. nat.*, 18: 95 (diagnosis). — Walckenaer, 1841, *Hist. nat. Ins., Aptères*, 2: 233 (description; confusing references to his own works). — Simon, 1929, *Arachn. France*, 6(3): 634, 744, fig. 971-973 (key, France). — Blauvelt, 1936, *Festschr. Strand*, 2: 122, pl. 8 fig. 55-59 (genitalia). — Locket & Millidge, 1953, *British Spid.*, 2: 397, fig. 238B, 240B (British Isles). — Wiehle, 1956, *Tierw. Deutschl.*, 44: 312, fig. 514-519 (key, Germany). — Oi, 1960, *Journ. Inst. Poly.*, D, 11: 231, pl. 26 fig. 367 (probable record; Japan).

?*Aranea octomaculata* Martini & Goeze, 1778, *Naturgesch. Spinnen*: 299 (nom. nov. pro *Aranea oculorum situ semilunato* 20 of Schaeffer, 1767: pl. 199 fig. 3).

Aranea resupina domestica Degeer, 1778, *Mém. servir hist. insectes*, 7: 251 (description; references to both *Aranea montana* Linnaeus and *Araneus montanus* Clerck).

Linyphia resupina domestica; Latreille, 1817a, *Règne anim.*, 3: 87 (synopsis of *Linyphia*).

Aranea resupinata Olivier, 1789, *Encycl. méthod., Hist. nat.*, 4: 213 (diagnosis). — Guérin, 1818, *Encycl. méthod., Hist. nat.*, 18: 132, pl. 259 fig. 8 (figure copied of Lister, 1678: pl. 19 tab. 19). — Thorell, 1870, *Rem. syn. Europ. spid.*: 44 (= *Linyphia montana* Clerck).

Linyphia marginata Blackwall, 1833b, *London & Edinburgh Phil. Mag. Journ. Sci.*, (3)3: 346 (description, England). — Thorell, 1870, *Rem. syn. Europ. spid.*: 44 (= *Linyphia montana* Clerck).

Linyphia resupina Wider, 1834, *Mus. Senckenb.*, 1: 246, pl. 17 fig. 4 (description, Germany). — Bösenberg & Strand, 1906, *Abh. senckenb. naturf. Ges.*, 30: 173 (Japan). — Strand, 1916, *Arch. Naturg.*, 81A(9): 7 (re-examination of type-series).

Linyphia domestica C. L. Koch, 1840, *Naturhist. Topogr. Regensburg*, 3: 403 (according to Bonnet (1957: 2518); not seen).

For complete list of references up to 1939, see Bonnet (1957: 2516).

Types. — Although the larger part of the original material on which Wider based his descriptions is still in existence (SMF), I have not found any specimens of his *Linyphia resupina*. Of the other names mentioned there are no types available.

Remarks. — The description of *Araneus montanus* by Clerck (1758) is short, but the annulated legs are explicitly mentioned and exclude any doubt. The rings on the legs are not recognizable in the figure of the female (pl. 3 tab. 1 fig. 1), which rather resembles *Linyphia triangularis* (Clerck). For confusion concerning the names *montana* and *triangularis*, see remarks on the latter species.

Aranea octomaculata Martini & Goeze was listed as a synonym of *Linyphia montana* (Clerck) by Bonnet (1957: 2516), but I have not discovered how he came to this conclusion. In the diagnosis only the abdominal pattern is mentioned, viz., eight dark brown spots on a yellow-brown abdomen, while Schaeffer's figure is very small. The specimen shows annulated legs indeed, but other details are not visible. I am not at all sure that it belongs to the Linyphiidae.

Degeer's description of *Aranea resupina domestica* leaves no doubt as to the identity of the species. As he lists both *Aranea montana* Linnaeus and *Araneus montanus* Clerck in the synonymy, he apparently was of the opinion that they were one and the same species. The former is now currently considered to be synonymous with *Araneus triangularis* Clerck [= *Linyphia triangularis* (Clerck)], as seems most likely indeed.

Olivier (1789: 213) suggested the new specific name *resupinata* for Lister's "Araneus niger aut castaneus". Lister's diagnosis is too superficial to give any support, and Olivier did not give any additional characters. Walckenaer (1841: 244) considered Lister's species to be identical with *L. resupina* Wider [= *Neriene montana* (Clerck)], and Thorell (1870: 44) held the same view with regard to *A. resupinata* Olivier.

Linyphia marginata Blackwall (1833b: 346) is clearly different from *Linyphia marginata* C. L. Koch [= *Neriene radiata* (Walckenaer)]; it is identical with *Linyphia clathrata* Sundevall. Blackwall's description is very detailed, and all diagnostic characters are mentioned. The synonymy has been stated already by Thorell (1870: 44).

Linyphia resupina Wider was also correctly described and depicted. Strand (1916: 7), when revising Wider's collection in the Senckenberg Museum at Frankfurt, still mentioned a large series of this species, but I have not succeeded in finding any material which with certainty originates from Wider's time.

Neriene montana (Clerck) is a senior homonym of *Neriene montana* Blackwall (1856: 234). The latter, however, is supposed to be a synonym of *Centromerus prudens* (O. Pickard-Cambridge), and was removed from *Neriene* by Falconer (1918: 195). The new combination can therefore be introduced without causing any difficulties.

Male. — Measurements in mm. Total length 6.0-7.0; cephalothorax, length 2.9-3.4, width 2.1-2.5; abdomen, length 3.3-4.1, width 2.0-2.5, height 2.1-2.4; chelicerae, length 1.45-1.8, width 0.55-0.65.

Cephalothorax. — Brown, striae and sides of head slightly suffused with black. Posterior margin excised mesally, sides evenly rounded, constricted

at border of head and thorax. Width 0.7 of length, width of head 0.6 of width of thorax. From side, dorsal line of thorax rising evenly from posterior margin to foveal region, rising more steeply from fovea to eye-region; clypeus slightly concave below AME, lower part straight. Striae and margin with short hairs, clypeus and eye-region with longer, forwardly directed spinehairs, which are also present on dorsal surface of cephalon behind PME and PLE.

Eyes. — Both rows of eyes nearly straight. Width of eye-region narrower than width of head, 0.45 of width of thorax. PME on large black tubercles. Diameter of PME 0.12-0.13 mm, all other eyes of approximately same size, including AME. PME separated from each other by 1.7-1.9 diams., from PLE by 1.2-1.4 diams., and from AME by 1.4-1.5 diams. of PME. AME separated by 0.6 of their own diameter. Height of clypeus 0.17-0.18 of length of cephalothorax.

Chelicerae. — Brown, slightly darker than cephalothorax. Rather long but not divergent. Basal tubercles barely visible, but two small blunt projections are present, meso- and latero-dorsal in position. Very faint broken ridges visible on basal two-thirds of lateral surface. Hairs on small warts on dorsal and lateral surfaces. Three cheliceral teeth in dorsal row, the basal pair situated rather ventrally; second tooth massive and blunt, basal tooth smaller and more pointed; apical tooth very small, situated dorsally of second tooth. Ventral row with five teeth, smaller than basal tooth of dorsal row, but larger than apical tooth; all teeth close together near base of fang, in one line with basal pair of dorsal row; apical three fused and forming a serrated ridge. Fang black-brown, with an excrescence meso-ventrally on basal half.

Gnathocoxae. — Dark brown at base, brown to light brown in the middle, apices whitish; lateral margins slightly converging, truncated obliquely apically. Labium black-brown, raised anterior margin brown. Sternum brown, suffused with black; width 0.8 of length, only narrowly produced between coxae IV.

Legs. — Light brown, with blackish annulations, the latter most conspicuous on posterior two pairs of legs, and on the ventral side of the segments. Femora with a narrow basal ring, a median, and a subapical ring. Patellae with a narrow apical ring, confluent with basal ring of tibiae; tibiae moreover with median and subapical rings, which are rather wide. Metatarsi faintly darkened in the middle. Length of femur I 1.1-1.2 times length cephalothorax, length of tibia I 12-14 diams. of segment. Measurements (of specimen from The Netherlands, Heerlen) in mm:

	I	II	III	IV	palp
Fe	3.45	3.25	2.50	3.20	1.30
Pa	0.85	0.85	0.70	0.75	0.32
Ti	3.50	3.20	2.00	2.80	0.52
Mt	4.00	3.65	2.45	3.40	—
Ta	1.65	1.45	1.00	1.25	1.25

Chaetotaxy. — Fe I 2 d, 3-4 l'; II 1-2 d, 2-3 l'; III d; IV 2-3 d. Pa I-IV d''d', on III and IV basal spine weaker than apical one.

Ti I - IV (v_b' v_b'') d'' (v' v'') l' (v' v'') l'' d' [l'_a l''_a v'_a v''_a]
 Mt I - II d l' l'' v d v v_a.
 III - IV d l' l'' v d l' l'' v (v'_a v''_a).

Length of d''-spine on tibia I 0.27-0.33 mm, diameter of segment at base of d''-spine 0.25-0.31 mm; on tibia IV 0.27-0.34 mm and 0.21-0.27 mm, respectively. Tm I 0.22-0.29. Position of d''-spine on tibia I 0.20-0.22.

Abdomen. — Dorsal surface with a leaf-shaped band, less well-defined than in female, occupying about whole width of abdomen, flanked by a clear white latero-dorsal band; dorsal band beige-coloured with small white blotches, suffused with black at margins, margins superficially and irregularly incised, lateral surface white dorsally, gradually passing into beige with black suffusion in ventral direction; a short black streak present on the anterior half above the opercula. Ventral surface heavily suffused with black, with small white blotches, forming four white spots, one pair behind epigastric furrow posteriorly of opercula, the other pair slightly closer to each other than first pair, and slightly nearer to spinnerets than to epigastric furrow. Genital area brown, opercula light brown, spinnerets brown suffused with black.

Palp (fig. 96, 100). — All segments light brown, femur dark brown at base. Patella short, dorsal spine about as long as segment. Tibia with about twenty long curved spines on dorsal half of lateral surface and along distal margin of ventro-lateral half. Cymbium with one or two weak spines dorsally. Paracymbium directed sideways; distal arm narrow, tapering to a sharp point. Tegulum strongly excavated ventro-laterally when viewed from side. Median apophysis (fig. 98) of usual shape, dorsal tip slightly curved, bearing a small hook at extreme tip. Embolus (fig. 95, e) curved as usual, slightly widened proximally of spermduct-tooth, with a large apical lobe at inner curve. Terminal apophysis (fig. 99) loosely coiled, with four coils; basal coil heavily chitinized and disk-shaped, other coils with transverse grooves, last coil with apical lappets. Lamella (fig. 101) with sharply pointed proximal tip, widening on one-third of length, mesal margin straight from there to antero-mesal tip; anterior margin barely emarginate, running back-

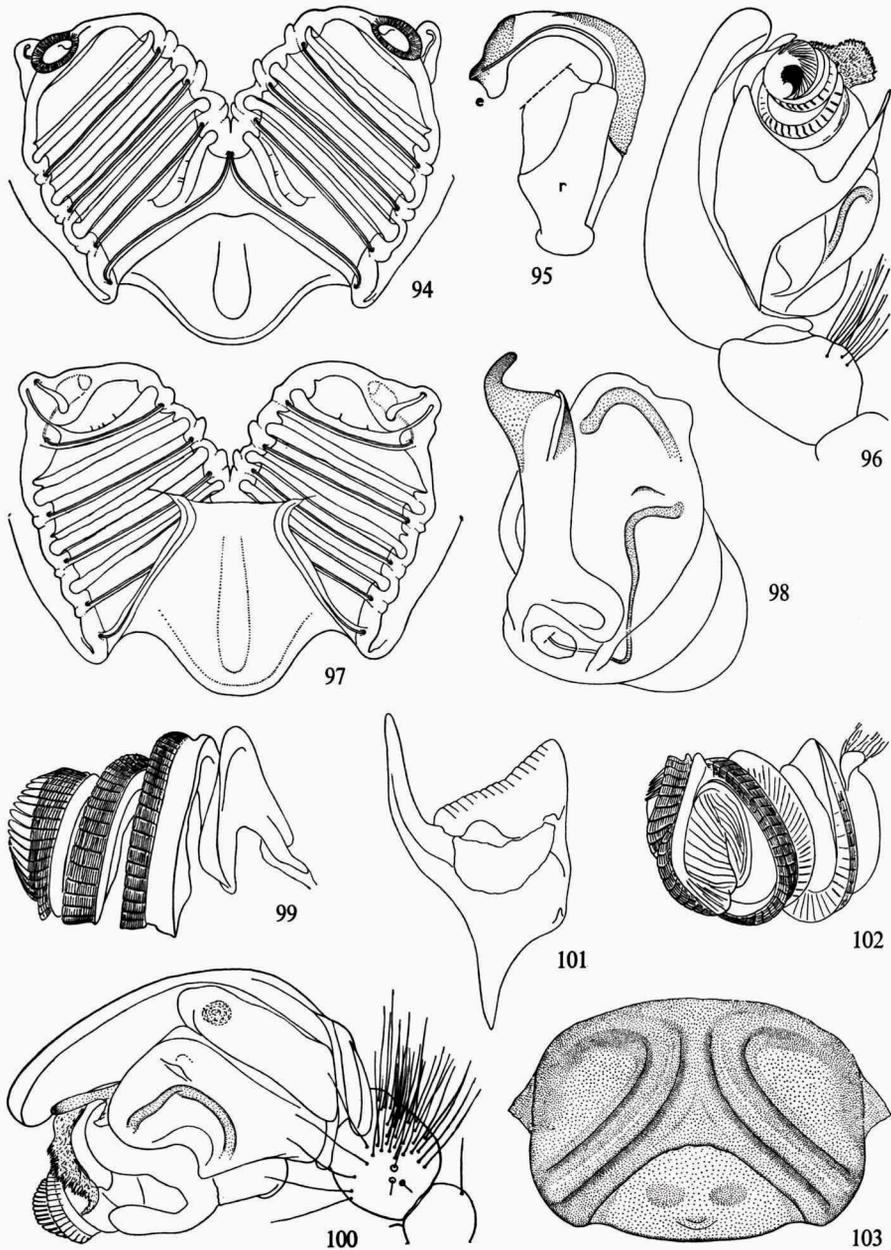


Fig. 94-101. *Neriene montana*. 94, vulva, ventral aspect; 95, radix(*r*) with embolus(*e*), dorsal aspect; 96, male palp, ventral aspect; 97, vulva, dorsal aspect; 98, tegulum with median apophysis, mesal aspect; 99, terminal apophysis; 100, male palp, lateral aspect; 101, lamella, dorsal aspect. Fig. 102-103. *N. digna*. 102, terminal apophysis, dorsal aspect; 103, epigyne. 94, 97, $\times 69$; 95, 98, 101, $\times 45$; 96, 100, $\times 33$; 99, 103, $\times 67$; 102, $\times 73$.

wards from antero-mesal tip to base of lateral projection, which is blade-shaped with rather blunt tip; dorsal surface of anterior third corrugated near apical margin. Transversal sclerite not present.

Female. — Measurements in mm. Total length 4.8-7.7; cephalothorax, length 2.1-3.5, width 1.5-2.4; abdomen, length 2.8-4.2, width 1.8-2.6, height 1.8-2.5; chelicerae, length 1.05-1.85, width 0.45-0.80.

Cephalothorax. — Colour and shape as in male; width 0.65-0.7 of length, width of head 0.6 of width of thorax. Eye-region with slightly shorter hairs, which are less spine-like. Sizes of eyes as in male. Distance between PME 1.4-1.6 diams., between PME and PLE 0.9-1.1 diams., and between PME and AME 1.3 diams. of PME. AME separated by 0.7 of their own diameter. Height of clypeus 0.13-0.15 of length of cephalothorax.

Chelicerae. — Without basal tubercles. Dorsal row with three or four large teeth, basal tooth half as large as second and third, fourth tooth, if present, of same size as basal tooth and close to third tooth, others equidistant. Ventral row with five teeth, of same size as basal tooth of dorsal row, apical tooth smaller; basal tooth opposite to apical tooth of dorsal row, all equidistant, apical tooth close to subapical one.

Legs. — Colour and annulation as in male. Legs more robust and shorter, length of femur I 1.0-1.1 times length cephalothorax; length of tibia I 9-10 diams. of segment. Measurements (of specimen from The Netherlands, Heerlen) in mm:

	I	II	III	IV
Fe	2.50	2.40	1.80	2.35
Pa	0.75	0.70	0.60	0.65
Ti	2.45	2.10	1.40	2.00
Mt	2.55	2.30	1.65	2.35
Ta	1.35	1.15	0.80	1.00

Chaetotaxy. — Femur I with 2-3 1'-spines. Ventral spines on tibiae III and IV not always present in pairs. In other respects not differing from male, but spines shorter. Length of d''-spine on tibia I 0.37-0.40 mm, diameter of segment at base of d''-spine 0.22-0.37 mm; on tibia IV 0.40-0.45 mm and 0.19-0.31 mm, respectively. Tm I 0.25-0.29. Position of d''-spine on tibia I 0.21-0.24.

Abdomen. — Dorsal surface evenly curved from base to spinnerets. Dorsal median band leaf-shaped, nearly as wide as abdomen, with irregularly excised or sinuate margins; band beige-coloured with some white blotches, and with blackish chevrons or W-shaped markings, and black margins; intersected by a narrow white transversal line posteriorly. Lateral surface mainly white,

with a short horizontal black streak above operculum, and often with some irregular black markings on posterior half. Ventral surface light brown suffused with black, with white spots as in male.

Epigyne (fig. 92, 93). — Large and protruding, as is characteristic for the species-group. Common opening of atria large. Scape broadly rounded.

Vulva (fig. 94, 97). — Atria large, semi-spherical, diverging away from a large common opening. Spiral groove with about three and a half coils, receptaculum comparatively small, fertilization duct running parallel with spiral groove; entrance of spiral groove in the middle of the ventral wall of either atrium. Scape short, rounded, with a depression mesally on ventral surface. Width of epigyneal aperture 0.46-0.49 mm.

Distribution and habitat. — Europe including the British Isles, Spain, Italy, the Balkans, and Scandinavia; Asia (Siberia) and Japan. The species has been recorded from a variety of situations, which have in common the possibility to build a retreat below a projecting part of the substratum, e.g., bark of trees, withered leaves, roots of trees, cracks in walls and rocks, etc. In northern Europe it is commonly found inside sheds, outhouses, cellars and other human-made shelters. It is one of the earliest species as regards the mating-period, which begins at the end of March or early April, and lasts till about the end of May and the beginning of June.

Material examined.

Netherlands. — 1 ♀ 1 ♂, Zuid-Holland, Oegstgeest near Leiden, in shed, 27.iv.1958, P. J. van Helsdingen (ML). 1 ♀, Leiden, indoors, 28.iv.1961, P. J. van Helsdingen (ML). 1 ♀, Nieuwkoopse Plassen, 26.iv.1968, P. J. van Helsdingen (ML). — 1 ♀, Limburg, Mheer, 3.vi.1962, P. J. van Helsdingen (ML). 3 ♀ 1 ♂, Gerendal near Schin op Geul, in hedge, 5.vi.1962, P. J. van Helsdingen (ML); 12 ♀ 4 ♂, do., among herbs and *Hedera helix* L., on side of sunken road, 29.v.1963 (ML). 2 ♀, Maastricht, 28.v.1963, P. J. van Helsdingen (ML).

Belgium. — 2 ♀, Oost-Vlaanderen, Moorsel, 28.v.1928, A. Ball (ISNB). — 1 ♀ 1 ♂, Brabant, Uccle, 31.v.1963, J. Kekenbosch (ISNB). 1 ♀, Audergem, 28.v.1956, A. Collart (ISNB); 1 ♀, do., 30.v.1958 (ISNB). — 1 ♂, Limburg, St. Pieters-berg, 4.iv.1957, J. Kekenbosch (ISNB). — 2 ♀ 1 ♂, Hainaut, Leernes, 12-18.iv.1961, J. Doucet (ISNB). 9 ♀ 1 ♂, Barbençon, 23.iv.1961, A. & J. Doucet (ISNB). 1 ♀, Vergnies, 29.iv.1961, J. Doucet (ISNB). 2 ♀, Boussu-lez-Walcourt, 6.v.1961, A. & J. Doucet (ISNB). — 2 ♂, Namur, Clermont-lez-Walcourt, 8.iv.1961, J. Doucet (ISNB); 1 ♀, do., 15.iv.1961 (ISNB); 1 ♂, do., 17.iv.1961, A. & J. Doucet (ISNB). 1 ♀, Winenne, 3.vi.1963, H. Synave (ISNB).

Germany. — 1 ♀, Niedersachsen, Bremen, park, C. F. Roewer (SMF).

Austria. — 1 ♀, Tirol, Brixlegg (SMF).

Yugoslavia. — 1 ♀, Croatia, Plitvice, 20-22.vi.1962, H. & L. Levi (MCZ).

Spain. — 1 ♂, Andalucia (SMF).

Siberia. — 6 subadult ♀, Jenissej, 10 km S. of Podkamenaya Tunguska, 22.ix.1875, Nordenskiöld & Stuxberg (L. Koch, 1879; MS).

Japan. — 1 ♀, Japan, 1882, W. Dönitz (SMF).

Neriene digna (Keyserling) comb. nov.

(fig. 102-112)

Linyphia digna Keyserling, 1886, Spinnen Amerikas, 2(2): 68, pl. 13 fig. 169 (description ♂ ♀, Washington Terr., U.S.A.). — Marx, 1890, Proc. U.S. Nat. Mus., 12: 527 (catalogue). — Banks, 1893, Journ. New York Ent. Soc., 1: 129 (Pacific coast of North America, key); 1904, Proc. Calif. Acad. Sci., (3) Zool., 3: 346 (*diana*; California); 1910, Bull. U.S. Nat. Mus., 72: 33 (*diana*; catalogue). — Coolidge, 1907, Canad. Ent., 39: 375 (*diana*; California). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 248 (catalogue). — Emerton, 1920, Trans. R. Canad. Inst., 12: 317 (*diana*; catalogue). — Moles & Johnson, 1921, Journ. Ent. Zool., 13(4): 41 (California). — Worley, 1932, Univ. Washington Publ. Biol., 1: 30 (Washington, notes about habitat). — Blauvelt, 1936, Festschr. Strand, 2: 100, pl. 7 fig. 11-15 (description ♂ ♀, genitalia). — Schenkel, 1950, Verh. naturf. Ges. Basel, 61: 63 (California).

Neriene dogmatica Chamberlin, 1925, Proc. Calif. Acad. Sci., (4)14: 119, fig. 28 (description ♂, California). — Blauvelt, 1936, Festschr. Strand, 2: 94, 100 (= *Linyphia digna* Keyserling).

Types. — ♂ lectotype of *Linyphia digna*, by present designation, from Washington Terr., U.S.A.; there is one ♀ paralectotype (BM). Holotype of *Neriene dogmatica*, from Jasper Ridge, San Mateo Co., California (MCZ).

Remarks. — *Linyphia digna* was described and figured by Keyserling from two specimens he had received from Simon. These specimens have become part of the collection of the British Museum (Natural History) by purchase of part of Keyserling's collection in 1890. The lectotype is now designated from this couple of specimens. The two specimens were obviously taken from a larger series (46♀ 16♂ and 15 immature and juvenile specimens), which still are present in the collection of Simon at Paris. Though this series is labelled "Types" it is quite clear from Keyserling's description that he based his data solely on the specimens he received from Simon. The measurements of the specimens exactly answer the description of Keyserling. The material from Paris therefore should not be looked upon as syntypes, though the type material was taken from this series. Apparently it was this non-typical original series with which Blauvelt (1936: 103) compared her specimens of *L. digna*, and not with true "cotypes".

Blauvelt (1936: 94) has examined specimens of *Neriene dogmatica*, sent to her by Chamberlin himself, and thus she was able to put the name in the synonymy of *Linyphia digna*. The figure of the palp as given by Chamberlin (1925) in his original description is proof of the correctness of her decision.

Male. — Measurements in mm. Total length 3.8-5.2; cephalothorax, length 2.0-2.5, width 1.4-1.7; abdomen, length 1.75-2.7, width 1.1-1.65, height 0.9-1.65; chelicerae, length 0.80-1.05, width 0.35-0.42.

Cephalothorax. — Brown, suffused with grey, forming a narrow grey margin and faint striae. Posterior margin straight, sides evenly curved to-

wards front, without constriction at border of head and thorax. Width 0.7 of length, width of head 0.5 of width of thorax. From side, dorsal line straight from posterior margin to eye-region; clypeus straight. Very short hairs on striae, rather short bristle-like hairs at eye-region, upper half of clypeus with short hairs.

Eyes. — Eye-region as wide as head. Both rows straight. PME on black tubercles, which remain separated mesally; AME on a common black spot; lateral eyes contiguous, with black base. Diameter of PME 0.10-0.11 mm, lateral eyes of same size, diameter of AME 0.7 of PME. PME separated by 1.6-1.7 diams., from PLE by 1.0-1.1 diams., and from AME by 1.3 diams. of PME. AME separated by 0.6 of their own diameter. Height of clypeus 0.18-0.21 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax, evenly suffused with grey with the exception of the apical slant. Two basal tubercles present, meso-dorsal and latero-dorsal in position, both blunt. Faint broken stridulating ridges visible on basal two-thirds of lateral surface. Dorsal row with two heavy teeth, equally large, separated by the width of their bases; a strong heavy tooth, twice as large, situated more ventrally and opposite to the second dorsal tooth, followed by a row of five or six small equidistant teeth, which are rather closely situated, increasing in size towards the apex of the chelicera, the apical pair often partly or completely fused.

Gnathocoxae. — Brown, suffused with black on basal halves, apices lighter; lateral margins converging, apices truncated obliquely. Labium black-brown, anterior raised margin lighter. Sternum brown, suffused with black, especially at margins; width 0.9 of length; narrowly produced between coxae IV.

Legs. — Light brown to brown with grey-brown to black-brown annulations, darkest on posterior legs. Coxae, at least coxae IV, with blackish ventral surfaces; femora with two rings on one-third and two-thirds of length, and with narrow basal and apical rings, rings as a rule interrupted on dorsal side of legs; patellae with ill-defined dark streaks; tibiae with a narrow basal, a broad median, and a broad apical ring; metatarsi with a broad median and a slightly narrower apical ring; tarsi with a faint median ring. Legs relatively stout; length of femur I 0.9-1.0 times length of cephalothorax; length of tibia I 11-13 diams. of segment. Measurements (of lectotype of *Linyphia digna*) in mm:

	I	II	III	IV	palp
Fe	2.30	2.20	1.80	2.35	0.98
Pa	0.55	0.55	0.50	0.50	0.24
Ti	2.30	2.10	1.45	2.15	0.32
Mt	2.25	2.15	1.60	2.30	—
Ta	1.10	1.00	0.70	1.00	1.07

Chaetotaxy. — Fe I 2 d, 2 l'; II-III 1-2 d, 0-1 l'; IV 1-2 d. Pa I-IV d''d', basal spine smaller than apical one.

Ti	I - II	v'' _b	d''	v' v''	l'	l''	v' v''	d'	[l'' _a l'' _a v'' _a v'' _a]
	III	v'' _b	d''		l'	l''	v'	d'	[l'' _a l'' _a v'' _a v'' _a]
	IV		d''	v'	l'	l''	v'	d'	[l'' _a l'' _a v'' _a v'' _a]
Mt	I - II	d;	III	d l' v _a ;	IV	d l' l'' v d v v _a			

Length of d''-spine on tibia I 0.14-0.24 mm, diameter of segment at base of d''-spine 0.15-0.19 mm; on tibia IV 0.19-0.27 mm and 0.15-0.17 mm, respectively. Tm I 0.20-0.27. Position of d''-spine on tibia I 0.22-0.25.

Abdomen. — Relatively small, rarely longer than cephalothorax. Cylindrical with straight posterior surface, without postero-dorsal tubercle. A dorso-lateral light band on either side, reaching from the anterior side to half length of abdomen, separated anteriorly by their own width, brightly spotted by white blotches, sometimes vaguely continuing along posterior half. Ventral surface with two small white spots behind epigastric furrow opposite to branchial opercula. Another equally small pair of light spots, but without white blotches, halfway between the anterior pair and the spinnerets, slightly closer to each other than anterior pair. Remaining part of abdomen brown, mottled with black, dorsally faintly interrupted by some narrow lighter chevrons, ventrally blackish. Opercula without suffusion on mesal halves, spinnerets brown suffused with black.

Palp (fig. 106, 110). — All segments brown as legs, suffused with grey. Femur straight, spineless. Patella short and humped dorsally, with a very short dorsal spine, shorter than segment. Tibia prolonged in mesal direction, with dorsal spine scarcely longer than long lateral and dorso-lateral hairs; spine two times as long as segment; in lateral view segment slightly higher than long, in dorsal view two times as wide as long. Cymbium spineless, with straight mesal margin. Paracymbium small, distal arm tapering to a point and directed rather sideways, not following the surface of the haematodocha-covered subtegulum. Tegulum excavated latero-ventrally, bluntly truncated anteriorly. Median apophysis (fig. 111) with socket-like depression at base; dorsal arm slightly curved outwards. Embolus (fig. 109, e) rising from strong embolic arm of radix, curved in lateral direction, outer margin strongly chitinous, sharply bent on three-fifths of length, curving in ventral direction from there; apex with a sharp spermduct-tooth and a slightly longer narrow apical lobe. Terminal apophysis (fig. 102, 108) with about three transversely grooved coils and an additional apical coil in reversed direction; basal coil disk-shaped; anterior-most normal coil with some lappets

ventrally at apex. Lamella (fig. 112) broad, proximal tip pointed, anterior margin straight and sharp, receding slightly towards free lateral projection, which is large and has a convex anterior margin in the middle; apex bluntly pointed; dorsal surface of anterior half in front of connecting membrane with radix slightly grooved, grooves running obliquely in lateral direction. Transversal sclerite not present.

Female. — Measurements in mm. Total length 3.5-4.6; cephalothorax, length 1.7-2.0, width 1.2-1.45; abdomen, length 2.3-3.0, width 1.4-2.5, height 1.25-1.4; chelicerae, length 0.81-1.02, width 0.36-0.45.

Cephalothorax. — Dull brown to reddish-brown, evenly suffused with grey, striae very obscure. Posterior margin superficially excised, sides evenly rounded, barely constricted at border of head and thorax. From side, dorsal line moderately rising from posterior margin to fovea, level on anterior part; clypeus slightly concave below eyes, lower part straight. Eyes in straight rows, with PME on black tubercles; sizes and distances as in male. Height of clypeus 0.15-0.16 of length of cephalothorax.

Chelicerae. — Sides parallel, only slightly diverging at apices. Basal tubercle absent. Dorsal row with three cheliceral teeth, all long and narrow, equidistant, second and third twice as large as basal tooth. Ventral row with five to seven smaller teeth, apical pair smallest, all equidistant, basal tooth opposite to apical dorsal tooth.

Legs. — Colour and annulation as in male. Length of femur I 1.0-1.1 times length cephalothorax; length of tibia I 9-10 diams. of segment. Measurements in mm (of specimen from California):

	I	II	III	IV
Fe	2.00	1.95	1.55	2.05
Pa	0.55	0.55	0.45	0.50
Ti	1.90	1.75	1.20	1.75
Mt	1.90	1.75	1.30	1.95
Ta	1.05	0.90	0.70	0.90

Chaetotaxy. — Fe I 1-2 d, 2-3 l'; II 1-2 d, 0-2 l'; III d; IV 1-2 d. Pa I-IV d''d', basal spine shorter than apical one. Tibiae and metatarsi as in male. Length of d''-spine on tibia I 0.31-0.37 mm, diameter of segment at base of d''-spine 0.18-0.21 mm; on tibia IV 0.38-0.44 mm and 0.16-0.19 mm, respectively. Tm I 0.22. Position of d''-spine on tibia I 0.23-0.25.

Abdomen. — Dorsal surface evenly curved, posteriorly gradually or abruptly passing into a short but steep posterior surface. Postero-dorsal tubercle absent. Dorsal surface with a broad median band with irregularly sinuate and serrate margins, flanked by broad beige-coloured dorso-lateral bands on anterior half, merging with mottled lateral parts on posterior half;

dorso-lateral bands usually with a reddish tinge posteriorly, with many white blotches anteriorly; anterior tips of bands separated from each other by a narrow black space. A narrow transverse light or white band usually present at the transition of dorsal into posterior surface. Ventral surface blackish with white spots as in male; some additional white blotches sometimes present laterally and posteriorly of spinnerets. Pattern of median dorsal band obscure, consisting of alternating blackish and beige-coloured chevrons, the beige-coloured ones comparatively larger in lighter specimens and strewn with scattered white blotches.

Epigyne (fig. 103, 105). — Very large and protruding, with a wide slightly triangular opening. Epigyneal protrusion with a translucent area at either side.

Vulva (fig. 104, 107). — Windings of spiral groove running parallel for two coils, then one coil in reversed direction to turning-point, the last reversed coil together with the end of the penultimate coil forming an S-shaped groove. Turning-points at dorsal sides of apices of atria, which are parallel and broadly fused. Receptacula small, situated at mesal side of apices. Fertilization ducts with slightly less than three coils. Postero-dorsal wall between ends of fertilization ducts trapezoid, posterior margin slightly convex; a mesal depression near the posterior margin, and a pair of slightly larger depressions more anteriorly situated, all on the ventral surface of the dorsal wall. Width of epigyneal aperture 0.39-0.45 mm.

Distribution and habitat. — The species has been recorded from many localities in a comparatively narrow region along the western coast of North America, from the southern part of Alaska in the north to California in the south. Data concerning habitat are only given by Worley (1932: 30), who mentions the occurrence in coniferous forests, where it is found on low plants, such as sedge (*Carex sitchensis*), horsetail (*Equisetum*), ferns (*Polystichum* and others), and a number of other herbs. Most captures date from June to August (Alaska, British Columbia, Washington), but in the southern part of its range the species appears to become adult at an earlier date, and captures are recorded from the end of February to June (Oregon, California). The find of one adult and one subadult specimen in "winter" in California (Chamberlin, 1925, *N. dogmatica*) suggests an occasional last moult in late autumn.

Material examined.

U.S.A., Washington. — 1 ♀ 1 ♂, "Washington Terr." (♂ lectotype and ♀ paralectotype of *Limyphia digna* Keyserling; BM). 46 ♀ 16 ♂ 15 subadult and juvenile specimens, "Washington Terr., Oregon" (MP).

U.S.A., California. — 2 ♀, Oakland, Mountain Bèlvedère, 17.x.1953, V. Roth & R. O.

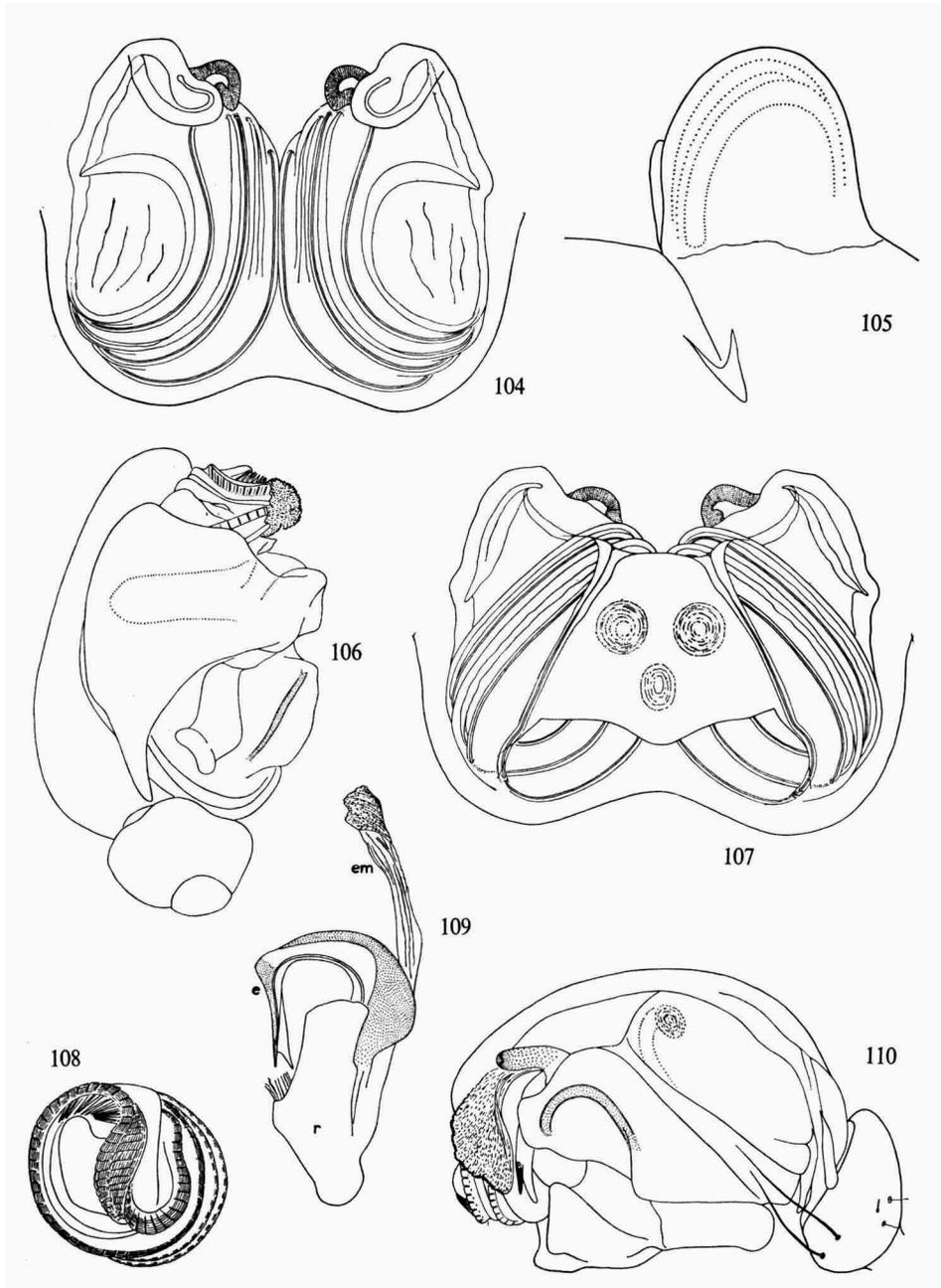


Fig. 104-110. *Neriene digna*. 104, vulva, ventral aspect; 105, epigyne, lateral aspect; 106, male palp, ventral aspect; 107, vulva, dorsal aspect; 108, terminal apophysis, distal aspect; 109, radix (*r*) with embolus (*e*) and embolic membrane (*em*), dorsal aspect; 110, male palp, lateral aspect. 104, 107, $\times 89$; 105, $\times 67$; 106, 110, $\times 49$; 108, $\times 73$; 109, $\times 53$.

Schuster (ML). 1 ♀ 3 ♂, Oakland, i.ii.1954, V. Roth & R. O. Schuster (ML). 1 ♀, Marin Co., Inverness, 19.x.1946, E. S. Ross (CAS). 1 ♂, Marin Co., Mill Valley, v.1950, E. S. Ross (CAS); 1 ♂, do., iv.1952, (CAS); 1 ♂, do., Cascade Canyon, 28.iii.1952, R. E. Leech (CAS). 1 ♂, San Francisco, 20.v.1938, S. M. Bertrand (CAS).

Neriene furtiva (O. Pickard-Cambridge) comb. nov.

(fig. 113-122)

Linyphia furtiva O. Pickard-Cambridge, 1871, Trans. Linn. Soc. London, 27: 425, pl. 55 fig. 20 (description ♂, England). — Simon, 1929, Arachn. France, 6(3): 636, 744, fig. 979-981 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 121, pl. 7 fig. 48-49, 51-54 (genitalia). — Bacelar, 1940a, Arq. Mus. Bocage, 11: 133 (Portugal); 1940b, Bull. Soc. portug. Sci. nat., 13: 109 (Portugal). — Locket & Millidge, 1953, British Spid., 2: 402, fig. 238D, 240C (British Isles). — Van Helsdingen, 1963b, Zool. Verh., 62: 34 (Netherlands). — Locket, 1964, Ann. Mag. Nat. Hist., (13)7: 276 (selection of neotype). — Lehtinen, 1964, Ann. Zool. Fennici, 1: 305 (Finland).

Linyphia albomaculata Canestrini & Pavesi, 1870, Arch. zool. anat. fisiol., (2)2: 15, 40 (short description ♀ ♂, Italy).

Linyphia canestrinii Pavesi, 1873, Ann. Mus. civ. Stor. nat. Genova, 4: 69 (nom. nov. pro *L. albomaculata* Canestrini & Pavesi). — Simon, 1929, Arachn. France, 6(3): 744 (= *Linyphia clathrata* Sundevall (p.p.) and *Linyphia hortensis* Sundevall (p.p.)), without motivation; listed as such in Bonnet).

For references up to 1939, see Bonnet (1957: 2504).

Types. — ♂ neotype (and ♀ "allotype") of *Linyphia furtiva*, designated by Locket (1964), from Bloxworth, Southport, Lancashire, England (HDO). Lectotype (?) of *Linyphia canestrinii*, a subadult ♂, from Ticino, Switzerland (MG).

Locket (1964) has selected specimens from the O. Pickard-Cambridge collection at Oxford for most of the species described by this author, to serve as an ultimate standard of reference. The term "neotype", though not strictly admissible, was used for these specimens, as the existence of syntypes was doubtful and the term lectotype therefore could not be used. In the case of *L. furtiva* a ♂ specimen was selected as a neotype, while a ♀ specimen was chosen as reference specimen for the other sex, here referred to as "allotype".

Remarks. — *Linyphia albomaculata* was described by Canestrini & Pavesi (1870) from Italy, but the name, being preoccupied, was changed in *L. canestrinii* by Pavesi in 1873. The original description is very superficial, but the relative length of the legs and the abdominal pattern point to *Neriene clathrata* (Sundevall) and related species. On the other hand, the authors themselves refer to Koch's figure of a male variety of *Linyphia frutetorum* (Koch, 1845: pl. 424 fig. 1046). This figure is usually considered to represent the male of *Linyphia hortensis* Sundevall, and correctly in my opinion, in view of the reddish tinge of the femora. Simon (1929), according to his catalogue in "Arachnides de France", apparently came to more or less the same conclusion, as he listed *L. canestrinii* as a synonym of *L. clathrata* Sun-

devall [= *Nerience clathrata* (Sundevall)] as well as of *L. hortensis* Sundevall.

The remnants of the collection of Pavesi at Genova contains a subadult ♂ specimen from Ticino, Switzerland, which is one of the localities mentioned in the original description; the specimen is labelled "type of *Linyphia canestrinii* Pavesi = *L. albomaculata* Can. & Pav.". There is no indication as to when or by whom the type has been labelled. In the original paper ♂ and ♀ were described but a type was not selected. The specimen consequently must be a lectotype by subsequent designation or by loss of other syntypes. There is another tube with two ♀ specimens of *L. albomaculata* from Albissola and Busalla, both in the surroundings of Genova, but this region is not mentioned in the original description. All three specimens, the ♂ lectotype and the two ♀ specimens, belong to *Nerience furtiva* (O. Pickard-Cambridge). This species is covered very well by the description of *albomaculata*, but Koch's figure certainly does not depict *Nerience furtiva*. It is possible, of course, that the original material was not homogeneous, and that some of the specimens resembled Koch's figure indeed, but then these specimens all have been lost. On the evidence of the three specimens of *albomaculata* (= *canestrinii*) in the collection at Genova, together with the original description, I regard *L. canestrinii* Pavesi as a synonym of *Nerience furtiva* (O. Pickard-Cambridge).

Male. — Measurements in mm. Total length 4.3-5.0; cephalothorax, length 2.2-2.3, width 1.3-1.45; abdomen, length 2.0-2.5, width 1.2-1.6, height 1.1-1.7; chelicerae, length 0.87-0.95, width 0.35.

Cephalothorax. — Yellow-brown to brown, evenly suffused with black, and with a narrow grey lateral margin. Rather narrow, diamond-shaped, with broadest point near the middle, attenuated posteriorly, posterior margin straight; width 0.6-0.65 of length, width of head 0.45 of width of thorax. From side, dorsal line straight, barely rising from high posterior margin to eye-region; clypeus straight. Hairs along margins, on striae, and on posterior part of cephalon very short; hairs on clypeus and at eye-region longer, on the latter spine-like.

Eyes. — Eye-region not much narrower than head. Anterior row straight, posterior row slightly recurved. PME on black tubercles. Diameter of PME 0.07 mm, laterals of same size, AME slightly smaller. PME separated from each other by 2.4-2.7 diams., from PLE by 1.8-2.0 diams., and from AME by 2.5 diams. of PME. AME separated by their own diameter. Height of clypeus 0.18-0.20 of length of cephalothorax.

Chelicerae. — Brown or yellow-brown as cephalothorax, suffused with

black on a dorsal oblique streak from mesally at base towards laterally at apex. Meso-dorsal basal tubercle blunt, latero-dorsal basal tubercle small but tooth-like. Stridulating files not visible. Three cheliceral teeth forming a triangle; two of same size, rather dorsal in position, the third tooth more ventral and two times as large. Ventral row with five to six very small teeth, close together near base of fang; third and fourth teeth slightly larger than others.

Gnathocoxae. — Light brown to brown, suffused with black, apices lighter. Lateral margins converging, apices truncated obliquely. Labium blackish brown, anterior raised border lighter. Sternum brown to dark brown, suffused with black; width 0.7 of length; narrowly produced between coxae IV.

Legs. — Light brown to brown, lightly suffused with black; femora with a black-brown ventral streak or broad median ring in dark specimens. Length of femur I 0.85-0.9 of length of cephalothorax; length of tibia I 11-12 diams. of segment. Measurements (of neotype) in mm:

	I	II	III	IV	palp
Fe	2.00	1.90	1.55	2.20	0.84
Pa	0.45	0.45	0.40	0.45	0.19
Ti	1.90	1.75	1.25	1.85	0.28
Mt	2.00	1.75	1.40	2.10	—
Ta	0.90	0.85	0.65	0.80	0.96

Chaetotaxy. — Fe I d l'; II-IV d. Pa I-IV d''d', basal spine shorter than apical one.

Ti	I	d''	v'	v''	l'	l''	d'	[l'_a l''_a v'_a v''_a]
	II	d''	v'	v''		l''	d'	[l'_a l''_a v'_a v''_a]
	III	d''	v'	v''			d'	[l'_a l''_a v'_a v''_a]
	IV	d''	v'		l'		d'	[l'_a l''_a v'_a v''_a]

Mt I - II d v_a; III - IV d l' v v_a

Length of d''-spine on tibia I 0.14-0.16 mm, diameter of segment at base of d''-spine 0.15-0.16 mm; on tibia IV 0.11-0.14 mm and 0.14 mm, respectively. Tm I 0.20-0.21. Position of d''-spine on tibia I 0.22-0.24.

Abdomen. — Cylindriform. Ventral surface and ventral half of lateral surface black-brown. Dorsal half of lateral surface with a row of white spots from base to above spinnerets; anterior spot large, second spot small, round; third spot, on half length of abdomen, oblong, vertical, followed by two other spots of same size and orientation; sixth spot horizontal, continuous with sixth spot of other side. White spots separated by narrow black streaks, which continue for some distance on dorsal surface. Dorsal surface beige-coloured, with some stray white blotches; a black spot present between the

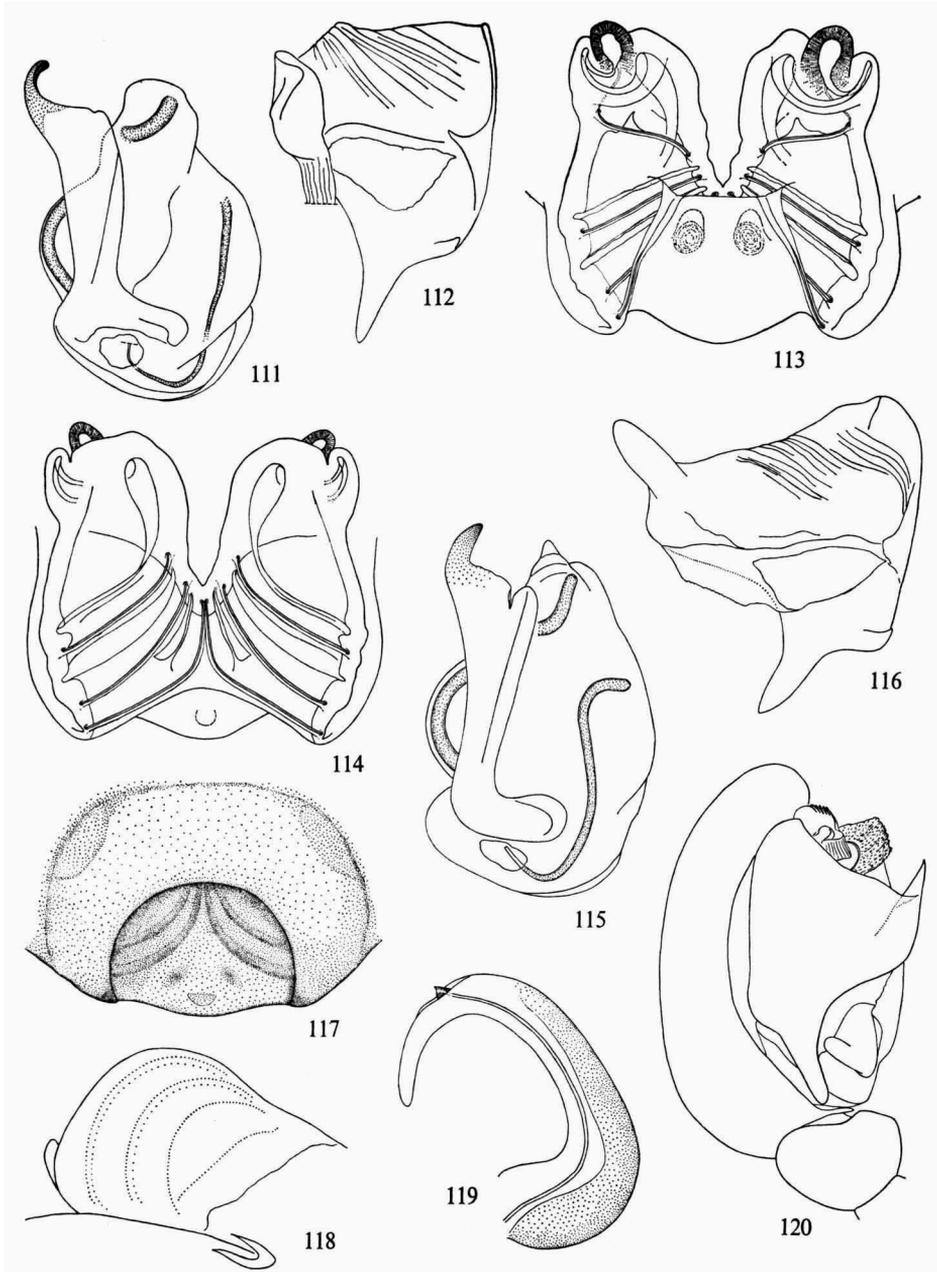


Fig. 111-112. *Neriene digna*. 111, tegulum with median apophysis, mesal aspect; 112, lamella, dorsal aspect. Fig. 113-120. *N. furtiva*. 113, vulva, dorsal aspect; 114, do., ventral aspect; 115, tegulum with median apophysis, mesal aspect; 116, lamella, dorsal aspect; 117, epigyne; 118, do., lateral aspect; 119, embolus, dorsal aspect; 120, male palp, ventral aspect. 111, 112, $\times 53$; 113, 114, $\times 89$; 115, 116, $\times 67$; 117, 118, $\times 80$; 119, $\times 95$; 120, $\times 49$.

first pair of dorso-lateral white spots; median three pairs of lateral black streaks well separated from corresponding streaks of the other side, fourth streak continuous with the other side, forming a narrow black transverse band. Opercula brown. Genital area and spinnerets black-brown. In dark specimens dorso-lateral rows of white spots reduced to a bright white anterior pair and a pair of small spots on posterior surface.

Palp (fig. 120, 122). — Light brown or brown as legs, suffused with black, especially the cymbium. Patella short, with a twisted dorsal spine near apical margin, which is slightly more than one and a half times as long as segment. Dorsal spine of tibia as long as segment, long spinehairs on dorso-lateral and ventro-lateral surfaces; element slightly higher than long. Cymbium without spines. Paracymbium with short and narrow distal arm tapering to a point, and directed sideways. Tegulum with excavation on ventral side, and conspicuously tapering to a point anteriorly. Median apophysis (fig. 115) with a slightly curved dorsal arm, which bears a small hook at the extreme tip. Embolus (fig. 119) evenly curved, with a long apical appendage distally of spermduct-tooth. Terminal apophysis (fig. 121) with slightly more than three coils; basal coil disk-shaped, second coil grooved transversely against apical margin, last coil also transversely grooved and prolonged in axial direction, the whole element consequently becoming narrow at tip; last coils with apical lappets. Lamella (fig. 116) very broad with short proximal spur; widening on one-fourth of length, mesal margin straight to rounded meso-distal tip; anterior margin straight, receding to lateral projection, the latter short and blade-like with blunt tip; dorsal surface corrugated. Transversal sclerite not present.

Female. — Measurements in mm. Total length 3.1-4.6; cephalothorax, length 1.5-1.9, width 1.05-1.2; abdomen, length 1.9-2.8, width 1.3-1.7, height 1.25-1.8; chelicerae, length 0.72-0.90, width 0.32-0.38.

Cephalothorax. — Posterior margin superficially excised, sides evenly rounded, lightly constricted at border of head and thorax. Width 0.7 of length, width of head 0.55 of width of thorax. From side, dorsal line rising rather steeply to fovea, less steeply from fovea to eye-region; clypeus straight. Hairs very short on striae and along margins, slightly longer on clypeus and at eye-region. Both rows of eyes nearly straight. PME separated from each other by 3.0-3.2 diams., from PLE by 1.2-1.3 diams., and from AME by 2.2 diams. of PME. Height of clypeus 0.16-0.19 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax, with a dorsal streak of grey suffusion from base internally to apex externally, which can be blackish in dark specimens. Basal two-thirds of lateral surface with very faint ridges. Dorsal

row with three equidistant cheliceral teeth, second and third teeth of same size, basal tooth slightly smaller. Ventral row with six to seven small teeth, basal pair opposite to apical dorsal tooth; apical tooth very small, others of same size, half as large as basal tooth of dorsal row.

Legs. — Yellow-brown to brown, without annulations. Dark specimens with streaks on femora as in males. Femur I as long as cephalothorax or nearly so. Length of tibia I 8-9 diams. of segment. Measurements (of specimen from The Netherlands, Heerlen) in mm:

	I	II	III	IV
Fe	1.60	1.50	1.20	1.65
Pa	0.45	0.40	0.35	0.40
Ti	1.50	1.30	0.90	1.35
Mt	1.45	1.25	1.00	1.50
Ta	0.80	0.70	0.55	0.70

Chaetotaxy. — Not differing from male, with the exception of the metatarsi, which bear more spines.

Mt I - II d v_a ; III d $v' v'' v'_a v''_a$; IV d $l' v' v'' v'_a v''_a$

Length of d'' -spine on tibia I 0.27-0.34 mm, diameter of segment at base of d'' -spine 0.16-0.21 mm; on tibia IV 0.37-0.40 mm and 0.14-0.17 mm, respectively. Tm I 0.20-0.25. Position of d'' -spine on tibia I 0.22-0.26.

Abdomen. — Postero-dorsal surface protruding slightly above spinnerets. Lateral surface with a dorso-lateral series of six white spots, as in male. Spots separated by black-brown streaks, which connect the dark ventral half of the lateral surface with the black-brown dorsal markings. Dorsal pattern as in male; in the darker specimens the pairs of dark spots fused into transverse bars or chevrons, the chevrons even fusing with each other at the sides in very dark specimens.

Epigyne (fig. 117, 118). — Protruding from ventral surface, broad and tube-like, slightly wider at apex than at base. Opening large, semi-circular or trapezoid with rounded corners. Without lateral depressed areas.

Vulva (fig. 113, 114). — Atria long conical, approximately parallel. Spiral grooves with entrances on ventral walls of atria, rather mesally; between two and a half and three coils from entrances to turning-points, which lie laterally of apices; receptacula at dorsal sides of apices. Dorsal plate moderately excised, posterior margin slightly rounded; ventral surface with a small depression mesally. Width of epigyneal aperture 0.29-0.36 mm.

Distribution and habitat. — Europe, apparently with a rather southern distribution; recorded from many European countries including the British Isles, Denmark, and Southern Finland (Lehtinen, 1964: 305); not yet re-

corded from Belgium and Germany; as far east as Poland and West-Turkey (Prinkipo Island, one of the Princes Islands (Lizil Adalar) in the Sea of Marmara; Nosek, 1905: 117). It is recorded from North Africa (Morocco) for the first time in this paper.

The specimens are found on low vegetation, e.g., heather and grasses, and become adult in early spring (in southern countries) until early summer (in the northern part of its distribution). The webs have no retreat.

Material examined.

British Isles. — 1 ♀ 1 ♂, Lancashire, Bloxworth near Southport, 1887, C. Warburton (♂ neotype and ♀ allotype of *L. furtiva* O. Pickard-Cambridge; Locket, 1964; HDO). — 1 ♀ 1 ♂, Hampshire, New Forest, G. H. Locket (ML).

Netherlands. — 4 ♀, Gelderland, Hoog-Soeren near Apeldoorn, below pine-trees on heath, 2.vi.1962, P. J. van Helsdingen (Van Helsdingen, 1963b; ML); 1 ♀, do., 2.viii.1965 (ML); 1 ♀, do., 22.v.1966 (ML). 3 ♀ 2 ♂, Hoog-Buurlo near Apeldoorn, on heather, 1.vii and 7.vii.1962, P. J. van Helsdingen (Van Helsdingen, 1963b; ML). — 6 ♀ 6 ♂, Limburg, Heerlen, on heather under the lower branches of pine-trees, 6.vi.1962, P. J. van Helsdingen (Van Helsdingen, 1963b; ML); 2 ♀ 4 ♂, do., 30.v.1963, P. J. van Helsdingen (ML).

France. — 1 ♀ 1 ♂, Landes, Souston, Forêt de Senyos (MNP).

Switzerland. — 1 subadult ♂, Ticino (lectotype(?) of *Linyphia canestrinii* Pavesi; MG).

Portugal. — 1 ♂, Tras os Montes, S. Martinho de Anta, 1923, C. de Barros (Bacelar, 1940a, b; MB). — 1 ♀, Douro Litoral, Fagilde, 25 km. S. of Porto, viii.1928, A. Bacelar (MB). — 1 ♀, Beira Litoral, Mata de Buçaco, v.1959 (ISNB). — 2 ♀, Estremadura, Sintra, v.1928, R. Lopes (Bacelar, 1940a, b; MB). 3 ♀ 1 ♂, Lisbon, leg. Forbes (HDO).

Morocco. — 1 ♀, Tanger, wet vegetation in Forêt diplomatique, 19.iii.1965 as subadult, last moult on 25.iii.1965, P. J. van Helsdingen (ML).

Italy. — 2 ♀, Liguria, Busalla and Albissola (MG). 1 ♀, Savona, Celli Ligure, 29.vii.1956, A. Valle (MECB). — 1 ♀, Bergamo, Entratico, 1 Moi, 400 m, 20.vi.1957, leg. Bonino (MECB). — 1 ♀, Trentino, Tremosine near Lago di Garda, in meadow, 28.v.1959, P. J. van Helsdingen (ML). 2 ♀, Lago di Tenna above Riva, amongst low plants between young pines, 17.v.1959, P. J. van Helsdingen (ML). 1 ♀, Castel Drena near Riva, 25.v.1959, P. J. van Helsdingen (ML). 1 ♀, Riva, olive-yard, 20.v.1959, P. J. van Helsdingen (ML).

Yugoslavia. — 1 ♂, Istria, Ročko polje, forest, 23.v.1968, C. L. Deeleman (ML). 1 ♀, N. slope of Mt Učka, 1100 m, 23.vi.1962, H. & L. Levi (MCZ). — 1 ♂, Dalmatia, Mlini near Dubrovnik, wet meadow, 30.v.1962 (ML).

Neriere redacta Chamberlin

(fig. 123, 130)

Neriere redacta Chamberlin, 1925, Proc. Calif. Acad. Sci., (4)14: 118, fig. 27 (short description of ♂, U.S.A., Florida).

Linyphia davis Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35(9): 26, 82 (preliminary note; nomen nudum). — Gertsch, 1951, Amer. Mus. Novit., 1514: 7, fig. 13-14 (description ♀, U.S.A., Mississippi). [new synonymy].

Types. — ♂ holotype of *Neriere redacta* from U.S.A., Florida, Punta Gorda (MCZ). ♀ holotype of *Linyphia davis* from U.S.A., Mississippi, Pass Christian (AMNH).

Remarks. — The two sexes were described independently under different names, and, though the two type-localities are situated in different states, both specimens originate from the south-eastern part of the United States. The only two specimens available are the holotypes of the two names mentioned here, and these two specimens approximately are of the same size. The lamella of the male palp corresponds very well with the globular epigyne, while the outline of the terminal apophysis agrees with size and shape of the atria of the epigyne. Consequently I assume *Linyphia davisii* to be the female of *Neriene redacta*.

N. redacta strongly resembles *N. obtusa* from Central Africa, but differs in size and abdominal pattern. The epigynes of *redacta* and *obtusa* are very much alike, cone-shaped in both species, but the organ protrudes strongest in *redacta*. There are minor differences in palp structure and chaetotaxy of the legs between the male of *redacta* and the male specimen from South Africa, which tentatively is placed with *N. obtusa* in this paper. Judging from the epigynes, *obtusa* and *redacta* show affinities to the European *furtiva* rather than to *clathrata*, *montana*, or *digna*, which all have cylindrical or spherical atria. The embolus of *obtusa*, on the other hand, is rather like that of the nearctic *digna*.

Male. — Measurements in mm. Total length 3.25; cephalothorax, length 1.55, width 0.85; abdomen, length 1.6, width 0.75, height 0.75; chelicerae, length 0.67, width 0.24.

Cephalothorax. — Brown, with a narrow grey margin along thoracic part posteriorly and laterally. Width 0.55 of length, width of head 0.6 of width of thorax. Transition of rounded sides into posterior margin angular, posterior margin much narrower than head, measuring 0.4 of width of thorax. From side, posterior margin raised, dorsal line rising evenly to front, leveling off just behind eye-region; clypeus straight. No hairs discernible on striae, eye-region and clypeus with few short hairs.

Eyes. — Eye-region about as wide as head. Both rows straight. PME on black tubercles, AME on a common black spot, bases of lateral eyes narrowly black. Diameter of PME 0.06 mm, laterals of same size; AME barely smaller, separated by their own diameter, which measures 0.05 mm. PME separated from each other by 2.2 diams., from PLE by 1.2 diams., and from AME by 1.8 diams. of PME. Height of clypeus 0.15 of length cephalothorax.

Chelicerae. — Brown as cephalothorax, yellow-brown on third quarter. Inner basal tubercle large and conspicuous, rather pointed; outer tubercle small and blunt. Lateral surfaces parallel, not diverging. No stridulating ridges visible. Three dorsal cheliceral teeth; basal tooth small, the other two

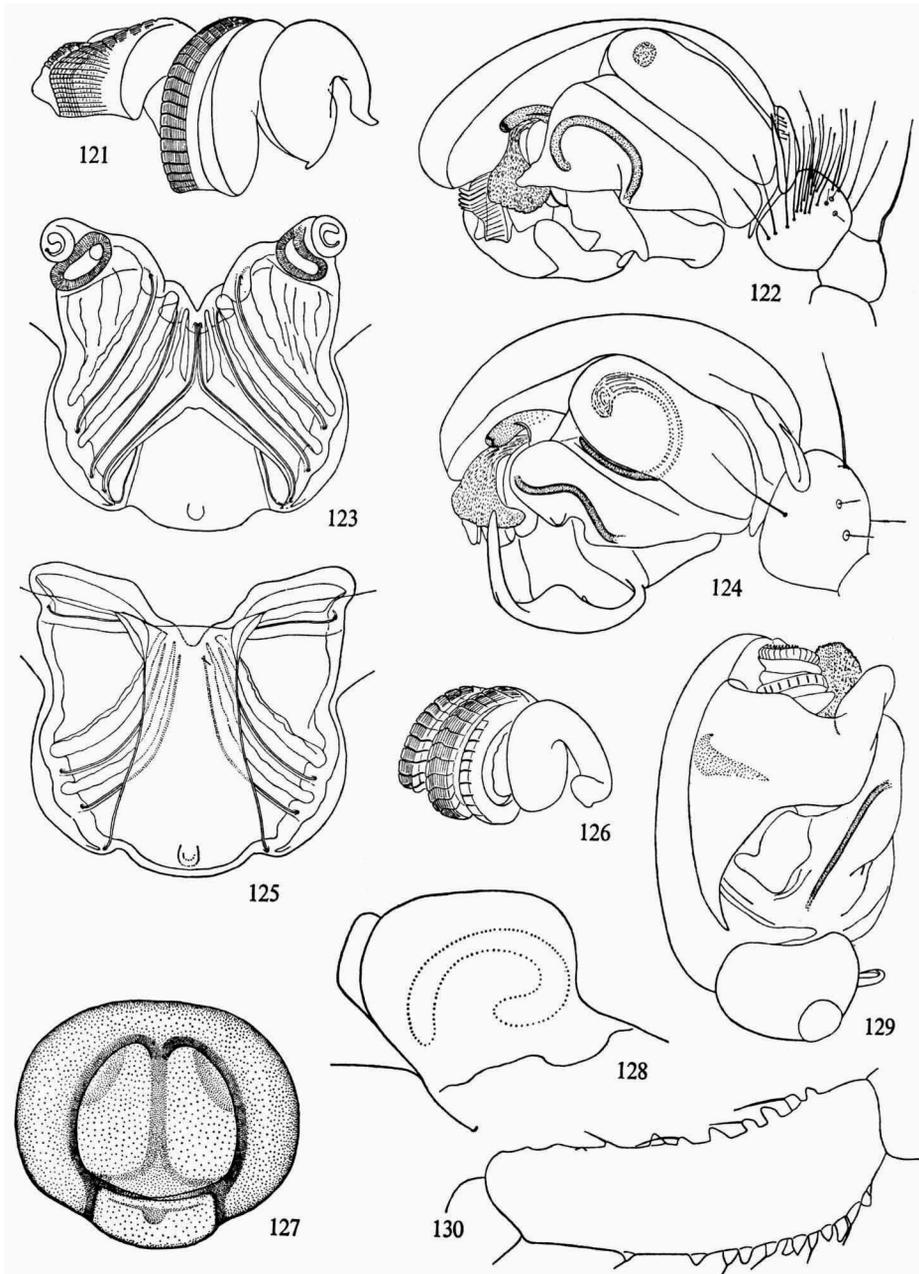


Fig. 121-122. *Neriene furtiva*. 121, terminal apophysis; 122, male palp, lateral aspect.
 Fig. 123-130. *N. redacta*. 123, vulva, ventral aspect; 124, male palp, lateral aspect;
 125, vulva, dorsal aspect; 126, terminal apophysis; 127, epigyne; 128, do., lateral aspect;
 129, male palp, ventral aspect; 130, male palpal femur, lateral aspect. 121, $\times 95$; 122,
 $\times 49$; 123, 125, 126, $\times 133$; 124, 129, $\times 83$; 127, 128, $\times 127$; 130, $\times 100$.

more than twice as large, one heavy and placed rather ventrally, the other slender but of same length as heavy tooth and situated more dorsally. Ventral row with three very small teeth apically of heavy dorsal tooth.

Gnathocoxae. — Brown as cephalothorax, lightly suffused with grey at bases and apices; lateral margins converging to front, apices rounded. Labium grey-brown, anterior margin raised. Sternum brown, lightly suffused with grey; rather narrow, width 0.65 of length, narrowly produced between coxae IV.

Legs. — Only available specimen in very bad condition, most legs broken off. Femora swollen on basal halves and with broad rings on swollen parts of femora III and IV; remainder of legs yellow-brown, slightly lighter than cephalothorax. Coxae with narrow grey apical rings and lightly suffused with grey. Length of femur I 0.95 of length cephalothorax, tibia I missing. Measurements (of holotype of *Nerienne redacta*) in mm:

	I	II	III	IV	palp
Fe	1.45	1.30	0.95	1.45	0.54
Pa	0.26	0.26	0.25	0.27	0.12
Ti	—	1.15	0.80	1.20	0.15
Mt	—	1.30	0.95	1.40	—
Ta	—	0.65	0.40	0.55	0.58

Chaetotaxy. — Most spines broken off in the badly preserved holotype, those still present very short, except apical spines on tibiae, which are of normal length. Femora with two or three very short dorsal spines, femur I with an additional 1'-spine. Tibiae with dorsal spines as usual, and with four apical spines. On metatarsi only a v_a -spine visible. Diameter of tibia IV 0.09 mm. Tm II 0.21.

Abdomen. — Very deeply caved in dorsally. Postero-dorsal tubercle large. Uniformly dark grey-brown, caved-in part slightly lighter. Ventral surface without light spots.

Palp (fig. 124, 129). — Femur (fig. 130) fusiform with concave dorsal and mesal sides; dorsal side with 6-7 papillae on basal half, standing in a row, each with a small hair on anterior side of tip; ventral surface with 14 similar papillae, equally haired, arranged on basal half, not in a row. Patella as long as high; dorsal spine broken off. Tibia slightly higher than long; dorsal spine as long as height of segment; with a lateral spinehair of same length. Cymbium without spines; mesal margin nearly straight. All segments yellow-brown, tibia and cymbium suffused with grey. Paracymbium small, with short and narrow distal arm tapering to a sharp point; element directed sideways. Tegulum narrow in lateral view, with the usual antero-ventral ex-

cavation. Median apophysis with dorsal tip lightly curved, bearing a small hook at extreme tip. Embolus with a rounded lobe distally of spermduct-tooth. Terminal apophysis (fig. 126) with slightly more than three parallel coils; basal coil disk-shaped and heavily chitinous, others membranous and transversely grooved. Lamella with short proximal tip; mesal margin straight; anterior margin perpendicularly to mesal side; anterior part concave dorsally, grooved along anterior margin; free lateral projection broad at base, with a narrow offshoot in anterior direction, curving in dorsal direction, rather long and narrow; free projection thickened dorsally at base, bearing a small blunt tooth, which is visible from the outside. Transversal sclerite not present.

Female. — Measurements in mm. Total length 2.7; cephalothorax, length 1.05, width 0.65; abdomen, length 1.6, width 1.05, height 1.15; chelicerae, length 0.52, width 0.25.

Cephalothorax. — Brown, heavily suffused with black on thoracic part and sides of head, dorsal surface of head with sparse suffusion. Posterior margin deeply excised mesally, sides lightly curved towards front, with the barest constriction at border of head and thorax. Relatively long and narrow, width 0.6 of length, width of head 0.65 of width of thorax. From side, dorsal line rather straight, slightly bulging behind eyes. Eye-region with short and inconspicuous hairs. Diameter of PME 0.075 mm, laterals of same size, AME much smaller, their diameter measuring 0.75 of PME. PME separated from each other by 1.7 diams., from PLE by 0.65 diam., and from AME by 1.3 diams. of PME. AME separated by less than their own diameter. Height of clypeus 0.12 of length of cephalothorax.

Chelicerae. — Yellow brown, suffused with black on an oblique dorsal streak from mesally at base towards laterally at apex, contrasting with the yellow-brown apical slant; lateral surface uniformly grey-brown. Lateral surface rather straight, only slightly bulging on basal two-thirds and scarcely diverging on apical third. Apical slant evenly curved from straight basal half towards base of fang. Basal tubercle absent. Very faint broken ridges visible on lateral surface. Dorsal row with three teeth, equidistant, basal tooth half as large as second and third teeth, which are of same size. Ventral row with five small equidistant teeth, apical tooth very small; basal tooth opposite to apical tooth of dorsal row, and as large as basal tooth of dorsal row.

Legs. — Yellow-brown, evenly suffused with grey; coxae heavily suffused with black on posterior side and on ventral half of apical side. Legs rather short and stout; femur I as long as cephalothorax; length of tibia I 9 diams. of segment. Measurements (of holotype of *Linyphia davisii*) in mm:

	I	II	III	IV
Fe	1.05	0.90	0.70	1.05
Pa	0.27	0.25	0.22	0.25
Ti	1.00	0.80	0.55	0.85
Mt	0.95	0.85	0.60	0.95
Ta	0.55	0.50	0.35	0.45

Chaetotaxy. — Fe I dl'; II dd; III-IV d. Pa I-IV d''d', both very short. All tibiae with a d''- and d'-spine, tibia I with an additional l'-spine. Apical spines of tibiae very weak. Metatarsi spineless. Diameter of tibia I 0.11 mm, of tibia IV 0.09 mm; d''-spines broken off. Tm I 0.20.

Abdomen. — Dorsal surface moderately curved, ending with a postero-dorsal tubercle, which protrudes well above spinnerets. Abdomen dark grey with light beige-coloured areas, some of which bear white blotches. Dorsal surface with a light area on basal half, half as wide as abdomen, composed of two triangular fused spots, their apices pointing forwards, followed by a faint light chevron just behind this area and still narrowly fused with it mesally; another even fainter chevron visible on the posterior fourth; remaining part of dorsal surface dark grey. Lateral surface with a row of light areas with few clear white blotches; an oval light area on anterior half, followed by three small spots, the anterior one squarish with a white spot, the others slightly rounded. The lateral row of spots continued on the posterior surface below the postero-dorsal tubercle with two oblong horizontal spots, one at each side, with a large clear white blotch each; remaining of lateral surface dark grey with two small white spots on ventral half. Ventral surface dark grey with a pair of white spots behind the epigastric furrow, separated as widely as the branchial opercula. Opercula and spinnerets of same colour as ventral surface.

Epigyne (fig. 127, 128). — Globular, conspicuously protruding, slightly constricted at base of protrusion. Opening slightly broader than long. Mesal part of posterior wall creamy yellow.

Vulva (fig. 123, 125). — Atria conical, diverging, but lateral walls parallel. About two and a half coils of spiral groove between entrance mesally on ventral wall to apical turning-point; receptacula at ventral side of apices, proximal of turning-points, pointing outwards. Fertilization ducts parallel with spiral grooves, and ending far anteriorly at the dorsal side of the vulva. Scape with a slightly curved posterior margin, barely projecting further backwards, or rather in ventral direction, than lateral walls of epigyne, and only slightly excised at sides. Width of epigyneal aperture 0.18 mm.

Distribution. — South-eastern part of the United States (Florida and Mississippi). Data about habitat not available.

Material examined.

U.S.A. — 1 ♂, Florida, Punta Gorda (holotype of *Neriene redacta* Chamberlin; MCZ). — 1 ♀, Mississippi, Pass Christian, 12.viii.1938, L. I. Davis (holotype of *Linyphia davisii* Gertsch; AMNH).

Neriene obtusa (Locket) comb. nov.

(fig. 131-141)

Linyphia obtusa Locket, 1969, Public. cult. Comp. Diamant. Angola, 77: 127, fig. 48A-C (description ♀, Angola).

Type. — ♀ holotype from Angola, Alto Cuílo, Ná-Ipanha stream (MD).

Remarks. — A second ♀ of this very small species was found in Kenya by Dr. Å. Holm, at Kakamega at 1400 m. It agrees in detail with the holotype from Angola. A male specimen, found in Transvaal at an altitude of 1200 m, is tentatively assigned to this species, although it is slightly larger, has three pairs of white ventral spots on the abdomen, and shows slight differences in chaetotaxy. I prefer to regard the three specimens as belonging to one species, despite the differences observed, until more material comes available.

Female. — Measurements in mm. Total length 1.95-2.1; cephalothorax, length 0.92-0.95, width 0.57-0.65; abdomen, length 1.0-1.15, width 0.7-0.8, height 0.65-0.7; chelicerae, length 0.46, width 0.20.

Cephalothorax. — Brown, suffused with grey on striae, and with a narrow grey lateral margin. Posterior margin broadly but shallowly excised, sides evenly rounded, constricted at border of head and thorax; width 0.6-0.7 of length, width of head 0.7 of width of thorax. From side, dorsal line rising evenly on thorax, less steeply on head; clypeus straight. Clypeus and eye-region with very short hairs, no hairs visible on striae and at margins.

Eyes. — Eye-region as wide as head. Anterior row straight, posterior row slightly recurved. Diameter of PME 0.06-0.07 mm, laterals of same size, AME 0.06 mm. PME separated from each other by 1.4 diams., from PLE by 1.0 diam., and from AME by 1.2 diams. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.13 of length of cephalothorax.

Chelicerae. — Light brown, with a dark grey dorsal streak from mesally at base towards laterally at apex. Without basal tubercle. Stridulating ridges not present. Dorsal row with three equidistant teeth, apical tooth twice as large as basal one, second tooth of intermediate size. Ventral row with five small teeth, apical tooth very small, others of equal size, all equidistant, basal tooth opposite to apical dorsal tooth.

Gnathocoxae. — Brown, suffused with black; lateral margins parallel, apices rounded. Labium and sternum coloured as gnathocoxae; width of sternum 0.8 of length, produced rather broadly between coxae IV.

Legs. — Yellow-brown, with faint grey annulations. Femora with a broad median and a narrow apical ring, most conspicuous pro- and retro-laterally. Patellae with black suffusion. Tibiae with broad median and narrow apical rings. Metatarsi with submedian and apical ring. Length of femur I 0.85-0.9 of length of cephalothorax; length of tibia I 7-8 diams. of segment. Measurements (of holotype) in mm:

	I	II	III	IV
Fe	0.82	0.75	0.62	0.85
Pa	0.25	0.22	0.20	0.22
Ti	0.72	0.65	0.45	0.70
Mt	0.75	0.67	0.50	0.77
Ta	0.50	0.45	0.32	0.42

Chaetotaxy. — Fe I dl'; II-III d; IV spineless. Pa I-IV d''d', basal spine small. Ti I d''d', no lateral spines present. Metatarsi spineless.

Length of d''-spine on tibia I 0.09-0.10 mm, diameter of segment at base of d''-spine 0.09-0.10 mm; on tibia IV 0.12 mm and 0.09 mm, respectively. Tm I 0.22-0.24. Position of d''-spine on tibia I 0.19-0.20.

Abdomen. — Flattened dorsally, with postero-dorsal tubercle protruding above spinnerets. Dorsal surface blackish, with two small triangular mesal spots on anterior half. Lateral surface with a series of six light spots, some of these bearing white blotches, the hindermost continuous on posterior surface with the other side. Remainder of lateral surface and ventral surface, including opercula and spinnerets, uniformly blackish.

Epigyne (fig. 131, 134). — Protruding from ventral surface. Opening oval, longer than wide. Scape semi-circular.

Vulva (fig. 132, 133). — Atria long conical, diverging from common opening in anterior direction. Spiral groove with three coils; entrance at meso-ventral side of each atrium; turning-point at apex of atrium, curved to ventral side; receptaculum at mesal side of apex. Scape with semi-circular posterior margin, conspicuously excised near lateral parts of epigyne; a small pit present mesally on ventral surface. Width of epigyneal aperture 0.12 mm.

Male. — Measurements in mm. Total length 3.3; cephalothorax, length 1.55, width 0.95; abdomen, length 1.75, width 1.0, height 1.0; chelicerae, length 0.67, width 0.26.

Cephalothorax. — Light brown, heavily suffused with black along posterior and lateral margins, this margin narrowly continued on the lower half of

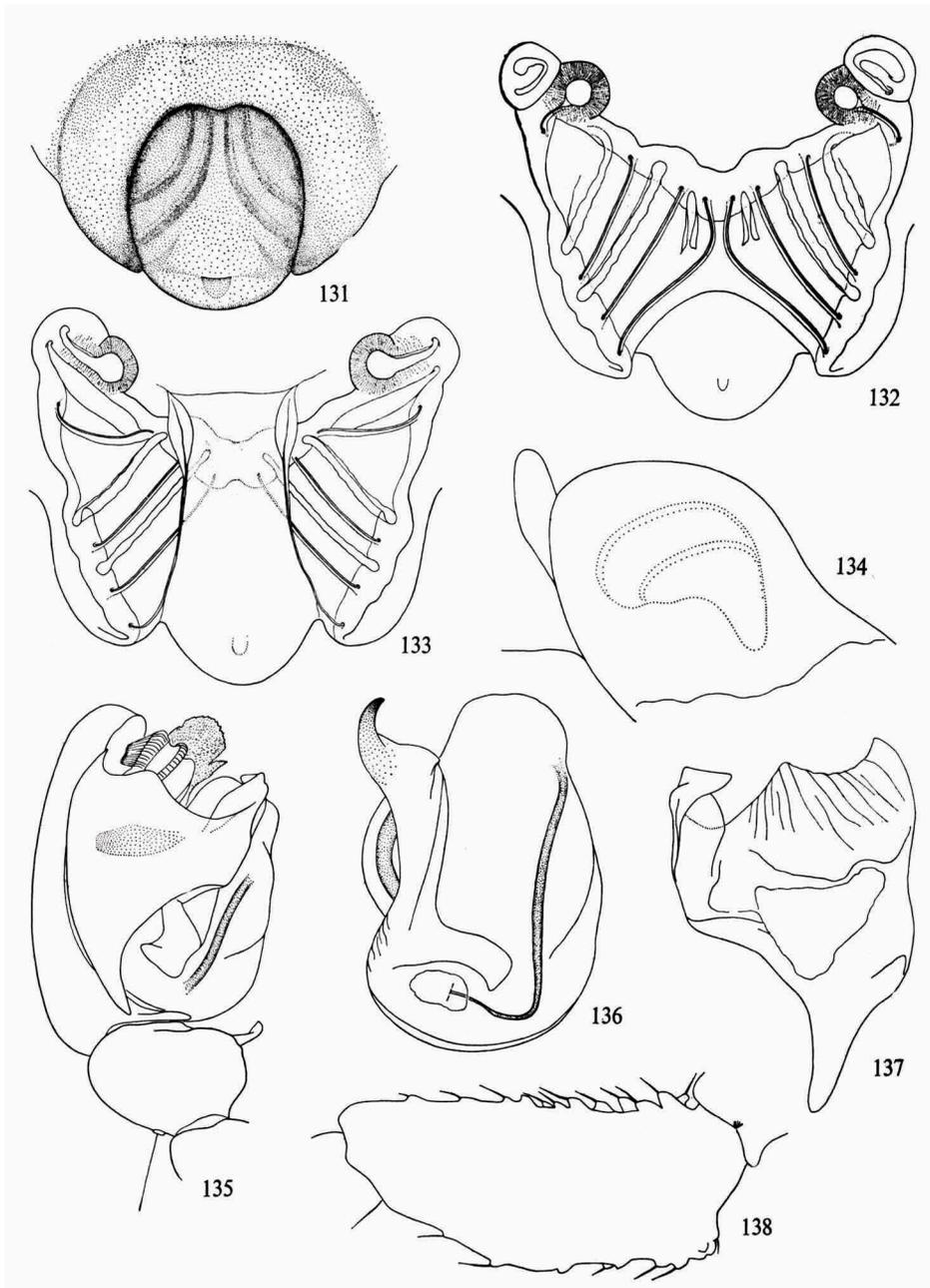


Fig. 131-138. *Neriene obtusa*. 131, epigyne; 132, vulva, ventral aspect; 133, do., dorsal aspect; 134, epigyne, lateral aspect; 135, male palp, ventral aspect; 136, tegulum with median apophysis, mesal aspect; 137, lamella, dorsal aspect; 138, male palpal femur, lateral aspect. 131, 134, $\times 189$; 132, 133, $\times 213$; 135, $\times 83$; 136, 137, $\times 117$; 138, $\times 100$.

the clypeus; a median blackish band reaching forwards from fovea to slightly behind PME, truncated there; lateral margins and median band not sharply set off against light brown background, of which only small areas are left on anterior part of thorax and at sides of head. Sides barely constricted at border of head and thorax, rather strongly converging towards posterior margin, which is straight; transition of sides into posterior margin angular. Width 0.6 of length, width of head 0.55 of width of thorax; posterior margin narrow, measuring only 0.4 of width of thorax. From side, dorsal line rising straight from slightly raised posterior margin towards fovea, rising barely steeper from fovea towards eye-region; clypeus straight. Very short hairs visible along striae, eye-region shortly haired with a few spinehairs, clypeus with a few stray short hairs.

Eyes. — Eye-region as wide as head. Anterior row straight, posterior row slightly recurved. PME on black tubercles, AME on a common black spot, bases of lateral eyes black. Diameter of PME 0.06 mm, laterals of same size, AME barely smaller, measuring 0.05 mm. PME separated from each other by 3.2 diams., from PLE by 1.8 diams., and from AME by 2.4 diams. of PME. Height of clypeus 0.16 of length of cephalothorax.

Chelicerae. — Light brown, faintly suffused with grey. Sides parallel, not diverging. Mesal basal tubercle conspicuous, lateral one barely visible. Lateral surface with faint broken ridges on basal half. Three dorsal teeth situated near transition of mesal side into apical slant; basal tooth conical, second tooth slightly larger and situated rather ventrally, a smaller tooth dorsally of second tooth. Ventral row with five very small teeth in a close row near base of fang.

Gnathocoxae. — Light brown with grey suffusion; sides converging towards apices, which are truncated obliquely. Labium with light raised anterior margin, remaining part dark as sternum. Sternum brown with black suffusion, darkest at margins; narrowly produced between coxae IV, width 0.8 of length.

Legs. — Yellow-brown, with faint annulations on anterior legs and dark rings on posterior legs; femora with submedian and subapical rings, tibiae with median and apical rings, patellae completely suffused with grey. Femur I barely shorter than cephalothorax, length of tibia I 12.5 diams. of segment. Measurements in mm:

	I	II	III	IV	palp
Fe	1.50	1.35	1.05	1.55	0.51
Pa	0.31	0.31	0.29	0.31	0.16
Ti	1.40	1.15	0.80	1.20	0.23
Mt	1.60	1.40	0.95	1.50	—
Ta	0.80	0.70	0.50	0.65	0.55

Chaetotaxy. — Fe I dl'; II-III d; IV -. Pa I-IV d''d', both spines short.

Ti	I	d''	l'	l''	d'	[l'_a l''_a v'_a v''_a]
	II	d''		l''	d'	[l'_a l''_a v'_a v''_a]
	III	d''			d'	[l'_a l''_a v'_a v''_a]
	IV	d''	l'		d'	[l'_a l''_a v'_a v''_a]

Mt I-II spineless; III-IV with one d-spine.

Length of d''-spine on tibia I 0.10 mm, diameter of segment at base of d''-spine 0.11 mm; on tibia IV spine and diameter both 0.11 mm. Tm I 0.25. Position of d''-spine on tibia I 0.21.

Abdomen. — Rather cylindrical, dorsal surface barely curved towards postero-dorsal tubercle, which protrudes slightly above spinnerets. Pattern composed of black-pigmented areas and light cream-coloured streaks and spots, which bear white blotches. Dorsal surface with broad black field, occupying whole width of abdomen, flanked by white dorso-lateral bands, which are broadly separated in front but are fused with each other on posterior surface of postero-dorsal tubercle, very bright there; dorsal black area with four cream-coloured spots in a longitudinal row, bearing stray white blotches; anterior two spots subtriangular, posterior spots becoming more chevron-shaped with arms pointing backwards. Ventral half of lateral surface mainly black with few white spots. Ventral surface dark grey with three pairs of white spots, viz., a pair of large spots behind the epigastric furrow opposite to the opercula, a second pair slightly closer to the spinnerets than to the anterior pair and slightly closer to each other, a third pair slightly more lateral in front of the spinnerets; second and third pair smaller than anterior pair. Opercula and spinnerets brown, suffused with grey.

Palp (fig. 135, 139). — All segments yellow-brown, lightly suffused with grey. Femur (fig. 138), when looked at from side, widened shortly after base, narrowing shortly before tip; dorsal and ventral hairs on large warts. Patella slightly longer than high, dorsal spine slightly shorter than segment. Tibia higher than long, dorsal spine of same length and strength as the six or seven spinehairs, which occur along the distal margin laterally; spine and spinehairs as long as height of segment. Cymbium without spines. Paracymbium small and curved, tapering to a point; element directed at side. Tegulum excavated ventrally on lateral side. Median apophysis (fig. 136) as in other species of this group, with dorsal hook-shaped tip curved in lateral direction. Embolus (fig. 141) with a sharp spermduct-tooth and a barely longer apical lobe with rounded tip. Terminal apophysis (fig. 140) with slightly more than three coils, basal coil disk-shaped, the apical pair transversely grooved; apical lappets present. Lamella (fig. 137) slightly

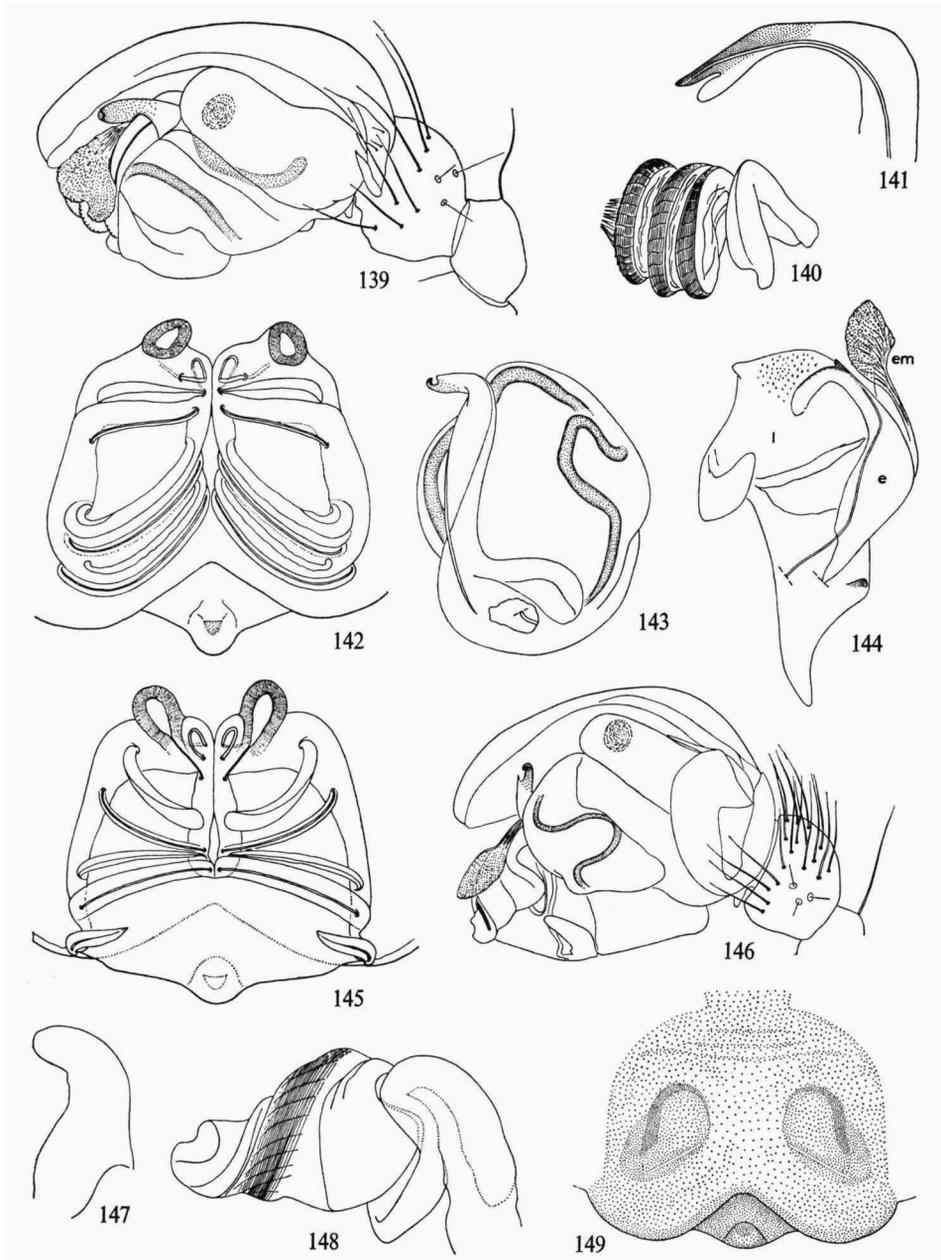


Fig. 139-141. *Neriene obtusa*. 139, male palp, lateral aspect; 140, terminal apophysis; 141, embolus, dorsal aspect. Fig. 142-149. *N. hammeni*. 142, vulva, ventral aspect; 143, tegulum with median apophysis, mesal aspect; 144, lamella(*l*) with embolus(*e*) and embolic membrane(*em*), dorsal aspect; 145, vulva, dorsal aspect; 146, male palp, lateral aspect; 147, lateral projection of lamella; 148, terminal apophysis; 149, epigyne. 139, $\times 83$; 140, 141, $\times 133$; 142, 145, $\times 89$; 143, 144, 149, $\times 67$; 146, $\times 49$; 147, $\times 95$; 148, $\times 123$.

longer than broad; proximal tip narrow and pointed, widening on one-third of length, mesal margin straight from there to anterior margin, which is lightly excised at either side of a blunt median tip; free lateral projection rather large and heavy, curved inwards below sharp tip; dorsal surface of anterior third of element with faintly visible oblique grooves. Transversal sclerite lacking.

Distribution and habitat. — A female specimen from Angola (holotype) and a female from Kenya, undoubtedly belong to this species. The female from Angola was found in detritus. The specimen from Kenya comes from 1400 m. The specimens have been collected in June and April, respectively.

The male specimen from Transvaal, tentatively placed with this species, was found in March on the bank of a watercourse at an attitude of 1200 m.

Material examined.

Angola. — 1 ♀, Alto Cuílo, Ná-Ipanha stream, in detritus, 10.vi.1954, A. de Barros Machado (holotype; MD).

Kenya. — 1 ♀, Kakamega, 1400 m, 7.iv.1938, A. Holm (ZIU).

Transvaal. — 1 ♂, Lydenburg Distr., Ohrigstad, 1200 m, on the bank of a watercourse, 21.iii.1962, N. Leleup (MT).

The *Nerienne hammeni* group

Nerienne hammeni (Van Helsdingen) comb. nov.

(fig. 142-154, pl. 2 fig. 3)

Linyphia hammeni van Helsdingen, 1963a, Proc. Kon. Ned. Akad. Wet., C, 66: 153, fig. 1-4, 6 (description ♂, Netherlands); 1963b, Zool. Verh., 62: 34 (Netherlands). — Chrysanthus, 1966, Natuurh. Maandbl., 55: 157 (Netherlands).

Types. — ♂ holotype and one ♂ paratype from The Netherlands, Heerlen (ML).

Remarks. — This species has been found up to the present in The Netherlands and Belgium only. The female is described here for the first time. As pointed out in my earlier paper on this species (Van Helsdingen, 1963a), *Nerienne hammeni* closely resembles the Japanese *Nerienne oidedicata*, then erroneously called *Linyphia albolimbata* Karsch (see p. 148). The differences are small, as indeed they are between most species of the *hammeni*-group. The main differences lie in the shape of the paracymbium, especially in the shape of the apical and subapical appendages; in the shape of the free lateral projection of the lamella, formerly (1963a) called the lateral process; and in the shape of the terminal apophysis. The distance between the black tubercles bearing the PME, and the shape of the cephalothorax, appear to

have no diagnostic value, contrary to my earlier suggestions on this point; the larger material now available clearly has shown these two supposed diagnostic features to be due to individual variation, and to a slight deformation of the cephalothorax of the only specimen of *oidedicata* available at the time.

The differences between the females of the two species now appear to be equally small. The main differences again are to be found in the genitalia. In *Neriene oidedicata* the vulva is distinctly bell-shaped and wider than long, with an epigyneal aperture of 0.46-0.50 mm. In the present species length and width of the vulva are equal, while the epigyneal aperture measures 0.31-0.40 mm; the vulva is not bell-shaped.

Male. — Measurements in mm. Total length 3.8-5.0; cephalothorax, length 1.75-2.3, width 1.25-1.6; abdomen, length 2.2-2.5, width 1.0-1.3, height 1.1-1.4; chelicerae, length 0.70-0.95, width 0.35-0.40.

Cephalothorax. — Brown, lightly suffused with black behind fovea, on head, and along margins; faint striae visible. From above, slightly excised posteriorly, barely constricted at border of head and thorax; width 0.65-0.7 of length, width of head about 0.5 of width of thorax. From side, dorsal line rising evenly from behind to fovea, dorsal line of head slightly steeper; clypeus straight. Surface smooth, very short hairs on striae, short hairs on border of head and thorax and on three rows from fovea towards eye-region; the latter and upper three-fourths of clypeus with longer hairs.

Eyes. — Eye-region occupying nearly whole width of head. Anterior row straight, posterior row slightly recurved. PME on large black tubercles, AME on a common black spot. Diameter of PME 0.09-0.10 mm, lateral eyes slightly smaller, diameter of AME 0.7 of PME. PME separated from each other by 2.2-2.4 diams., from PLE by 1.1-1.4 diams., from AME by 1.3-1.4 diams. of PME. AME separated from each other by their own diameter or slightly less. Height of clypeus 0.23-0.28 of length of cephalothorax.

Chelicerae. — Brown, lightly suffused with black. Sparsely covered with short hairs, longer hairs near cheliceral teeth dorsally and ventrally. Basal tubercle small but distinct at latero-dorsal corner. Stridulating file not present. Ventral row with three to five, usually four teeth, small and evenly spaced, near base of fang. Dorsal row with four, rarely five teeth, occupying whole width of meso-apical slant; basal pair situated more ventrally than apicals and in one line with ventral row, apicals opposite to basal tooth of ventral row.

Gnathocoxae. — Brown, suffused with black, apices grey. Labium black-brown, anterior half lighter. Sternum black-brown, produced between coxae IV; width 0.8 of length.

Legs. — Yellow to light yellow-brown; femora sometimes with dark brown or black-brown streaks; tarsi narrowly brown at bases. All segments long and slender, length of femur I 1.1-1.25 times length of cephalothorax, length of tibia I 15-16 diams. of segment. Measurements (of holotype) in mm:

	I	II	III	IV	palp
Fe	2.40	2.10	1.65	2.40	0.77
Pa	0.50	0.45	0.40	0.40	0.22
Ti	2.40	2.00	1.35	1.90	0.27
Mt	2.70	2.30	1.65	2.50	—
Ta	1.80	1.20	0.80	1.10	0.82

Chaetotaxy. — Fe I dl''; II-IV d. Pa I-IV d''d', basal spine weaker and smaller than apical one.

Ti	I - II	v _b '	d''	v'	v''	l'	v'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III - IV		d''			l'	v'			[l' _a l'' _a v' _a v'' _a]
Mt	I - IV	dl'	l''	vdv _a						

Length of d''-spine on tibia I 0.17-0.26 mm, diameter of tibia I at base of d''-spine 0.14-0.16 mm; on tibia IV 0.28-0.34 mm and 0.14-0.16 mm, respectively. Tm I 0.18-0.25. Position of d''-spine on tibia I 0.25-0.28.

Abdomen. — Cylindriform, with rounded postero-dorsal tubercle. Obscure black-brown dorsal markings on light grey-brown background, sometimes with small white blotches on background areas; markings as in female, but less distinct. Ventral, posterior, and lower half of lateral surface black-brown. Ventral surface with a pair of small light areas, situated slightly nearer to spinnerets than to epigastric furrow, but never with white spots. Posterior surface with a light brown spot above spinnerets. Genital area brownish-black, opercula brown, spinnerets brown, suffused with black.

Palp (fig. 146, 153). — All segments yellow-brown to brown, femur sometimes with black-brown streaks. Patella short, dorsal spine near anterior margin about one and a half times as long as segment. Tibia higher than long, with a dorsal spine and with about twenty spinehairs on dorso-lateral and lateral surfaces; spinehairs barely longer than segment. Cymbium (fig. 154) suffused with grey or black, with one or two spines on distal half. Paracymbium closely following surface of tegular section with broad and flat distal arm (fig. 151), which bears a subapical appendage pointing in proximal direction, and an apical appendage pointing forwards; subapical appendage approximately in the shape of an equilateral triangle, apical appendage more narrowly triangular. Tegulum not excavated ventrally. Median apophysis (fig. 143) curved in dorsal direction and slightly backwards shortly before small hook-shaped tip. Embolus (fig. 144, e) with apically rounded

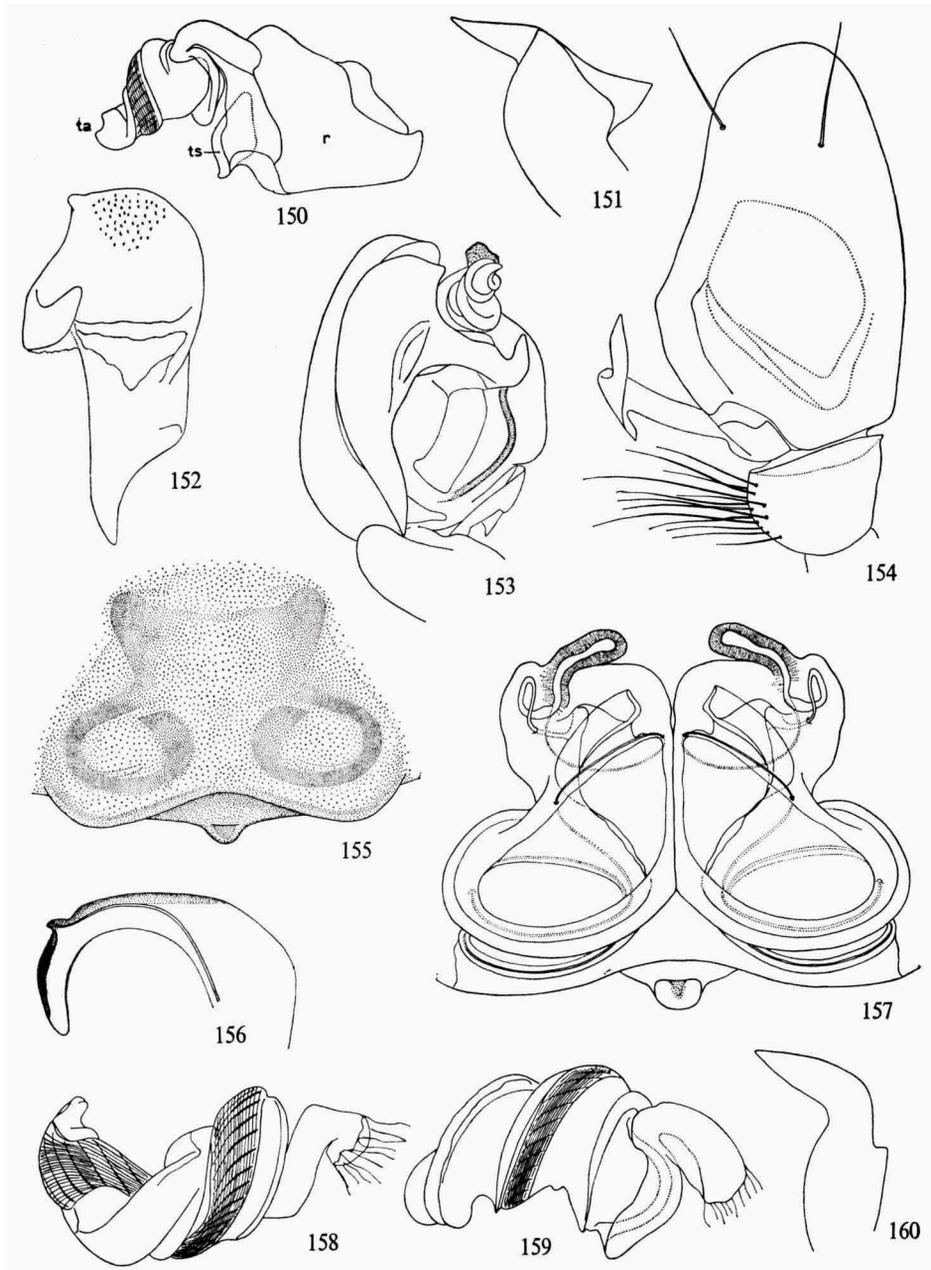


Fig. 150-154. *Neriene hammeni*. 150, radix(*r*) with terminal apophysis(*ta*) and transversal sclerite(*ts*), lateral aspect; 151, tip of paracymbium; 152, lamella, dorsal aspect; 153, male palp, ventral aspect; 154, cymbium, dorsal aspect. Fig. 155-160. *N. variabilis*. 155, epigyne; 156, embolus, dorsal aspect; 157, vulva, ventral aspect; 158, terminal apophysis, dorsal aspect; 159, do., lateral aspect; 160, tip of paracymbium. 150, 152, 154, 155, $\times 67$; 151, 156, 158, 159, $\times 95$; 153, $\times 49$; 157, 160, $\times 100$.

lobe distally of spermduct-tooth, without heavily pigmented tooth at base of lobe (cf. African species). Terminal apophysis (fig. 148, 150, *ta*) with about two and a half coils; basal coil saucer-shaped, hollow side distally, giving support to proximal tip of solid and heavily chitinous axial body of second coil; second coil broad and transversely grooved, half terminal coil narrow and with blunt tip. Lamella (fig. 144, 152, *l*) with narrow proximal tip; anterior half of mesal margin and anterior margin evenly curved to sharp latero-distal tip; laterally a curved and blunt free membranous projection (fig. 147) at tip of narrow lateral arm. Transversal sclerite (fig. 150, *ts*) present between distal tip of radix and lateral arm of lamella, diamond-shaped.

Female. — Measurements in mm. Total length 3.7-5.9; cephalothorax, length 1.55-2.0, width 1.05-1.35; abdomen, length 2.2-3.8, width 1.3-2.1, height 1.3-2.3; chelicerae, length 0.83-0.95, width 0.32-0.40.

Cephalothorax. — Distinctly excised posteriorly, constricted at border of head and thorax; width 0.7 of length, width of head 0.6 of width of thorax. From side, dorsal line of thorax and head rising evenly, becoming more level at fovea; clypeus straight. Short hairs on posterior part of head, at eye-region, and on clypeus. In most specimens a light area present between AME and ALE and below AME, narrowly continuing towards lower margin of clypeus, caused by absence of black suffusion and by lighter pigmentation of the integument.

Eyes. — Both rows of eyes straight. Diameter of PME 0.10-0.11 mm, lateral eyes of approximately the same size, diameter of AME measuring 0.7 of diam. of PME. PME separated from each other by 2.0-2.5 diams., from PLE by about 1.0 diam., and from AME by 1.7 diams. of PME; AME separated from each other by their own diameter or slightly less. Height of clypeus 0.20-0.23 of length of cephalothorax.

Chelicerae. — Light brown to brown, suffused with black on lateral surface, and on narrow dorsal streak from mesally at base towards laterally at apex. Sparsely covered with short hairs, longer hairs present near cheliceral teeth. Stridulating file on second third of lateral surface composed of broken ridges. Basal tubercle absent. Four to five teeth in dorsal row, equidistant, second tooth largest, others slightly smaller, apical tooth, if present, very small and close to fourth. Ventral row with five, rarely four teeth, small and equidistant, fifth very small, basal tooth opposite to third tooth of dorsal row.

Legs. — Colour as in male. Legs long and slender, femur I 1.2-1.3 times as long as cephalothorax, length of tibia I 12-13 diams. of segment. Measurements (of specimen from Belgium, Mt. St.-Pierre) in mm:

	I	II	III	IV
Fe	2.25	1.95	1.50	2.15
Pa	0.52	0.50	0.40	0.45
Ti	2.20	1.75	1.20	1.75
Mt	2.25	1.90	1.40	2.10
Ta	1.30	1.05	0.70	0.90

Chaetotaxy. — Not differing from male. Length of d''-spine on tibia I 0.30-0.41 mm, diameter of tibia I at base of d''-spine 0.15-0.20 mm; on tibia IV 0.37-0.50 mm and 0.12-0.16 mm, respectively. Tm I 0.18-0.26. Position of d''-spine on tibia I 0.23-0.25.

Abdomen (pl. 2 fig. 3). — Light yellow-brown background with pattern of black pigmentation and white blotches. Dorsal surface with a median row of narrowly connected black spots; anterior spot diamond-shaped and narrowly connected with lateral dark areas, second and third spots more triangular, fourth spot continuous with dark lateral markings, and separated from black posterior spot by two light transverse crescent-shaped areas. Dorsal dark areas surrounded by light background with white blotches. Dorso-laterally a black band, anteriorly connected with the dark median spot, posteriorly ending at posterior dark area, deeply incised at ventral border opposite to third and fourth dorsal spots. Light pale-brown lateral band with white spots from dorsal margin of operculum to posterior surface of abdomen, continuous with band on other side. Ventral half of lateral surface and area above spinnerets black, ventral surface brown-black. Opercula brown, suffused with black; spinnerets light brown, suffused with black. In light specimens dorsal dark areas smaller, more or less V-shaped with free arms pointing backwards; lateral bands broken up in isolated dark spots. In dark specimens all dorsal black markings connected with lateral dark areas.

Epigyne (fig. 149). — Common opening of atria broad and low. Black-brown, with two lateral brown translucent areas; posterior margin excised mesally; scape curved in ventral direction.

Vulva (fig. 142, 145). — Barely broader than long. Spiral groove with two and a half coils; entrance of spiral groove in latero-ventral wall, turning-point meso-dorsally; receptacula curved in ventral direction. Width of epigyneal aperture 0.32-0.40 mm.

Distribution and habitat. — Up to the present the species has been collected in Belgium and the southernmost part of The Netherlands only. It is likely to be found also in some of the adjacent countries. The species occurs in the same habitat as *N. clathrata* (Sundevall), viz., between vegetation and on low plants, never far from the ground. The long series from Tervuren

was taken from *Hypericum perforatum* L., where the webs were found between the newly emerging stalks together with the webs of *N. clathrata*. At the other localities it has been found on heather and other low plants. The specimens become adult during the first half of May.

Material examined.

Netherlands. — 2 ♂, Limburg, Heerlen, v-vi.1958, Fr. Arnaud (holotype and paratype; ML).

Belgium. — 4 ♀ 3 ♂ 1 subadult ♀, Limburg, Mt. St.-Pierre, on low plants, 22.v.1964, J. Kekenbosch (ISNB). — 2 ♀, Brabant, Limelette, on heather, 7.vi.1962, J. Kekenbosch (ISNB); 1 ♀, do., subadult on 4.v.1966, last moult on 6.v.1966, P. J. van Helsdingen (ML). 1 ♀, Tervuren, Coolenshoek, 13.vi.1957, J. Kekenbosch (ISNB); 16 ♀ 16 ♂, do., between stalks of *Hypericum perforatum* L., subadult on 2.v.1966, all moulted before 10.v.1966, P. J. van Helsdingen (ML). — 2 ♀, Namur, Eprave, on low plants, 10.vi.1959, J. M. Vrydagh (ISNB). — 1 ♀, Luxembourg, Orval, 3.vii.1963, E. Derenne (ISNB). 1 ♂, Amonines, on low plants, 7.v.1957, J. Kekenbosch (ISNB). 1 ♀, Lamorteau, on low herbs, 21.vi.1957, J. Kekenbosch (ISNB).

Neriene variabilis (Banks) (*Linyphia maculata* Emerton)

(fig. 155-166)

Linyphia variabilis Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892: 42, pl. 2 fig. 28 (description subadult ♀ ♂, New York); 1893, Journ. New York Ent. Soc., 1: 129 (Eastern U.S.A., key); 1916, Proc. Acad. Nat. Sci. Philadelphia, 68: 75 (belongs to *Neriene*). — Slosson, 1898, Journ. New York Ent. Soc., 6: 247 (New Hampshire). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 255 (catalogue). — Emerton, 1917, Ent. News, 28: 60 (New York); 1930, Nantucket Maria Mitchell Assoc. Publ., 3(2): 166 (= *Linyphia maculata* Emerton; Massachusetts). — Crosby & Bishop, 1928, Mem. Cornell Univ. Agric. Exper. Stat., 101: 1049 (New York). — Chickering, 1933, Pap. Michigan Acad. Sci., 17: 518 (New York). — Blauvelt, 1936, Festschr. Strand, 2: 95, 131 (= *Linyphia pusilla* Sundevall).

Neriene variabilis; Banks, 1910, Bull. U.S. Nat. Mus., 72: 32 (catalogue). — Comstock, 1913, Spider Book: 385, fig. 398 (diagnosis subadult ♀ ♂).

Linyphia maculata Emerton, 1909, Trans. Connecticut Acad. Arts Sci., 14: 195, pl. 4 fig. 10 (description ♀ ♂, Massachusetts; = *L. conferta* Banks). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 251 (catalogue). — Banks, 1911, Proc. Acad. Nat. Sci. Philadelphia, 63: 448 (N. Carolina). — Crosby & Bishop, 1928, Mem. Cornell Univ. Agric. Exper. Stat., 101: 1048 (New York). — Blauvelt, 1936, Festschr. Strand, 2: 103, pl. 8 fig. 16-20 (genitalia). — Kaston, 1938, Bull. Connecticut Geol. Nat. Hist. Surv., 60: 187 (checklist Connecticut); 1948, Bull. Connecticut Geol. Nat. Hist. Surv., 70: 124, pl. 11 fig. 206-213 (Connecticut). — Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35(9): 26, 82 (Georgia). — Lowrie, 1948, Ecology, 29: 337 (Illinois).

Neriene maculata; Banks, 1910, Bull. U.S. Nat. Mus., 72: 32 (catalogue).

Linyphia conferta; Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892: 42, pl. 2 fig. 38 (New York).

Floronia conferta; Banks, 1893, Journ. New York Ent. Soc., 1: 126 (transferred to *Floronia*).

Neriene conferta; Banks, 1916, Proc. Acad. Nat. Sci. Philadelphia, 68: 75 (= *Linyphia maculata* Emerton).

Remarks. — I have not located the original material, if still in existence, of *Linyphia maculata* or *L. variabilis*. Blauvelt (1936) claims to have examined the original series of the latter, which consisted of numerous immature males and females, according to her belonging to *Linyphia pusilla* Sundevall [probably = *Microlinyphia mandibulata* (Emerton)]. Apparently she was not aware of an earlier paper by Emerton (1930), in which he listed *L. variabilis* as a synonym of *L. maculata*. The opinion of Emerton is favoured by the presence of three specimens of *L. variabilis* in the collection of the Muséum National d'Histoire naturelle at Paris, which were collected at Ithaca, New York, by Banks, and which were sent to Paris by Banks himself. These specimens, 2 ♂ and 1 ♀, probably come from the type-locality, and are identical with *Neriene maculata*. This forms strong evidence for the correctness of Emerton's opinion. The original description of Banks moreover contains several elements, which point to *maculata* and not to *mandibulata*, viz., the coloration of cephalothorax and mouth-parts, reddish-yellow and reddish respectively, and the coloration and pattern of the abdomen. I have therefore come to the conclusion that *Linyphia variabilis* Banks is indeed, as indicated already by Emerton (1930: 166), a senior synonym of *L. maculata* Emerton, and that the latter name must fall into the synonymy of the former.

Emerton (1909: 195), in his original description of *L. maculata*, listed *Linyphia conferta* sensu Banks (1892) as a synonym. This is agreed upon by Banks himself (1916). *Linyphia conferta* Hentz, 1850, seems to be a more southern species, which belongs to the Argyropidae. According to Archer (1940) the latter is a senior synonym of *Allepeira basilica* (MacCook). Chamberlin & Ivie (1944: 13, 93) on their turn have recognized in *Linyphia lemniscata* Walckenaer a senior synonym of that species, which now should be called *Allepeira lemniscata* (Walckenaer) [= *Mecynogea lemniscata* (Walckenaer), see Levi (1968: 322)].

Male. — Measurements in mm. Total length 3.8-4.7; cephalothorax, length 1.8-2.3, width 1.3-1.6; abdomen, length 2.2-2.4, width 1.0-1.15, height 0.95; chelicerae, length 0.69-0.94, width 0.32-0.41.

Cephalothorax. — Light brown to orange-brown, faintly suffused with grey along margins and on clypeus. Sides evenly rounded, not constricted at border of thorax and head, posterior margin rounded, not excised mesally. Width 0.7 of length, width of head 0.6 of width of thorax. From side, dorsal line nearly straight from rounded posterior margin to eye-region; clypeus slightly concave below AME, lower part straight. Striae very shortly haired, eye-region and upper half of clypeus with long hairs.

Eyes. — Eye-region slightly narrower than head. Posterior row slightly procurved, anterior row straight. PME on black tubercles, base of lateral eyes black, region of ventral eyes suffused with black. Diameter of PME 0.10-0.11 mm, laterals slightly smaller, diameter of AME 0.07 mm. PME separated from each other by 2.0-2.1 diams., from PLE by 1.1 diams., and from AME by 1.4-1.5 diams. of PME. AME separated by their own diameter. Height of clypeus 0.22-0.24 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Basal tubercle small but distinct. Lateral sides about straight and parallel. Hairs on small warts. Lateral surface with broken ridges on basal half. Dorsal row with four to five teeth; basal tooth near meso-apical corner and second tooth rather ventral in position, both large; apical pair or triad small, dorsal in position. Ventral row with four small equidistant teeth in one line with dorsal basal pair.

Gnathocoxae. — Light brown to brown, suffused with black at bases; lateral margins slightly converging, apices truncated obliquely. Labium blackish brown, anterior margin raised and lighter. Sternum brown, suffused with black; width 0.8 of length, produced between coxae IV.

Legs. — Uniformly yellow-brown to brown, coxae IV lightly suffused with grey. Legs slender; length of femur I 1.15-1.25 times length cephalothorax, length tibia I 17-18 diams. of segments. Measurements in mm (specimen from New Jersey):

	I	II	III	IV	palp
Fe	2.20	1.95	1.45	2.05	0.69
Pa	0.40	0.38	0.35	0.35	0.19
Ti	2.25	1.80	1.15	1.70	0.25
Mt	2.45	2.00	1.40	2.00	—
Ta	1.35	1.05	0.70	0.95	0.77

Chaetotaxy. — Fe I dl'; II-IV d. Pa I-IV d''d', basal spine weak and small.

Ti	I - II	v _b '	d'	v'	v''	l'	v'	l''	d'	[l _a ' l _a '' v _a ' v _a '']
	III - IV		d''			l'	v'		d'	[l _a ' l _a '' v _a ' v _a '']
Mt	I - IV	dl' l'	v	dv _a						

Length of d''-spine on tibia I 0.12 mm, diameter of segment at base of d''-spine 0.12-0.14 mm; diameter of tibia IV 0.11-0.12 mm. Tm I 0.18-0.20. Position of d''-spine on tibia I 0.19-0.21.

Abdomen. — Cylindriform with small postero-dorsal tubercle. Very faint pattern of grey suffusion on a median dorsal band, flanked by a light dorso-lateral band. Postero-dorsal tubercle blackish dorsally. Ventral surface and ventral half of lateral surface uniformly grey-brown, opercula and spinnerets included.

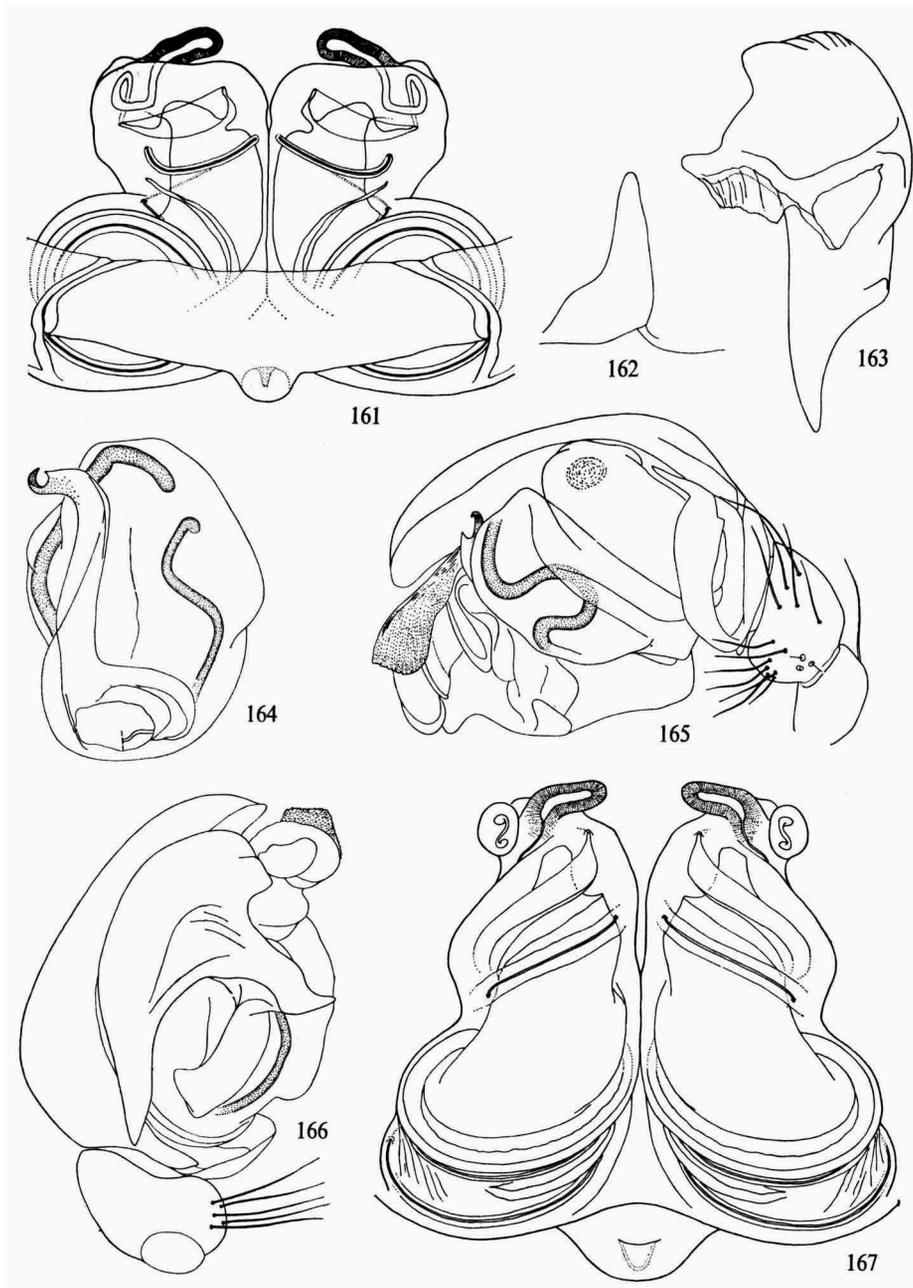


Fig. 161-166. *Neriene variabilis*. 161, vulva, dorsal aspect; 162, lateral projection of lamella; 163, lamella, dorsal aspect; 164, tegulum with median apophysis, mesal aspect; 165, male palp, lateral aspect; 166, male palp, ventral aspect. Fig. 167. *N. coosa*, vulva, ventral aspect. 161, 162, $\times 100$; 163, 164, $\times 67$; 165, 166, $\times 58$; 167, $\times 123$.

Palp (fig. 165, 166). — All segments brown to light brown, suffused with grey, cymbium heavily suffused with grey. Patella short, dorsal spine two times as long as segment. Dorsal spine of tibia as long as patellar spine; ten long spinehairs present on dorso-lateral and lateral surfaces; element barely higher than long. Cymbium with a dorsal spinehair on distal half. Paracymbium with broad and flat distal arm (fig. 160) suddenly narrowing subapically, but without distinct subapical appendage; apical appendage as in other species of the group, tapering to a point. Tegulum without ventral excavation. Median apophysis (fig. 164) curved in dorsal direction and backwards shortly before hook-shaped tip. Embolus (fig. 156) with outer margin of apical appendage chitinous, but without distinct tooth distally of spermduct-tooth. Terminal apophysis (fig. 158, 159) curving to antero-lateral tip of lamella; besides the saucer-shaped basal coil two more coils present, the central axes of which stand perpendicularly to each other, element consequently conspicuously bent; axial body of second coil fitting into concave anterior side of basal coil; anterior margins of second and third coils transversely grooved and chitinous, remaining parts membraneous. Lamella (fig. 163) with slender proximal tip and evenly curved antero-mesal and anterior margins; antero-lateral tip blunt; lateral arm ending with straight and slender membraneous free projection (fig. 162). Transversal sclerite, between lateral arm of lamella and anterior tip of radix, oblong.

Female. — Measurements in mm. Total length 3.4-5.4; cephalothorax, length 1.55-2.0, width 1.2-1.45; abdomen, length 1.9-3.4, width 1.1-2.35, height 1.0-2.35; chelicerae, length 0.69-0.90, width 0.31-0.44.

Cephalothorax. — Posterior margin broadly excised. From side, dorsal line rising from posterior margin to foveal region, level there, rising again towards eye-region; clypeus straight. Both rows of eyes slightly procurved. Diameter of PME 0.10-0.13 mm, laterals slightly smaller, diameter of AME 0.6 of PME. PME separated from each other by 2.0-2.4 diams., from PLE by 0.8-1.0 diam., and from AME by 1.3-1.7 diams. of PME. AME separated by their own diameter. Height of clypeus 0.17-0.21 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Lateral surface with broken ridges on basal two-thirds. Dorsal row with five cheliceral teeth, all equidistant; basal tooth small, second and third teeth twice as large, fourth tooth of same size as basal tooth, apical one very small. Ventral row with five small equidistant teeth; basal tooth opposite to third dorsal tooth, apical tooth slightly larger than others.

Legs. — Yellow-brown to orange-brown. Coxae, femora, patellae and

tibiae with narrow grey or black apical margins. Length of femur I 1.2-1.4 times length cephalothorax, length of tibia I 10-12 diams. of segment. Measurements in mm (of specimen from New Jersey):

	I	II	III	IV
Fe	2.45	2.20	1.70	2.35
Pa	0.55	0.55	0.45	0.50
Ti	2.40	1.90	1.35	1.85
Mt	2.45	2.05	1.55	2.25
Ta	1.35	1.15	0.80	1.05

Chaetotaxy. — Spines as in male, but femur I often with two l'-spines. Length of d''-spine on tibia I 0.31-0.35 mm, diameter of segment at base of d''-spine 0.19-0.22 mm; on tibia IV 0.35-0.39 mm and 0.15-0.19 mm, respectively. Tm I 0.18-0.23. Position of d''-spine on tibia I 0.23-0.25.

Abdomen. — Oblong in dorsal aspect; dorsal and ventral surfaces parallel, postero-dorsal tubercle conspicuous. Much lighter in coloration than *coosa*. Dorsal surface beige-coloured with or without scattered white blotches. Posterior two-thirds with three pairs of black spots of various extent; spots triangular, apices pointing outwards and bases parallel to median plane, but anterior pair of more irregular shape; spots narrowly separated in light specimens, fused with each other lengthwise or even across light mesal area in dark specimens, and in that case posterior spots fused with the black dorsal surface of the postero-dorsal tubercle. Dorsal field surrounded by a black band or series of black spots. Lateral surface with a light band from dorsal margin of operculum to posterior surface, continuous with light band on other side; bands with many white blotches, which are concentrated mainly in four white spots. Ventral half of lateral surface and ventral surface uniformly brown, suffused with black, slightly lighter than dorsal black markings. Opercula and spinnerets as ventral surface.

Epigyne (fig. 155). — Broad, with two lateral clear brown translucent areas. Position of receptacula and turning-points visible through the integument, showing the relative shortness of the vulva.

Vulva (fig. 157, 161). — Broader than long, scape included; ratio length to width 0.8. Broadest point posteriorly, constricted in the middle, becoming wider again towards apices of atria. Three coils of spiral grooves between entrances and turning-points; entrances situated laterally in ventral wall; turning-points laterally of apices, pointing in ventral direction. Receptacula pointing in mesal direction. Scape very short, curved to ventral side with the knob-shaped mesal part, which bears a semi-covered depression on the anterior surface. Width of epigyneal aperture 0.49-0.57 mm.

Distribution and habitat. — *Neriene variabilis* appears to be restricted to the north-eastern part of the United States, from the east coast to Minnesota; North Carolina and the northern tip of Georgia are the southernmost records. The record of *Linyphia maculata* from Georgia (Chamberlin & Ivie, 1944) is based on juvenile specimens, and it dates from prior to the description of its more southern relative *N. coosa* (Gertsch) from Alabama. In this case, and probably in others too, it is important to re-examine the specimens concerned, as it is not yet clear from the available data whether *variabilis* and *coosa* occur to the exclusion of each other, or show an overlap in their areas.

The majority of the records date from May and June, but adult specimens have been collected as early as March and as late as October. Emerton (1909: 195) described the webs as large and flat, sometimes slightly raised in the middle. The webs are built close to the ground in the shade of trees and bushes, not in meadows.

Material examined.

U.S.A., New York. — 1 ♀ 2 ♂, Ithaca, N. Banks (MNP).

U.S.A., New Jersey. — 11 ♀ 1 ♂, Lambertville, viii.1953, W. Ivie (ML). — 2 ♀ 1 ♂, Ramsey, 6.vi.1933, W. J. Gertsch (ML).

Neriene coosa (Gertsch) comb. nov.

(fig. 167-177)

Linyphia coosa Gertsch, 1951, Amer. Mus. Novit., 1514: 6, fig. 11-12 (description ♀ ♂, U.S.A., Alabama).

Types. — ♀ holotype, from Alabama, Macon Co., Tuskegee, Uphapee Creek, 30.x.1940, A. F. Archer (AMNH). ♂ and ♀ paratypes from the same and one other locality in Alabama (AMNH).

I have not seen any of the type-specimens, but through kindness of Dr. W. J. Gertsch I have had the opportunity to examine and dissect some specimens of the non-typical material, mentioned with the original description.

Male. — Measurements in mm. Total length 4.5; cephalothorax, length 2.1, width 1.25; abdomen, length 2.25, width 0.95, height 1.0; chelicerae, length 0.80, width 0.34.

Cephalothorax. — Light brown, faintly suffused with grey, forming striae. Posteriorly attenuate and superficially incised mesally, sides evenly

rounded to front, not constricted at border of head and thorax. Width 0.6 of length, width of head 0.55 of width of thorax. From side, dorsal line rising gradually from posterior margin to fovea, slightly steeper from fovea to eye-region; clypeus straight. Striae and lateral margins with very short hairs, eye-region and upper two-thirds of clypeus with long hairs.

Eyes. — Eye-region barely narrower than head, measuring 0.5 of width of thorax. Both rows of eyes slightly procurved. Diameter of PME 0.10 mm, laterals of same size, diameter of AME 0.6 of PME. PME on black tubercles, which remain separated mesally; lateral eyes with black bases, AME on a common black spot. PME separated from each other by 2.0 diams., from PLE by 0.9 diam., and from AME by 1.2 diams. of PME. Height of clypeus 0.23 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax, lightly suffused with grey. Small but distinct basal tubercle present on dorso-lateral corner. Lateral surface devoid of stridulating file. Dorsal row of cheliceral teeth numbering five, all blunt; basal pair situated rather ventrally, nearly in line with ventral row; second tooth largest, basal and third teeth half as large, apicals small. Ventral row with five equally spaced small teeth.

Gnathocoxae. — Light brown, heavily suffused with grey at bases; lateral margins slightly converging to front, apices truncated obliquely. Labium blackish-brown, raised anterior margin barely lighter. Sternum blackish-brown, width 0.65 of length, narrowly produced between coxae IV.

Legs. — Light brown, without annulations. Legs long and slender; femur I 1.05 times as long as cephalothorax; length of tibia I 17 diams. of segment. Measurements in mm (of specimen from Alabama):

	I	II	III	IV	palp
Fe	2.25	2.05	1.60	2.30	0.69
Pa	0.44	0.42	0.34	—	0.19
Ti	2.30	1.95	1.40	—	0.27
Mt	2.70	2.30	1.60	—	—
Ta	1.40	1.10	—	—	0.74

Chaetotaxy. — Fe I $d'l'$; II-IV d. Pa I-IV $d''d'$, spines of equal length.

Ti	I - II	v'_b	d''	v	v''	l'	v'	l''	d'	$[l'_a l''_a v'_a v''_a]$
	III		d''	v		l'		d'	$[l'_a l''_a v'_a v''_a]$	
Mt	I - III	$d'l'$	l''	vd						

Length of d'' -spine on tibia I 0.11 mm, diameter of segment at base of d'' -spine 0.14 mm. Tm I 0.18.

Abdomen. — Cylindric, dorsal surface caved in on half length. Postero-dorsal tubercle protruding above spinnerets. Dorsal and lateral surfaces

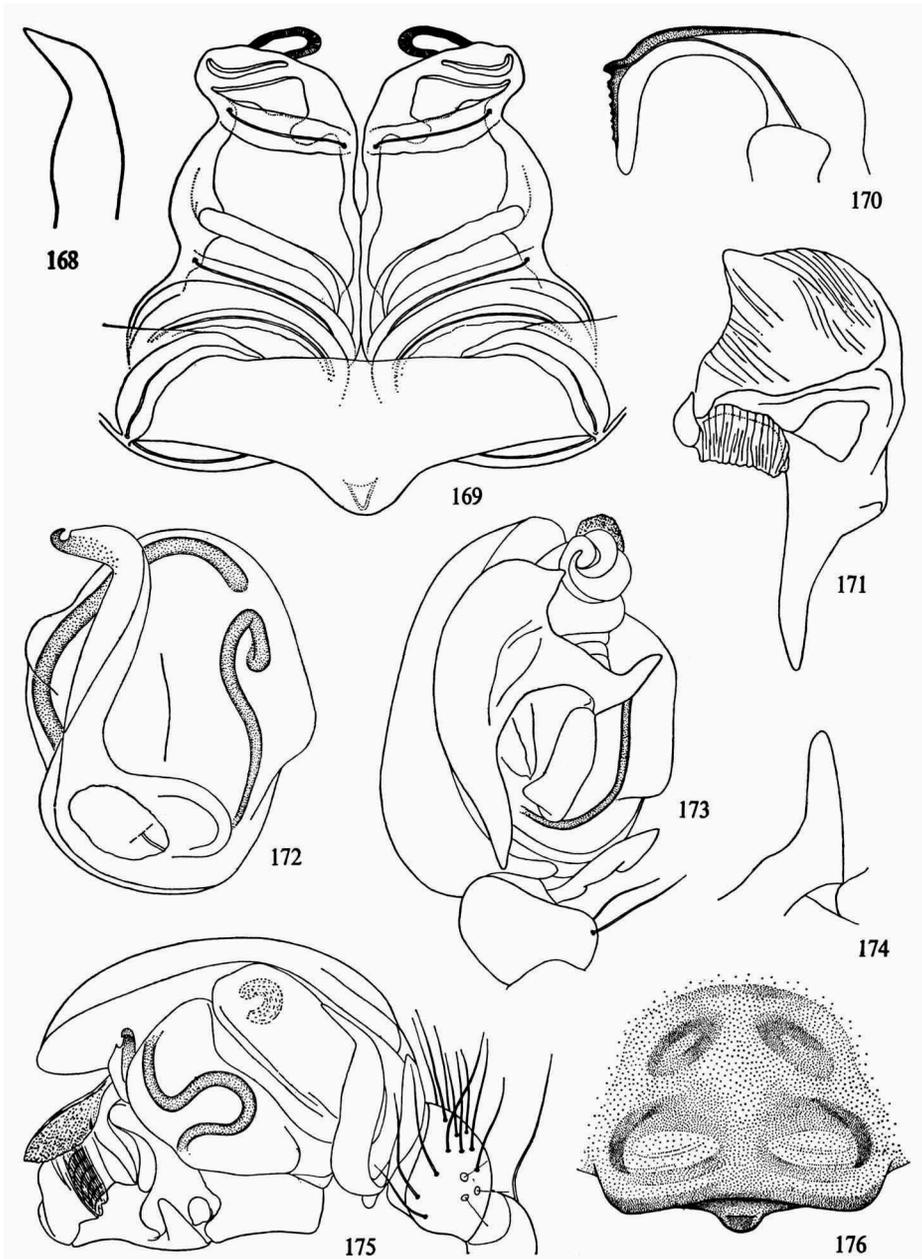


Fig. 168-176. *Neriene coosa*. 168, tip of paracymbium; 169, vulva, dorsal aspect; 170, embolus, dorsal aspect; 171, lamella, dorsal aspect; 172, tegulum with median apophysis, mesal aspect; 173, male palp, ventral aspect; 174, lateral projection of lamella; 175, male palp, lateral aspect; 176, epigyne. 168, 170, 174, $\times 100$; 169, $\times 123$; 171, 172, $\times 89$; 173, 175, 176, $\times 67$.

creamy yellow, with a pair of faint grey spots on anterior half; postero-dorsal tubercle blackish dorsally and laterally, and continuous with black posterior surface above spinnerets. Faint trace of the posterior end of a lateral light spot at either side below the postero-dorsal tubercle. Ventral surface uniformly suffused with grey, opercula and spinnerets included.

Palp (fig. 173, 175). — All segments light brown. Patella short, as long as high, dorsal spine near anterior margin 1.7 times as long as segment. Tibia with dorsal spine barely longer than segment, and with 15 equally long or slightly shorter spines on dorso-lateral and ventro-lateral surfaces. Cymbium with a single dorsal spine on distal half. Paracymbium with broad and flat distal arm lightly curved in anterior direction at apex (fig. 168), tapering to a point; subapical posterior appendage absent. Tegulum not excavated at ventral side. Median apophysis (fig. 172) curved in dorsal direction and backwards apically; extreme tip hook-shaped. Embolus (fig. 170) with long appendage distally of spermduct-tooth; outer margin of element chitinous, outer margin of appendage crenate. Terminal apophysis (fig. 177) with two and a half coils; basal coil saucer-shaped, concave side distally, axial body of second coil fitting into cavity; axes of second and third coils not in a direct line, but forming an angle, which is much larger than in *variabilis*, the element as a whole consequently less conspicuously bent; anterior halves of coils transversely grooved. Lamella (fig. 171) with narrow proximal tip; margin evenly curved from mesal side to distinct antero-lateral tip; free lateral projection (fig. 174) at tip of lateral arm straight and slender, membranous. Transversal sclerite rather squarish, lying between lateral arm of lamella and anterior tip of radix.

Female. — Measurements in mm. Total length 3.2-4.0; cephalothorax, length 1.3-1.5, width 0.9-0.95; abdomen, length 1.95-2.45, width 1.15-1.6, height 1.15-1.7; chelicerae, length 0.63-0.65, width 0.29-0.31.

Cephalothorax. — Brown, with faint grey margins at sides and on clypeus. Posterior margin excised. Width 0.65-0.7 of length, width of head 0.6 of width of thorax. Hairs at eye-region and on clypeus slightly shorter than in male. Eye-region as wide as head. Both rows straight. Sizes of eyes as in male. PME separated from each other by 1.5 diams., from PLE by 0.7 diam., and from AME by 1.1 diams. of PME. Height of clypeus 0.17-0.18 of length of cephalothorax.

Chelicerae. — Slightly darker than cephalothorax, suffused with grey on oblique dorsal streak from mesally at base to laterally at apex. Lateral surfaces with broken ridges only. Dorsal row with four equidistant cheliceral teeth; basal tooth small, second tooth twice as large, third tooth slightly

smaller, apical tooth very small. Ventral row with five small teeth, apical pair very small and close together, others equidistant; basal tooth opposite to gap between second and third dorsal teeth. Gnathocoxae rather squarish, apices rounded.

Legs. — Uniformly yellow-brown, lightly suffused with grey, and with very narrow blackish apical rings on coxae, femora, patellae and tibiae. Legs slender; length of femur I 1.3 times length cephalothorax; length of tibia I 11-12 diams. of segment. Measurements in mm (of specimen from Alabama):

	I	II	III	IV
Fe	1.95	1.70	1.25	1.80
Pa	0.40	0.40	0.35	0.40
Ti	1.85	1.50	1.00	1.45
Mt	1.90	1.60	1.15	1.65
Ta	1.10	0.85	0.60	0.75

Chaetotaxy. — As in male, but v_6'' -spines on tibiae I and II not present in available specimens. Length of d'' -spine on tibia I 0.29-0.34 mm, diameter of segment at base of d'' -spine 0.14-0.16 mm; on tibia IV 0.34 mm and 0.12-0.14 mm, respectively. Tm I 0.20-0.21.

Abdomen. — Rather short and high, with a well-developed postero-dorsal tubercle. Dorsal surface about parallel with ventral surface, only slightly curved. Background beige-coloured, pattern composed of black areas and white blotches and spots. Dorsal surface with two pairs of black spots, at one-third and three-fifths of length respectively, spots of either pair narrowly separated or faintly connected mesally; followed by a black transverse bar at four-fifths of length, which is continuous with the lateral black markings, and separated from the black postero-dorsal tubercle by a faint beige-coloured chevron. Dorsal field surrounded by a black dorso-lateral band, which lies between the light-coloured dorsal area and the white lateral spots. Lateral surface with two horizontal spots on anterior half just below the black dorso-lateral band, and with a narrow spot postero-dorsally of the branchial operculum. Posterior half of lateral surface with three vertical spots, the anterior one occupying the upper two-thirds, the other spots smaller, the posterior one reaching the posterior surface of the postero-dorsal tubercle. All spots beige-coloured with large clear white blotches. Spots surrounded by black areas; ventral third of lateral surface and ventral surface black, including spinnerets and opercula.

Epigyne (fig. 176). — Broad, with broad but low entrance of atria. Ventral surface with two large lateral translucent spots, which are dark brown. Position of turning-points indicated by pigmentation.

Vulva (fig. 167, 169). — Barely wider than long, scape included. Broadest point posteriorly, constricted in the middle. Atria parallel and contiguous. Between two and a half and three coils of spiral groove from entrance of groove to turning-point; entrances in the middle of posterior side of ventral wall of either atrium; turning-points laterally, pointing in ventral direction. Receptacula apically, pointing in mesal direction. Scape barely prolonged, curved to ventral side, with a small semi-covered depression. Width of epigyneal aperture 0.42-0.46 mm.

Distribution and habitat. — The species has been recorded from several localities in Alabama. Adult specimens have been collected from October to January, and in June and July. Data about habitat are not mentioned.

Material examined.

U.S.A., Alabama. — 2 ♀ 1 ♂ 1 subadult ♀, Chambers Co., Five Points, 1.vii.1940, A. F. Archer (Gertsch, 1951; AMNH).

Neriene albolimbata (Karsch, non Bösenberg & Strand) comb. nov.

(fig. 178-188)

Linyphia albolimbata Karsch, 1879, Verh. naturh. Ver. preuss. Rheinl. Westfalens, 36: 62 (description ♀, Japan). — Saito, 1939, Saito Ho-on Kai Mus. Res. Bull., 18: 53 (Japan, Honshu).

Linyphia pennata Oi, 1960, Journ. Inst. Polyt., D, 11: 231, fig. 365-366 (description ♀, Japan, Honshu); 1964, Journ. Biol., 15: 29, fig. 34 (description ♂, Japan, Hokkaido, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue). [new synonymy].

Types. — ♀ lectotype of *Linyphia albolimbata*, by present designation, from Japan (ZMB). ♀ holotype of *Linyphia pennata*, from Japan, Honshu (CO).

The lectotype of *L. albolimbata* was chosen from the contents of a tube, which contained, besides 1 ♀ and a subadult ♀ of the present species, the holotype of *Linyphia limbatinella* Bösenberg & Strand, and 1 ♀ of *Microlinyphia pusilla* (Sundevall).

Remarks. — The name *Linyphia albolimbata* has been used in connection with another species since Bösenberg & Strand (1906). This is due to Strand, who in Bösenberg & Strand (1906: 171) wrongly assigned some specimens, collected by Dönitz in Japan, to *L. albolimbata* Karsch. It is certain that Strand did examine the type-material of *albolimbata*, as in the same paper (p. 174) he described a new species, *Linyphia limbatinella*, based on a specimen found by him in the tube of *albolimbata* at Berlin. Not noticing any differences, however, Strand described and depicted his specimens, and wrongly called them *L. albolimbata* Karsch. Subsequent authors probably have all used *albolimbata* in the sense of Strand, as in most cases is evident

from the figures. Only in the case of Saito (1939: 53) the size of the specimen mentioned makes it very probable he had a true *Neriene albolimbata* (Karsch) before him.

Recently Oi (1960, 1964) described the true *Neriene albolimbata* (Karsch) as a new species, again misled by Strand's figures. Examination of the types of this new species, *Linyphia pennata*, and of *L. albolimbata* Karsch, have now revealed their identity. *Linyphia albolimbata* sensu Bösenberg & Strand belongs to a new species, here described as *Neriene oidedicata*.

Male. — Measurements in mm. Total length 4.5; cephalothorax, length 2.2, width 1.5; abdomen, length 2.25, width 1.25, height 1.2; chelicerae, length 1.0, width 0.45.

Cephalothorax. — Orange-brown, with narrow grey lateral margins. Striae not indicated by pigmentation. Posterior margin straight, not incised; lateral margins evenly rounded, with slight constriction at border of head and thorax. Width 0.7 of length, width of head 0.6 of width of thorax. From side, dorsal line rising evenly from posterior margin to fovea, becoming level there, rising again towards eye-region. Clypeus straight, perpendicular to dorsal line of cephalon. Eye region and upper three-fourths of clypeus with long hairs, directed forwards and upwards; some spinehairs at eye-region.

Eyes. — Width of eye-region 0.5 of width of thorax. Posterior row of eyes straight, anterior row slightly procurved. PME large, their diameter measuring 0.10 mm; lateral eyes of about same size. PME on large black tubercles. PME separated from each other by 2.0-2.2 diams., from PLE by 1.0-1.2 diams., and from AME by 1.2-1.3 diams. of PME. AME smaller, their diameter 0.85 of diameter of PME, separated from each other by slightly less than their own diameter. Height of clypeus 0.26 of length of cephalothorax.

Chelicerae. — Evenly brown. Basal tubercle small but conspicuous. Stridulating file, composed of broken ridges, faintly visible. A small elevation at end of straight mesal surface preceding dorsal row of four cheliceral teeth. Basal pair next to elevation and situated more ventrally than apical pair; second tooth large, apical pair small and situated near base of fang. Ventrally five small teeth, equidistant, basal tooth larger than others and opposite to third tooth of dorsal row.

Gnathocoxae. — Brown, suffused with black. Lateral margins rather strongly converging towards apex. Labium blackish-brown, rebordered half lighter. Sternum brown, suffused with black; produced between coxae IV; width 0.8 of length.

Legs. — Yellow-brown, coxae included. Legs long, femur I 1.07 times as long as cephalothorax, length of tibia I 16 diams. of segment. Measurements (of specimen from Ashifu) in mm:

	I	II	III	IV	palp
Fe	2.35	2.10	1.70	2.45	0.94
Pa	0.50	0.50	0.45	0.48	0.22
Ti	2.40	2.05	1.45	2.05	0.28
Mt	2.70	2.35	1.75	2.40	—
Ta	1.50	1.20	0.80	1.05	0.87

Chaetotaxy. — Fe I dl' ; II-IV d. Pa I-IV $d''d'$, basal spine weak.

Ti	I - II	v''_b	d''	v'	v''	l'	v'	l''	d'	$[l'_a l''_a v'_a v''_a]$
	III		d''			l'	v'		d'	$[l'_a l''_a v'_a v''_a]$
	IV		d''			l'	v'		d'	$[l'_a l''_a v'_a v''_a]$

Mt I-IV $dl''vd$, an additional v_a -spine on III and IV.

Length of d'' -spine on tibia I 0.29 mm, diameter of tibia at base of d'' -spine 0.15 mm; on tibia IV 0.40 mm and 0.14 mm, respectively. Tm I 0.17. Position of d'' -spine on tibia I 0.21.

Abdomen. — Cylindriform, without postero-dorsal tubercle. Dark grey with some lighter areas laterally, without pattern. Opercula brown, genital area brown-black.

Palp (fig. 183, 185). — All segments black-brown. Patella short, with slightly twisted dorsal spine, which is about one and a half times as long as segment. Tibia higher than long, with about 15 spines on dorsal and lateral surfaces, which are slightly longer than height of segment. Cymbium with a dorsal spine on distal half. Paracymbium with posterior margin of broad distal arm (fig. 184) slightly curved backwards below tip, but not forming a distinct appendage; apical appendage subtriangular. Tegulum not excavated on ventral side. Median apophysis (fig. 187) curved to dorsal side and backwards shortly before hook-shaped tip. Embolus (fig. 180) with long apical appendage distally of spermduct-tooth, the base of which is pigmented next to this tooth, but lacks a protrusion. Terminal apophysis (fig. 182) short and high, bluntly rounded anteriorly, composed of two coils, first coil saucer-shaped and supporting the axial part of broad second coil, the latter transversely grooved on anterior half. Lamella (fig. 188) with narrow proximal tip; anterior half of mesal margin and anterior margin evenly curved towards small antero-lateral tip, which lies slightly proximally of anteriormost tip of element; free lateral projection (fig. 186) at tip of long lateral arm present, membranous, moderately curved forwards. Trans-

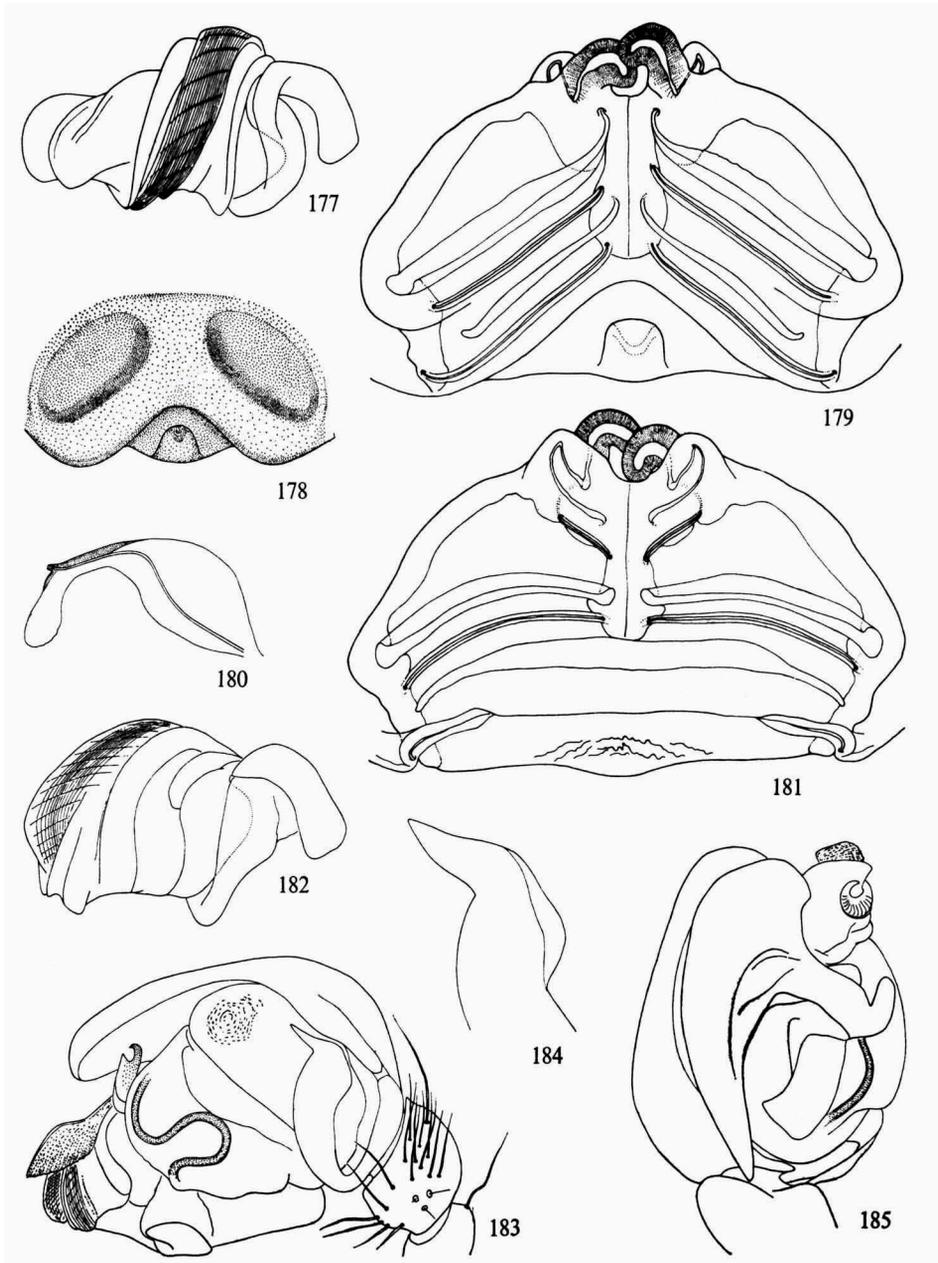


Fig. 177. *Neriene coosa*, terminal apophysis. Fig. 178-185. *N. albolimbata*. 178, epigyne; 179, vulva, ventral aspect; 180, embolus, dorsal aspect; 181, vulva, dorsal aspect; 182, terminal apophysis; 183, male palp, lateral aspect; 184, tip of paracymbium; 185, male palp, ventral aspect. 177, $\times 117$; 178, 183, 185, $\times 49$; 179, 181, $\times 89$; 180, $\times 67$; 182, 184, $\times 95$.

versal sclerite diamond-shaped, connecting the distal tip of the radix with the lateral arm of the lamella.

Female. — Measurements in mm. Total length 4.9-5.2; cephalothorax, length 2.0-2.15, width 1.4-1.55; abdomen, length 2.75-3.15, width 1.7-2.25, height 1.7-2.45; chelicerae, length 0.81-1.00, width 0.40-0.47.

Cephalothorax. — Slightly lighter than male. Moderately excised posteriorly. Hairs on clypeus and at eye-region slightly shorter than in male. Diameter of PME 0.10-0.11 mm, lateral eyes of same size. PME separated from each other by 1.8-2.3 diams., from PLE by 1.1-1.3 diams., and from AME by 1.6 diams. of PME. AME separated by their own diameter, which measures 0.75 of diam. of PME. Height of clypeus 0.19-0.23 of length of cephalothorax.

Chelicerae. — Orange-brown, somewhat darker than cephalothorax, lightly suffused with black on lateral surface, and on dorsal streak from mesally at base towards apex laterally. Basal tubercle absent. Stridulating file composed of broken ridges. Four to five teeth in dorsal row, equidistant, second and third teeth largest, others smaller. Ventral row with five small teeth of equal size, slightly smaller than basal tooth of dorsal row, basal tooth opposite to third tooth of dorsal row.

Legs. — Uniformly light orange-brown. Legs long and slender, femur I 1.1-1.3 times as long as cephalothorax, length of tibia I 12-13 diams. of segment. Measurements (of specimen from Ashifu) in mm:

	I	II	III	IV
Fe	2.75	2.45	1.95	2.65
Pa	0.65	0.62	0.58	0.55
Ti	2.75	2.30	1.60	2.20
Mt	2.80	2.45	1.85	2.55
Ta	1.55	1.25	0.85	1.10

Chaetotaxy. — As in male. Tibia IV usually with a v' -spine. Length of d'' -spine on tibia I 0.39 mm, diameter of tibia I at base of d'' -spine 0.20-0.21 mm; on tibia IV 0.42 mm and 0.19 mm, respectively. Tm I 0.18-0.20. Position of d'' -spine on tibia I 0.23-0.25.

Abdomen. — Light cream-coloured background with isolated or confluent white blotches, and black pigmented areas. Dorsally with four black spots, basal one diamond-shaped, second and third spots triangular, pointing in anterior direction, followed by a black chevron; all spots connected on median line, fourth spot connected with dark lateral area, and separated from black dorsal side of postero-dorsal tubercle by a cream-coloured chevron; remaining areas on dorsal surface of background colour with isolated white blotches,

and with a white latero-dorsal band from apex to two-fifths of length; whole dorsal surface bordered by a black-pigmented dorso-lateral band from anterior side of abdomen towards black dorsal surface of postero-dorsal tubercle. Laterally with white dented band, composed of confluent white blotches on cream-coloured background, reaching from dorsal margin of operculum towards posterior side of postero-dorsal tubercle. Ventral half of lateral surface and ventral surface, including spinnerets uniformly black-brown. Opercula brown.

Epigyne (fig. 178). — Opening broad but low. Grey-brown, with two oblique oval black-brown areas; posterior margin broadly excised, scape curved in ventral direction.

Vulva (fig. 179, 181). — Much broader than long, with about two coils of spiral groove; entrance of spiral groove laterally in ventral wall, turning-point near median plane, but pointing outwards and in dorsal direction; receptacula near median plane, curved inwards. Width of epigyneal aperture 0.42-0.52 mm.

Distribution and habitat. — Japan (Hokkaido, Honshu). Not recorded from the Asiatic mainland. No data about habitat available. According to the authors mentioned above, specimens have been collected from the end of May till August, males in May only. In this respect *N. albolimbata* resembles *N. hammeni* from Europe.

Material examined.

Japan. — 1 ♀ 1 subadult ♀, Japan, Hilgendorf (♀ lectotype and paralectotype of *L. albolimbata* Karsch; ZMB).

Japan, Honshu. — 1 ♀, Kyoto Pref., Ashifu Experimental Forest, 31.v.1958, R. Oi (holotype of *L. pennata* Oi; CO); 1 ♀ 1 ♂, do., 24-25.v.1961, R. Oi (*L. pennata*; Oi, 1964; ML).

***Neriene oidedicata* spec. nov. (*Linyphia albolimbata* auct. non Karsch)**

(fig. 189-199)

Linyphia albolimbata; Bösenberg & Strand, 1906, Abh. senckenb. naturf. Ges., 30: 171, fig. 51, 249 (description ♀ ♂, Japan, Kyushu). — Oi, 1960, Journ. Inst. Polyt., D, 11: 228, fig. 360-362 (description ♀ ♂, Japan, Honshu, Shikoku). — Yaginuma, 1958, Misc. Rep. Res. Inst. Natur. Resources, 46/47: 71 (Japan); 1960, Spid. Japan Colour: 41, pl. 12 fig. 74 (not 75!), text-fig. 40-3 (in Japanese); 1962a, Spid. fauna Japan: 18 (catalogue). — Van Helsdingen, 1963a, Proc. Kon. Ned. Akad. Wet., C, 66: 156, fig. 5, 7-8 (compared with *L. hammeni*). — Paik, 1965a, Educ. Journ., 3: 69, fig. 25-27 (description ♀ ♂, Korea; in Korean). — Nishiki, 1966, Acta Arachn., 20: 27 (aerial migration; in Japanese).

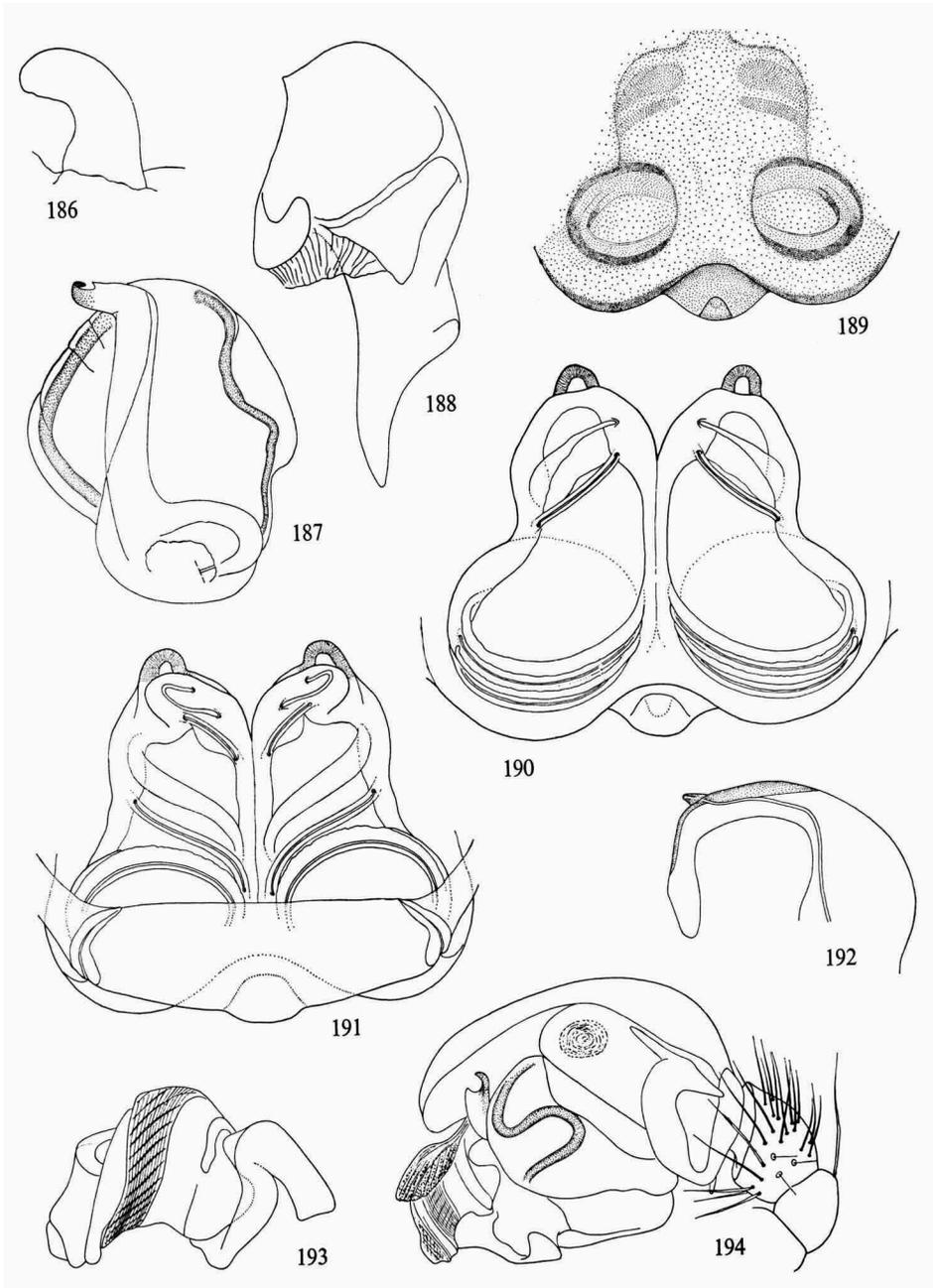


Fig. 186-188. *Neriene albolimbata*. 186, lateral projection of lamella; 187, tegulum with median apophysis, mesal aspect; 188, lamella, dorsal aspect. Fig. 189-194. *N. oidedicata*. 189, epigyne; 190, vulva, ventral aspect; 191, do., dorsal aspect; 192, embolus, dorsal aspect; 193, terminal apophysis; 194, male palp, lateral aspect. 186, 192, 193, $\times 95$; 187-189, $\times 67$; 190, 191, $\times 89$; 194 $\times 49$.

Types. — ♂ holotype, from Japan, Shikoku, Kochi-City, Katsurahama, 5.iv.1956, R. Oi (ML). The other specimens examined are paratypes.

Remarks. — The species has been confounded with *Linyphia albolimbata* Karsch [= *Neriere albolimbata* (Karsch)] since Bösenberg & Strand (1906), as pointed out under that species. Most records of *albolimbata* in fact refer to the new species described here, as may be inferred from the figures and other data. Only in the case of Saito (1939: 53) the size of the specimen makes it most likely that it belongs to *Neriere albolimbata* indeed.

Neriere oidedicata differs from *N. albolimbata* in the following respects. The total length as well as the length of the cephalothorax are less in *oidedicata*; as the length of the legs is the same in both species, the ratio length cephalothorax to length femur I is also smaller in *oidedicata*; the dorsal abdominal patterns of the females are different; the genitalia have many differential characters.

The species is dedicated to Prof. Dr. R. Oi of the Raika Woman's University at Osaka, Japan, to whom I am indebted for his invaluable help with the loan of types and the gift of many specimens from his country.

Male. — Measurements of holotype in mm. Total length 4.15; cephalothorax, length 2.2, width 1.5; abdomen, length 2.15, width 1.1, height 1.05; chelicerae, length 0.92, width 0.38. Black tubercles, on which the PME are situated, touching. Cephalothorax nearly diamond-shaped, due to a post-mortem deformation.

Measurements of male paratype in mm. Total length 4.2; cephalothorax, length 2.15, width 1.5; abdomen, length 2.05, width 1.2, height 1.0; chelicerae, length 0.92, width 0.38.

Cephalothorax. — Orange-brown, lightly suffused with black near lateral margins. Broadly cut off posteriorly with rounded corners, sides barely constricted at border of thorax and head. Width of thorax 0.7 of length; width of head 0.5 of width of thorax. From side, rounded posteriorly, becoming nearly level at fovea, then rising evenly towards eye-region; clypeus slightly convex. Very short hairs on striae as usual, posterior region of head with short hairs; eye-region and upper four-fifths of clypeus with long hairs, directed forwards and upwards.

Eyes. — Eye-region occupying whole width of head. Both rows of eyes straight. PME on black tubercles. Diameter of PME 0.11 mm, lateral eyes of approximately same size. PME separated from each other by 2.0 diams., from PLE by 1.1 diams., and from AME by 1.2 diams. of PME. AME smaller, diameter 0.65 of PME, separated from each other by slightly less than their own diameter. Clypeus 0.25 of length of cephalothorax.

Chelicerae. — Orange-brown, as cephalothorax. Basal tubercle small but distinct. Stridulating file not visible. Rounded elevation present at end of straight mesal margin. First tooth of dorsal row of cheliceral teeth close to this elevation; basal pair of dorsal row situated more ventrally than apicals, nearly in line with ventral row; second tooth largest; apical three equidistant, as large as basal tooth, apical one smaller. Ventral row with five small teeth, smaller than dorsal teeth; basal tooth more ventral than the others and close to second tooth, other teeth equidistant; first and second teeth not far from second dorsal tooth.

Gnathocoxae. — Brown, suffused with black, apices lighter. Labium and sternum brown, suffused with black. Labium with apical rebordered third lighter. Width of sternum 0.7 of length, produced between coxae IV.

Legs. — Uniformly light yellow-brown. Legs long and slender, length of femur I 1.05 times length cephalothorax, length of tibia I 16 diams. of tibia. Measurements (of holotype) in mm:

	I	II	III	IV	palp
Fe	2.30	2.00	1.60	2.35	0.75
Pa	0.48	0.45	0.43	0.43	0.20
Ti	2.45	1.95	1.35	1.90	0.29
Mt	2.65	2.20	1.60	2.35	—
Ta	1.50	1.10	0.75	0.95	0.85

Chaetotaxy. — Fe I dl'; II-IV d. Pa I-IV d''d', basal spine short.

Ti	I - II	v'' _b	d''	v'	v''	l'	v'	l''	d'	[l'' _a l'' _a v'' _a v'' _a]
	III	v'' _b	d''			l'	v'		d'	[l'' _a l'' _a v'' _a v'' _a]
	IV		d''			l'	v'		d'	[l'' _a l'' _a v'' _a v'' _a]
Mt	I - IV	dl' l''	vd	(v'' _a v'' _a on III and IV)						

Length of d''-spine on tibia I 0.15 mm, diameter of segment at base of d''-spine 0.15 mm; on tibia IV 0.25 mm and 0.14 mm, respectively. Tm I 0.17. Position of d''-spine on tibia I 0.24-0.25.

Abdomen. — Cylindric, evenly rounded posteriorly, without postero-dorsal tubercle. Dorsally grey-brown with very obscure pattern of dark grey spots, ventrally darker blackish-brown. Opercula brown; genital area brown, suffused with black. Spinnerets brown, lightly suffused with black.

Palp (fig. 194, 195). — All segments yellow-brown, suffused with black. Patella short, dorsal spine two times as long as segment. Tibia as high as long, with a dorsal spine, and with about 20 spinehairs on latero-dorsal and

lateral surfaces. Cymbium with one dorsal spine on distal half. Paracymbium with broad and flat distal arm (fig. 197), bearing a triangular subapical appendage proximally, and a slightly longer apical appendage, with parallel sides and obliquely truncated tip. Tegulum without ventral excavation. Median apophysis (fig. 196) as in other species of the group with distal parts perpendicularly bent in dorsal direction; tip hook-shaped. Embolus (fig. 192) with long and slender appendage distally of spermduct-tooth; appendage pigmented at base next to tooth but without second tooth. Terminal apophysis (fig. 193) conspicuously curved in ventral direction at tip; with three coils, basal coil saucer-shaped and supporting with its concave side the axial part of the second coil; the latter broad and transversely grooved on anterior half; axis of apical coil directed to ventral side, tip of element truncate in consequence. Lamella (fig. 198) with narrow and pointed proximal tip; anterior half of mesal margin and anterior margin evenly curved and ending at antero-lateral tip; free lateral projection (fig. 199) at tip of lateral arm membranous, barely curved, slender if compared with *hammeni*. Transversal sclerite small, oblong, between lateral arm of lamella and tip of radix.

Female. — Measurements in mm. Total length 3.8-4.5; cephalothorax, length 1.6-1.9, width 1.1-1.35; abdomen, length 2.2-2.75, width 1.2-1.85, height 1.3-2.0; chelicerae, length 0.70-0.87, width 0.35-0.40.

Cephalothorax. — Posteriorly distinctly incised. Width about 0.7 of length; width of head 0.6 of width of thorax. Hairs on clypeus and eye-region slightly shorter than in male. PME large, their diameter measuring 0.11 mm. PME separated from each other by 1.7-1.9 diams., from laterals by 0.8-1.0 diam., and from AME by slightly more than 1.0 diam. of PME. Diameter of AME 0.7 of diam. of PME; AME separated by slightly more than their own diameter. Height of clypeus 0.20-0.22 of length of cephalothorax.

Chelicerae. — Light yellow-brown, sparsely suffused with black laterally and on dorsal streak from mesally at base to laterally at apex. Stridulating file composed of faint broken ridges. Dorsal row of cheliceral teeth numbering four to five, second tooth largest, basal and third teeth nearly half as long, apical pair or apical tooth small; teeth of dorsal row equidistant, fifth tooth close to preceding one. Ventral row with five small, evenly spaced teeth, basal tooth situated slightly more apically than second tooth of dorsal row, apical tooth opposite to last tooth of dorsal row.

Legs. — Light yellow-brown, with very narrow apical rings on femora and tibiae. Legs long and slender, femur I 1.3-1.4 times as long as cephalothorax, length of tibia I 12-13 diams. of segment. Measurements (of paratype from Osaka) in mm:

	I	II	III	IV
Fe	2.20	1.95	1.45	2.10
Pa	0.48	0.45	0.40	0.42
Ti	2.20	1.75	1.20	1.70
Mt	2.30	1.95	1.50	2.10
Ta	1.35	1.05	0.70	0.90

Chaetotaxy. — Females not differing from males in the number of spines or their positions. Spines much longer than in male. Length of d'' -spine on tibia I 0.34-0.37 mm, diameter of tibia I at base of d'' -spine 0.19-0.20 mm; on tibia IV 0.44 mm and 0.15-0.17 mm, respectively. Tm I 0.17-0.21. Position of d'' -spine on tibia I 0.24-0.28.

Abdomen. — Light cream-coloured background with white spots, and with black pigmented markings. Dorsal surface with basal V-shaped marking, pointing in anterior direction, connected with latero-dorsal black band; a pair of black spots on half length of abdomen, narrowly connected with latero-dorsal markings; followed by a pair of black spots, narrowly connected mesally and with latero-dorsal markings; followed by an undulating black bar, separated from black postero-dorsal tubercle by a cream-coloured area; remainder of background areas with small white blotches. Lateral surface with black latero-dorsal band from anterior side of abdomen towards black dorsal side of postero-dorsal tubercle; this band broad at points of connection with dorsal markings, deeply incised from ventral side in between; separated from black latero-ventral surface by cream-coloured band from lateral margin of operculum towards posterior surface of caudal tubercle, with many large white spots at incisions of latero-dorsal dark band. Latero-ventral surface uniformly blackish; ventral surface, spinnerets, lower half of posterior side and opercula grey-brown.

Epigyne (fig. 189). — Large, grey-brown with two large dark brown areas; posterior margin excised in the middle, scape curved in ventral direction.

Vulva (fig. 190, 191). — Barely broader than long. Nearly three coils of spiral groove; entrance of spiral groove laterally, turning-point pointing towards sides; receptacula laterally, curved in ventral direction. Width of epigyneal aperture 0.46-0.50 mm.

Distribution and habitat. — Korea, Japan (Honshu, Shikoku, Kyushu). Probably with a much wider distribution on the East Asiatic mainland. Data about the habitat of the species were not mentioned by any of the authors; from the collecting data given one may infer that the specimens become adult from April onwards.

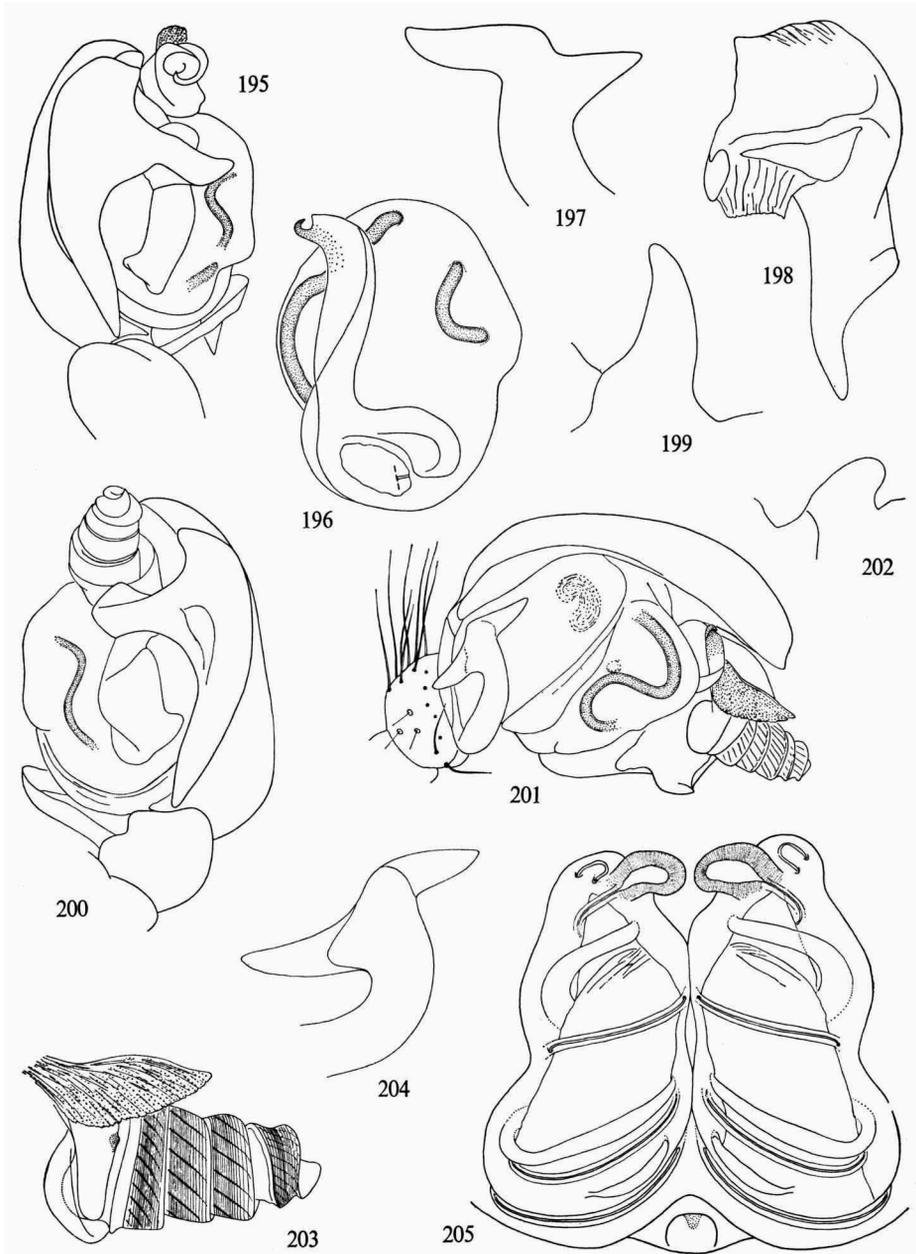


Fig. 195-199. *Neriene oidedicata*. 195, male palp, ventral aspect; 196, tegulum with median apophysis, mesal aspect; 197, tip of paracymbium; 198, lamella, dorsal aspect; 199, lateral projection of lamella. Fig. 200-204. *N. cavaleriei*. 200, male palp, ventral aspect; 201, do., lateral aspect; 202, lateral projection of lamella; 203, terminal apophysis with tips of embolus and embolic membrane, lateral aspect; 204, tip of paracymbium. Fig. 205. *N. kibonotensis*, vulva, ventral aspect. 195, 200, 201, $\times 49$; 196, 198, $\times 67$; 197, 199, 202-204, $\times 95$; 205, $\times 89$.

Material examined.

Japan, Honshu. — 1 ♀, Osaka Prefecture, Mt. Ikoma, 22.viii.1957, R. Oi (ML).

Shikoku. — 1 ♂, Kochi-City, Katsurahama, 5.iv.1956, R. Oi (*Linyphia albolimbata*; Oi, 1960; holotype of *Neriene oidedicata*; ML).

Kyushu. — 4 ♀ 2 subadult ♂ 1 juvenile, Saga, 1882, W. Dönitz (*Linyphia albolimbata*; Bösenberg & Strand, 1906; SMF). 1 ♂, Nagasaki, 1882, G. Lewis (HDO).

Neriene cavaleriei (Schenkel) comb. nov.

(fig. 200-204)

Linyphia? *cavaleriei* Schenkel, 1963, Mém. Mus. nat. Hist. nat. Paris, A, 25; 119, fig. 71 (description ♂, China).

Type. — ♂ holotype, from China, Kweichow, Anshun fu, Gan schuen fu [Anshun] (MNP).

Remarks. — The species was described by Schenkel from a single male specimen. Apparently it was with some hesitation that he placed the species in *Linyphia*, mainly because of the strange shapes of paracymbium and terminal apophysis. It certainly is in the right place in the *hammeni*-group, nearly all species of which have a similar paracymbium; the terminal apophysis, though longer and with more coils than in the other species, has the peculiar saucer-shaped first coil, which is characteristic for the species-group. The female is still unknown.

Male. — Measurements in mm. Cephalothorax, length 2.2., width 1.5; abdomen, missing; chelicerae, length 0.9, width 0.4.

Cephalothorax. — Light brown, suffused with black on striae. Posteriorly barely incised, sides evenly rounded towards head, barely constricted at border of head and thorax, sides of head straight. Width 0.7 of length; width of head near posterior row of eyes 0.55 of width of thorax. From side, curved posteriorly, becoming level near fovea, then rising steadily to eye-region; clypeus straight, perpendicular to lower margin of cephalothorax. Head with two rows of short hairs from fovea to region behind PLE, eye-region and upper two-thirds of clypeus with long hairs, pointing forwards and upwards.

Eyes. — Posterior row slightly recurved, anterior row straight. Eye-region slightly narrower than width of head. PME situated on black tubercles. Diameter of PME 0.125 mm. PME separated from each other by 1.7 diams., from PLE by 0.95 diam., and from AME by 1.1 diams. of PME. AME smaller, their diameter 0.7 of diam. of PME, separated by less than their own diameter. Height of clypeus 0.23 of length of cephalothorax.

Chelicerae. — Light brown, lightly suffused with black. Basal tubercle small, rounded. Hairs on small warts. Stridulating file very obscure, ridges broken. Five small equidistant teeth in ventral row, basal pair slightly larger than apicals. Dorsal row with five teeth, basal three in line with ventral row, fourth more dorsal, fifth not far from base of fang; second and third teeth with fused bases, large, others small as ventral ones; third tooth opposite to basal tooth of ventral row.

Gnathocoxae. — Light brown, faintly suffused with black, apices light. Labium brown-black, anterior border lighter. Sternum brown-black, with short and long hairs; width 0.75 of length.

Legs. — Coxae light yellow, other segments light yellow-brown, with faint brown striae on femora. Legs long and slender, length of femur I 1.35 times length of cephalothorax, length of tibia II (tibia I missing!) 16 diams. of segment. Measurements in mm:

	I	II	III	IV	palp
Fe	3.00	2.45	1.80	2.60	0.94
Pa	—	0.50	0.45	0.50	0.21
Ti	—	2.40	1.55	2.25	0.22
Mt	—	—	1.95	2.90	—
Ta	—	—	0.85	1.20	0.91

Chaetotaxy. — Fe I dl'; II-IV d. Pa I-IV d''d', basal spine short.

Ti	I	missing				
	II	v _b '	d''	v'	v''	l' v' l'' d' [l' _a l'' _a v' _a v'' _a]
	III - IV	d''			l' v'	d' [l' _a l'' _a v' _a v'' _a]
Mt	III - IV	dl' l'' vd				

Length of d''-spine on tibia II 0.26 mm, diameter of tibia at base of d''-spine 0.15 mm; diameter of tibia IV at base of d''-spine (broken off) 0.14 mm. Position of d''-spine on tibia II 0.24.

Abdomen. — The abdomen was already missing, when Schenkel described the specimen.

Palp (fig. 200, 201). — As there is only one palp left on the sole available male, viz., the holotype, I have refrained from dissecting the organ. The following description is therefore based on external examination only.

Segments yellow-brown, cymbium suffused with grey. Patella short, dorsal spine slightly twisted, two times as long as segment. Tibia higher than long, with a dorsal spine, and with about 15 spinehairs scattered on dorso-lateral surface and along distal margin of lateral and ventral surfaces. Cymbium with a single dorsal spine on distal half. Paracymbium with broad and flat distal arm (fig. 204); subapical posterior appendage long and

narrow, tapering to a point, lower margin straight, upper margin slightly concave near base; apical appendage slightly shorter and likewise tapering. Tegulum not excavated on ventral side. Median apophysis curved backwards apically, extreme tip hook-shaped. Usual apical appendage of embolus visible at base of terminal apophysis; a pigmented blunt protrusion lacking. Terminal apophysis (fig. 203) conspicuously long, with slightly more than five coils; basal coil distinctly saucer-shaped, concave anterior side lying against axial parts of second coil; other coils transversely grooved. Lamella with slender and pointed proximal tip and evenly curved mesal and anterior margin; antero-lateral tip blunt; free lateral projection (fig. 202) at end of lateral arm membranous and small, much shorter than in the other Palaearctic species. Transversal sclerite roughly rectangular, lying between lateral arm of lamella and anterior tip of radix.

Distribution and habitat. — Known from the type-locality only. Data about habitat are not available.

Material examined.

China. — 1 ♂, Kweichow, Anshun fu, Gan schuen fu [Anshun], 1912, P. Cavalerie (holotype; MNP).

Neriene multidentata (Schenkel) comb. nov.

Linyphia multidentata Schenkel, 1937, Ark. Zool., 29A(1): 7, 80, fig. 27 (description juvenile specimen, China, S. Kansu).

Type. — Holotype, juvenile, from China, S. Kansu, Tan-Chang, Da-chu-ho River, 1800 m, 28.ix.1930, D. Hummel (MS; examined).

Remarks. — The heading of the original description of the species reads „*Linyphia multidentata* n.sp.” in bold-type letter. On the other hand the species is called *Linyphia multidentata* on page 7, where a summary is given of all species mentioned in the paper, while on page 81 the caption of figure 27 likewise reads *L. multidentata*. The original label in Schenkel's writing, which accompanies the holotype in the collection at Stockholm, again reads *multidentata*, and one, therefore, may conclude that *multidentata* is a printer's error, which must be emended.

The species was described from one juvenile specimen only. All characters make its belonging to be *hammeni*-group of this genus very probable, viz., the median row of triangular spots and chevrons, the PME being situated on black tubercles, the occurrence of five cheliceral teeth in both rows, and the chaetotaxy of the legs. From the East Asiatic mainland two

species of the *hammeni*-group are known up to the present, viz., *Neriene oidedicata* and *N. cavaleriei*. The juvenility of the specimen makes it impossible to elucidate its true status within the group.

***Neriene kibonotensis* (Tullgren) comb. nov.**

Linyphia kibonotensis Tullgren, 1910, Wissensch. Ergebn. schwed. zool. Exped. Kili-mandjaro, 3(20): 146, pl. 3 fig. 66a-b (description ♀ ♂, Tanganyika). — Di Caporiacco, 1947, Ann. Hist.-nat. Mus. Nat. Hungarici, 40: 146 (p.p.; Tanganyika); 1949, Comment. Pont. Acad. Scient., 13: 354 (p.p.; Kenya). — Locket, 1969, Public. cult. Comp. Diamant. Angola, 77: 125, fig. 47A (Angola).

Linyphia bonneti Di Caporiacco, 1949, Comment. Pont. Acad. Scient., 13: 354, fig. 21a-c (p.p.; description subadult ♀ and ♂, Kenya). [new synonymy].

Types. — ♂ lectotype of *Linyphia kibonotensis*, by present designation, from Tanganyika, Kibonoto. The lectotype was selected from the syntype series, which contains 6 more specimens, viz., 4♀ and 2♂ paralectotypes (MS).

Lectotype, a subadult ♀, of *Linyphia bonneti*, by present designation, from Kenya, Mau (LZAB). The original series further consists of 5 subadult ♀ and 2 subadult ♂ specimens, all *kibonotensis*, 1♀ of *Microlinyphia sterilis* (Pavesi), and 1 adult ♀ of *kibonotensis* (LZAB). A subadult ♂ specimen in the collection at Florence (MZF) also belongs to the original series. I have not chosen the adult ♀ of *kibonotensis* as lectotype, because Di Caporiacco did not mention any adult specimens, and because his figure (1949, fig. 21c) of the "epigyne non omnino adulta" shows a subadult specimen of *kibonotensis*.

Remarks. — One of the specimens mentioned by Di Caporiacco (1947: 146), a ♂ from Tanganyika, appeared to belong to another Ethiopian representative of the species-group, viz., *Neriene helsdingeni*; the other specimens were correctly identified with *N. kibonotensis*. His 1949 record of *kibonotensis* again only partly refers to this species, as the ♂ from Nairobi belongs to *Neriene conica* (Locket).

Male. — Measurements in mm. Total length 3.5-4.9; cephalothorax, length 1.7-2.15, width 1.25-1.55; abdomen, length 1.9-2.5, width 0.9-1.1, height 0.9-1.1; chelicerae, length 0.77-0.95, width 0.35-0.40.

Cephalothorax. — Light brown to brown, suffused with black, and with a narrow grey margin; striae faintly indicated. Thorax moderately excised posteriorly, sides evenly rounded to front, border of thorax and head barely constricted. From side, dorsal line rounded posteriorly, then becoming level, dorsal line rising evenly to eye-region, clypeus straight. Width 0.7 of length,

width of head 0.5 of width of thorax. Thorax smooth, with some very short forwardly directed hairs on striae; head smooth with two rows of short hairs from fovea to behind PLE; eye-region and upper three-fourths of clypeus with longer and stronger hairs, some spinehairs near posterior row of eyes.

Eyes. — Width of eye-region 0.5 of width of thorax, occupying whole width of head. Posterior row straight, anterior row slightly procurved. PME on large black tubercles. PME large, their diameter measuring 0.14 mm, separated by 1.7 diams., distance between PME and PLE 0.8-0.9 diam., and distance between PME and AME 1.1 diams. of PME. AME smaller, their diameter approximately 0.65 diam. of PME. Height of clypeus 0.21-0.24 of length of cephalothorax.

Chelicerae. — Light brown to brown, as cephalothorax, suffused with black on an oblique frontal streak from mesally at base to laterally at apex. Stridulating file not discernible. Basal tubercle small, latero-dorsal in position. Ventral row of cheliceral teeth consisting of five small evenly spaced teeth near base of fang. Dorsal row with five or six teeth, the basal pair larger than the others and more to the ventral side, notably the second one, which stands nearly in line with the ventral row; apical three or four diminishing in size from base to apex.

Gnathocoxae. — Brown suffused with black and with lighter apex. Labium black-brown, anterior margin scarcely lighter. Sternum brown, suffused with black; width 0.85 of length.

Legs. — Light yellow-brown, lightly suffused with black. Tibiae sometimes apically and basally narrowly lighter. Legs long, length of femur I 1.2-1.4 times length of cephalothorax, tibia I 16-18 times as long as diam. of segment. Measurements in mm (of specimen from Ruanda, Bugesera):

	I	II	III	IV	palp
Fe	2.25	1.95	1.50	2.15	0.75
Pa	0.40	0.40	0.35	0.38	0.19
Ti	2.30	1.80	1.30	1.80	0.22
Mt	2.65	2.20	1.55	2.30	—
Ta	1.35	1.05	0.65	0.90	0.75

Chaetotaxy. — Fe I dl''; II-IV d. Pa I-IV d''d', basal spine weak.

Ti	I - II	d''	v'	v''	l'	v'	l''	d'	$\begin{bmatrix} l'_a & l''_a & v'_a & v''_a \end{bmatrix}$
	III - IV	d''	v'		l'			d'	$\begin{bmatrix} l'_a & l''_a & v'_a & v''_a \end{bmatrix}$
Mt	I - IV	dl'l	vd						

A small v''-spine sometimes present at base of tibia I and II. Length of d''-spine on tibia I 0.14-0.20 mm, diameter at base of d''-spine 0.13-0.16 mm;

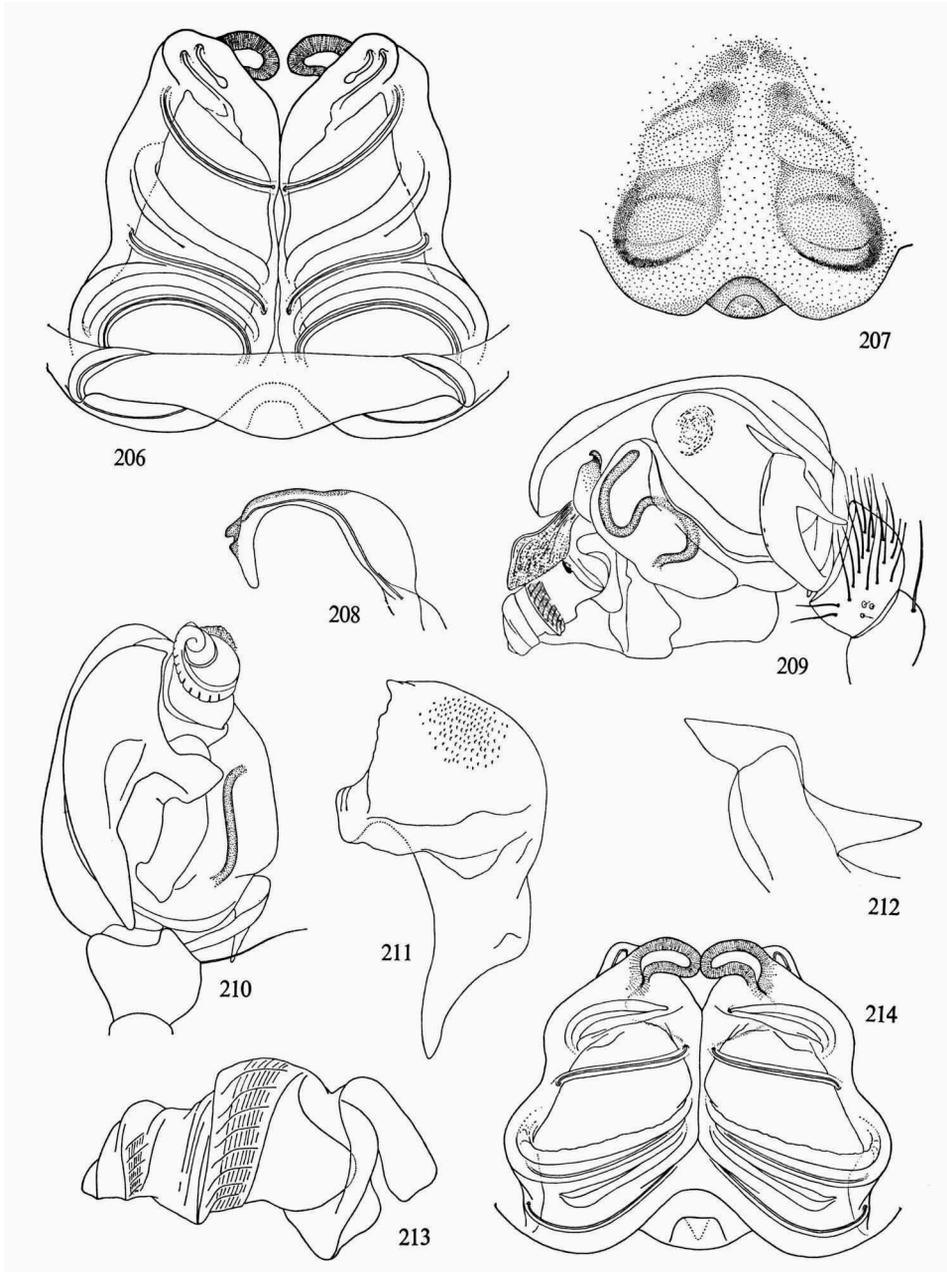


Fig. 206-213. *Neriene kibonotensis*. 206, vulva, dorsal aspect; 207, epigyne; 208, embolus, dorsal aspect; 209, male palp, lateral aspect; 210, do., ventral aspect; 211, lamella, dorsal aspect; 212, tip of paracymbium; 213, terminal apophysis. Fig. 214. *N. helsdingeni*, vulva, ventral aspect. 206, 214, $\times 89$; 207, $\times 57$; 208, 211, $\times 67$; 209, 210, $\times 49$; 212, 213, $\times 95$.

on tibia IV 0.28-0.32 mm and 0.12-0.15 mm, respectively. Tm I 0.16-0.18. Position of d''-spine on tibia I 0.19-0.22.

Abdomen. — Cylindriform with postero-dorsal tubercle, which projects posteriorly above spinnerets. Dorsally and laterally with pattern, formed by black pigment on a light brown background; laterally with white spots on background areas. Pattern usually distinct, like that of female. Ventral surface uniformly black, opercula, genital region and spinnerets included. Postero-dorsal tubercle black posteriorly.

Palp (fig. 209, 210). — Colour of segments as legs, but cymbium heavily suffused with black. Patella short, dorsal spine two times as long as segment. Tibia higher than long, with from 10 to 20 curved spines on dorso-lateral and ventro-lateral surfaces; spines measuring about the height of segment. Cymbium with a dorsal spine on distal half. Paracymbium with broad distal arm (fig. 212); subapical appendage triangular, less slender than in *helsdingeni*, pointing backwards; apical appendage slightly shorter. Tegulum without ventral excavation. Median apophysis curved in dorsal direction and backwards shortly before hook-shaped tip. Embolus (fig. 208) as in *helsdingeni*, with a blunt and low protrusion at base of apical appendage close to spermduct-tooth. Terminal apophysis (fig. 213) with three coils; basal coil saucer-shaped and supporting axial part of second coil; third coil as long as second one, making the element slender, and not compact as in *helsdingeni*; anterior halves of second and third coils transversely grooved. Lamella (fig. 211) with slender proximal tip and evenly curved mesal and anterior margins; antero-lateral tip rather sharp; lateral arm short, without free projection. Transversal sclerite oblong, situated between arm of lamella and anterior tip of radix.

Female. — Measurements in mm. Total length 3.4-4.6; cephalothorax, length 1.35-1.75, width 0.95-1.15; abdomen, length 2.1-2.8, width 1.4-1.5, height 1.25-1.55; chelicerae, length 0.69-0.87, width 0.32-0.37.

Cephalothorax. — Light brown in central area near fovea, darker towards margins, suffused with black, forming striae and broad grey margins; sides of head and clypeus grey-brown as margins of thorax. Broadly excised at posterior margin. Width of cephalothorax 0.65-0.75 of length, width of head 0.6-0.65 of width of thorax. Hairs on clypeus and at eye-region short, some spinehairs present. Eye-region occupying whole width of head. Diameter of PME 0.11-0.14 mm. PME separated from each other by 1.45-1.75 diams., from PLE by 0.5-0.65 diam., and from AME by 0.9-1.0 diam. of PME. Diameter of AME 0.65 of PME; AME separated from each other

by slightly less than their own diameter. Height of clypeus 0.16-0.20 of length of cephalothorax.

Chelicerae. — Colour as in male. Very faint stridulating file present, composed of broken ridges. Dorsal row of teeth numbering five to six, basal and fifth teeth small, second and third twice as large, fourth of intermediate size, apical tooth, if present, very small; all teeth equidistant. Ventral row with five teeth; with the exception of the very small apical one, all of same size as basal tooth of dorsal row, equidistant, basal tooth opposite to interstice between third and fourth teeth of dorsal row.

Legs. — Light yellow-brown, lightly suffused with black, often more heavily on legs III and IV; without annulations. Legs long and slender, femur I 1.3-1.6 times as long as cephalothorax; length of tibia I 11.5-14 diams. of segment. Measurements in mm (of specimen from Tanganyika):

	I	II	III	IV
Fe	2.10	1.80	1.40	1.95
Pa	0.50	0.48	0.40	0.45
Ti	2.10	1.65	1.20	1.65
Mt	2.20	1.85	1.40	1.95
Ta	1.25	0.95	0.70	0.90

Chaetotaxy. — As in male. A v_b'' -spine sometimes present on tibia I. Length of d'' -spine on tibia I 0.32-0.37 mm, diameter of segment at base of d'' -spine 0.15-0.21 mm; on tibia IV 0.40-0.44 mm and 0.12-0.17 mm, respectively. Tm I 0.15-0.18. Position of d'' -spine on tibia I 0.20-0.24.

Abdomen. — Light beige-coloured background with isolated white blotches and pattern of black pigment. Dorsal surface with black triangular spot near base with one of its angles pointing forwards, the two posterior angles connected laterally with a pair of black spots, situated approximately on two-fifths of length of abdomen; this pair of spots again connected laterally with a second pair of black spots, situated at base of second half of abdomen and usually connected in some degree with each other mesally, thus forming a transverse bar or chevron; this pair of spots laterally connected with a V-shaped bar, pointing in anterior direction, which on its turn laterally passes into the black dorsal surface of the postero-dorsal tubercle, enclosing a beige-coloured transverse bar between them. Lateral surface with dorso-lateral band of background colour with some white blotches, from anterior side of abdomen towards two-fifths of its length, followed by two vertical bars and a horizontal spot of same colour, the latter reaching the posterior surface of the postero-dorsal tubercle; a horizontal oblong light spot from dorsal margin of operculum to two-fifths of length of abdomen; intervening areas black, fused with black dorsal markings; ventro-lateral surface black,

ventral surface, opercula and spinnerets brown-grey. In dark specimens lateral light spots small, on dorsal surface black-pigmented area very extensive, leaving a small background-coloured area in the middle of basal half and two narrow transverse bars on posterior half.

Epigyne (fig. 207). — Grey-brown, with two large clear orange-brown translucent areas laterally; posterior margin incised mesally; scape curved to ventral side.

Vulva (fig. 205, 206). — As long as wide; three coils of spiral groove; entrances of spiral grooves in ventral wall, in the middle of either atrium; turning-points laterally of apices, pointing inwards; receptacula at ventral side of apices, also pointing inwards. Epigyneal aperture 0.44-0.54 mm wide.

Distribution and habitat. — Central Africa from east to west coast, between approximately 1°N and 15°S. Most records are from relative high altitudes, viz., 1000 m and above, the highest locality merely indicated as "2000-3500 m". As usual not many data are available about the habitat of the species, but, if present, they point to similar situations, viz., under bark of a tree, in dead leaves, under a heap of weeds and under stones. Adult specimens of both sexes have been collected nearly all the year round, with the exception of February, June, July, and December.

Material examined.

Tanganyika. — 4 ♀ 3 ♂, Kibonoto, cultivation zone, 2000-3500 m, viii. and x.1905, Swedish Kilimandjaro Expedition (♂ lectotype and paralectotypes of *Linyphia kibonotensis* Tullgren; MS). 7 ♀ 1 ♂ 2 juveniles, Arusha, 1905, K. Kittenberger (*Linyphia kibonotensis*; Di Caporiacco, 1947 (p.p.); 5 ♀ 1 ♂ 2 juveniles, HM, 2 ♀ MZF). 2 ♀ 2 ♂, Bundukl, Uluguru Mts, moy Mgeta, 1300 m, 30.iv.-2.v.1957 (MT).

Kenya. — 2 ♂, Mau, i.1946, Meneghetti (*Linyphia kibonotensis*; Di Caporiacco, 1949 (p.p.); 1 ♂ MZF, 1 ♂ LZAB). 1 ♀ 6 subadult ♀ 3 subadult ♂, Mau, xii.1945 (lectotype (subadult ♀) and paralectotypes (p.p.) of *Linyphia bonneti* Di Caporiacco; 1 ♀, 6 subadult ♀, 2 subadult ♂, LZAB, 1 subadult ♂, MZF). — 1 ♂, Mt. Elgon, S. side at Kimilili River, 2400 m, 30.i.1965, A. Holm (ZIU).

Uganda. — 1 ♀, Entebbe, Zika Forest, i.iii.1957, J. D. Gillett (BM).

Ruanda. — 1 ♀ 3 ♂ 1 subadult ♂, Bugesera, Biharagu, in dead leaves below shrubs on dead termitary, savannah, 27.ii.1960, N. Leleup (MT); 1 ♀, do., under heap of weeds, i.iii.1960, N. Leleup (MT).

Congo-Kinshasa. — 4 ♀, Kivu, Rutshuru, v.1937, J. Ghesquière (MT); 4 ♀ 1 ♂, do. (ML). 1 ♀, Kisanga near Lwiro, gallery forest, 14.xi.1964, J. Bafort (MT). — 1 ♂, Fizi, Natubonge River, i.1957, N. Leleup (MT). — 2 ♀ 1 ♂, Sankuru, Komi, i.1930, J. Ghesquière (MT). — 1 ♂, Equateur, Distr. Ikela, Besoke, 50 km W. of Ikela on road to Bokungu, ix.1959, N. Leleup (MT). — 5 ♀ 1 ♂ 3 juveniles, Katanga, Kasapa, gallery forest, ii.1965, J. Bafort (MT).

Gabon. — 1 ♀, Makokou, i.1966, P. Darchen (MT).

Angola. — 2 ♀, Lunda, Alto Cuilo, gallery forest along Xa-Muchito River, in litter, 1200 m, i.vi.1954, A. de Barros Machado (*Linyphia kibonotensis*; Locket, 1969; BM). 1 ♂, Dundo, Luachimo forest, under bark of fallen tree, 8.xi.1948, A. de Barros Machado (*Linyphia kibonotensis*; Locket, 1969; BM).

Neriene helsdingeni (Locket) comb. nov.

(fig. 214-225)

Linyphia helsdingeni Locket, 1969, Public. cult. Comp. Diamant. Angola, 77: 126, fig. 47B, D (diagnosis, Angola).

Linyphia kibonotensis; Di Caporiacco, 1947, Ann. Hist.-nat. Mus. Nat. Hungarici, 40: 146 (p.p.; Tanganyika).

Types. — ♂ holotype from Angola, Boca da Humpata (MD); 1 ♂ and 4 ♀ paratypes from same locality (BM).

Remarks. — This species resembles *N. kibonotensis* very closely. With the exception of small differences in the abdominal pattern, as indicated in the description, I have not found any differences in texture. The males of the two species do not differ in total length, length of cephalothorax, or length of femur I. There are, however, differences in outline and length of the terminal apophysis. In *helsdingeni* the length of the terminal apophysis measures 0.31-0.34 mm, while in *kibonotensis* it is distinctly larger, 0.37-0.41 mm. As in both species the element has about three coils, the comparatively short terminal apophysis of *N. helsdingeni* is more compact (compare fig. 213 and 223). If the length of the element is plotted against the length of the cephalothorax, the presence of two distinct taxa is clearly demonstrated (fig. 215).

As to the females, *kibonotensis* is the smaller species; both total length and length of cephalothorax have a lower mean value, but the ranges are broadly overlapping. The epigyneal aperture is slightly wider, 0.44-0.54 mm in *kibonotensis* against 0.39-0.52 mm in *helsdingeni*, which difference proba-

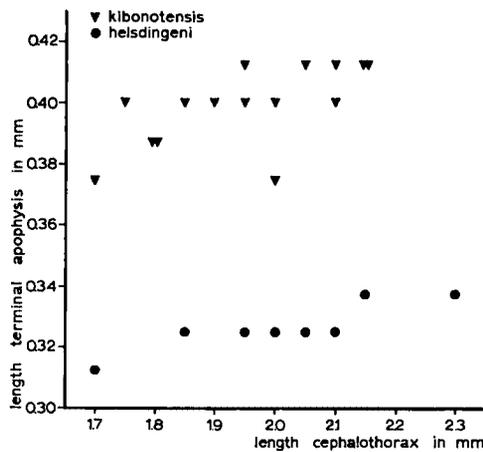


Fig. 215. Diagram, showing correlation between length of cephalothorax and length of terminal apophysis in males of *Neriene kibonotensis* and *N. helsdingeni*.

bly is not significant. This equally holds for the width of the vulva. However, the length of the vulva is markedly different in the two species, 0.50-0.62 mm in *kibonotensis*, 0.44-0.54 mm in *helsdingeni*. If we calculate the ratio of length of vulva to width of vulva, it appears that in *kibonotensis* this ratio is always larger than 0.9, while in *helsdingeni* it is always smaller. If we plot the length against the width of the vulva (fig. 216A), or the length of the vulva against the length of the cephalothorax (fig. 216B), the presence of two different groups of specimens is obvious, be it less convincingly than in the male specimens.

From the available data I cannot deduce any differences in distribution, time of maturity, or habitat. Both species have been collected in Central Africa, from Tanganyika to Congo and Angola, at altitudes of 1000 m and above.

One ♂ specimen from the series of *Linyphia kibonotensis*, mentioned by Di Caporiacco (1947: 146) from Tanganyika, Arusha, also belongs to this species; the other specimens of the series belong to *kibonotensis*.

Male. — Measurements in mm. Total length 3.5-5.0; cephalothorax, length 1.7-2.3, width 1.25-1.65; abdomen, length 1.9-2.4, width 0.9-1.2, height 0.9-1.1; chelicerae, length 0.75-0.94, width 0.35-0.40.

Cephalothorax. — Brown, barely suffused with black, without black margin. Posteriorly not excised; sides evenly rounded, not constricted at

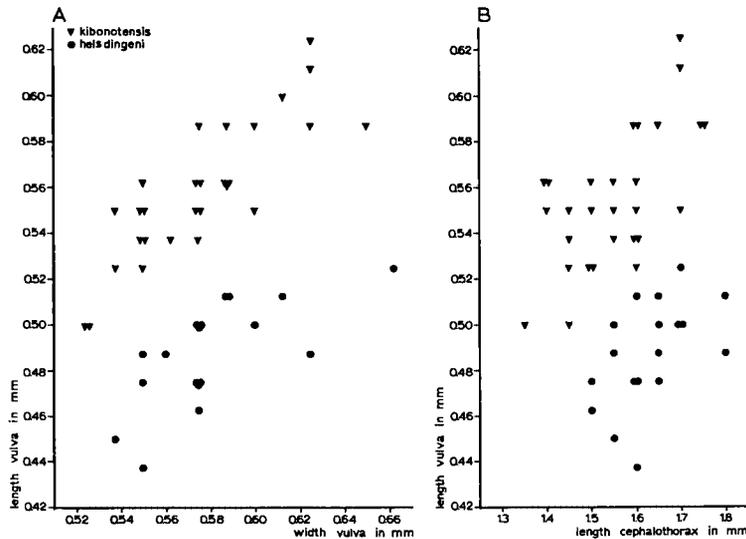


Fig. 216. Diagram, showing correlation between width and length of vulva (A), and between length of cephalothorax and length of vulva (B) in *Neriene kibonotensis* and *N. helsdingeni*.

border of head and thorax. From side, rounded posteriorly, rising evenly towards fovea, line of head rising slightly steeper towards eye-region; clypeus straight, perpendicular to lower margin of cephalothorax. Greatest width 0.7 of length, width of head 0.5 of width of thorax. Thorax smooth, with barely visible hairs on striae; head with two rows of short hairs from fovea to region behind PLE; eye-region and upper three-fourths of clypeus with long hairs, curved forwards and upwards; some spinehairs between eyes and behind PLE.

Eyes. — Width of eye-region 0.5 of width of thorax, occupying whole width of head. Posterior row straight, anterior row slightly procurved. PME on large black tubercles. PME largest, their diameter measuring 0.12 mm, separated from each other by 1.8 diams., from PLE by 0.8 diam., and from AME by 1.2 diams. of PME. AME smaller, separated by less than their own diameter, which measures 0.7 of diameter of PME. Height of clypeus 0.24 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax, lightly suffused with black. With short hairs as in *kibonotensis*, some longer hairs apically. Basal tubercle very small. Basal half of lateral surface with broken ridges only. Ventral row of cheliceral teeth consisting of four very small, evenly spaced teeth, situated near apex; basal one slightly larger than others. Dorsal row consisting of five teeth; second from base largest and situated more ventrally, first and third smaller, apical pair very small, as large as ventral ones; all equidistant.

Gnathocoxae. — Brown, suffused with black, apices lighter. Labium black-brown, rebordered part yellow-brown. Sternum brown, heavily suffused with black; width 0.8 of length.

Legs. — Uniformly yellow-brown. Legs long, femur I 1.2-1.3 times as long as cephalothorax, tibia I 19 times as long as diameter of segment. Measurements in mm (of specimen from Tanganyika):

	I	II	III	IV	palp
Fe	2.55	2.25	1.75	2.40	0.81
Pa	0.50	0.45	0.40	0.45	0.21
Ti	2.60	2.05	1.40	1.95	0.25
Mt	2.75	2.30	1.70	2.45	—
Ta	1.50	1.15	0.75	1.05	0.81

Chaetotaxy. — Fe I dl'l'; II-IV d. Pa I-IV d''d', basal spine weak.

Ti I - II d'' v' v'' l' v' l'' d' [$l'_a l''_a v'_a v''_a$],
 a v''_b -spine sometimes present.
 III - IV d'' v' l' d' [$l'_a l''_a v'_a v''_a$]
 Mt I - IV dl' l'' vd

Length of d''-spine on tibia I 0.20-0.30 mm, diameter at base of d''-spine

0.14-0.16 mm; on tibia IV 0.42 mm and 0.13 mm, respectively. Tm I 0.22. Position of d''-spine on tibia I 0.22-0.25.

Abdomen. — Cylindriform, dorsally caved in on half length. Postero-dorsal tubercle protruding above spinnerets. Dorsally and laterally with obscure pattern of grey and black on light brown background; background on sides with some white spots. Ventrally uniformly grey; opercula brown, suffused with black. Postero-dorsal tubercle black on posterior surface.

Palp (fig. 221, 225). — Colour of segments as legs, cymbium heavily suffused with black. Patella short, dorsal spine about two times as long as segment, slightly twisted. Tibia higher than long, with 15 to 20 spines from latero-dorsal to latero-ventral surfaces, the longest spines slightly longer than height of tibia. Cymbium with a single weak spine dorsally on distal half. Paracymbium with broad distal arm (fig. 218); subapical appendage pointing in posterior direction, slenderly triangular, two and a half times as long as high; apical appendage slightly shorter, pointing in distal direction. Tegulum not excavated on ventral side. Median apophysis (fig. 219) with hook-shaped tip; element curved in dorsal direction and backwards shortly before tip. Embolus (fig. 222) with a pigmented protrusion at base of membranous apical appendage; protrusion more blunt and less elevated than spermduct-tooth. Terminal apophysis (fig. 223) with three coils, the basal one of which is saucer-shaped and supports the axial body of the second coil with anterior concave side; third coil half as long as second coil, and consequently more compact than in *kibonotensis*; second and third coils with transversely grooved anterior halves. Lamella (fig. 224) with narrow and pointed proximal tip; mesal and anterior margins evenly curved; antero-lateral tip blunt; lateral arm short and without a free projection. Transversal sclerite between lateral arm of lamella and anterior tip of radix irregularly oblong.

Female. — Measurements in mm. Total length 3.3-5.1; cephalothorax, length 1.5-1.85, width 1.1-1.3; abdomen, length 1.85-2.75, width 1.3-1.85, height 1.3-2.0; chelicerae, length 0.72-0.85, width 0.30-0.35.

Cephalothorax. — Brown, suffused with black on striae and increasingly towards margins; eye-region very dark. Broadly excised posteriorly. Clypeus and eye-region with short hairs. Width of cephalothorax 0.70-0.75 of length, width of head 0.6 of width of thorax. Diameter of PME 0.10-0.14 mm. PME separated from each other by 1.6-2.2 diams., from PLE by 0.9-1.1 diams. and from AME by 1.1-1.2 diams. of PME. AME smaller, separated by their own diameter, which measures about 0.6 of diam. of PME. Height of clypeus 0.17-0.21 of length of cephalothorax.

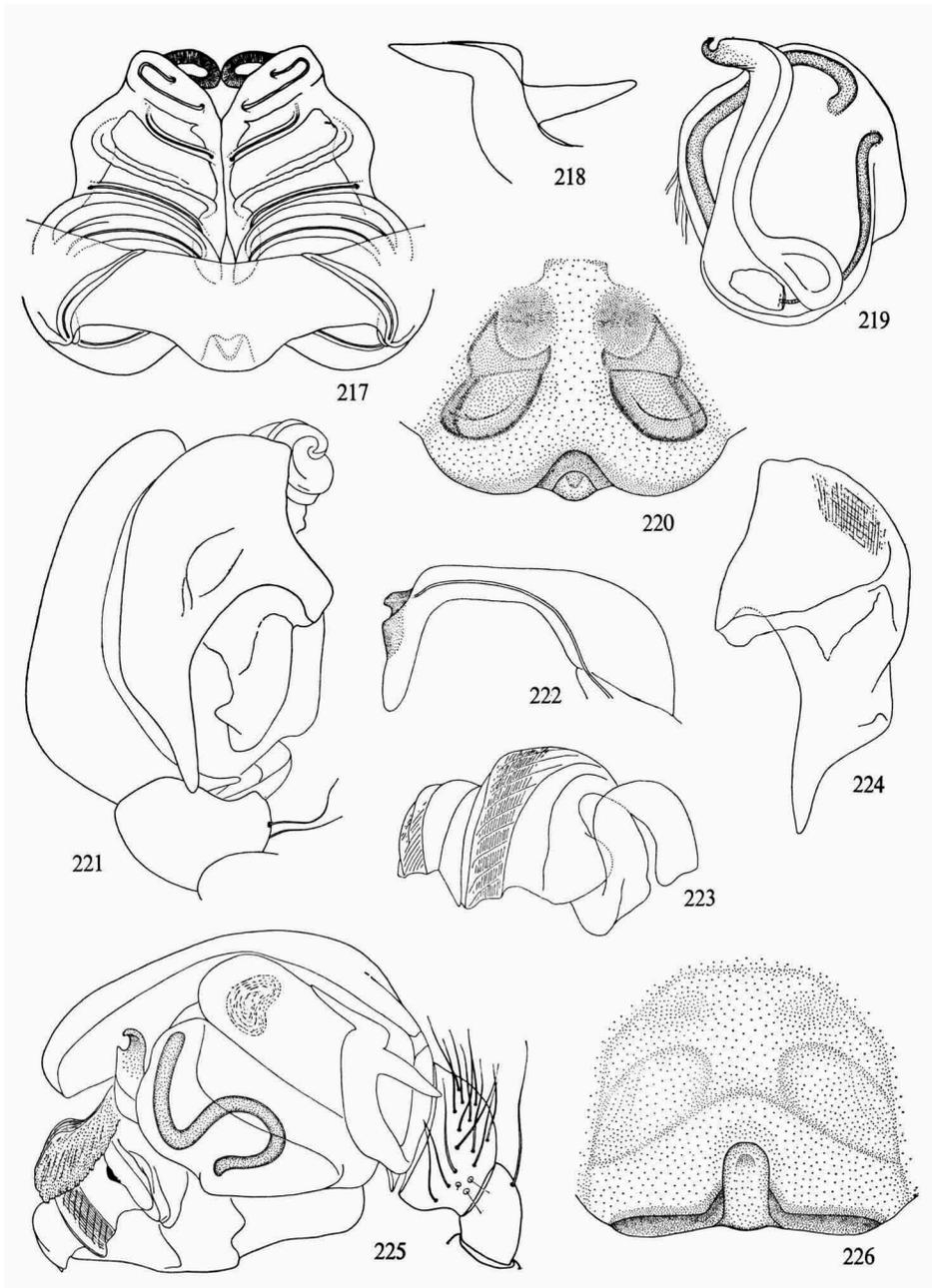


Fig. 217-225. *Neriene helsdingeni*. 217, vulva, dorsal aspect; 218, tip of paracymbium; 219, tegulum with median apophysis, mesal aspect; 220, epigyne; 221, male palp, ventral aspect; 222, embolus, dorsal aspect; 223, terminal apophysis; 224, lamella, dorsal aspect; 225, male palp, lateral aspect. Fig. 226. *N. natalensis*, epigyne. 217, $\times 89$; 218, 222, 223, $\times 95$; 219, 221, 224, 225, $\times 67$; 220, $\times 49$; 226, $\times 58$.

Chelicerae. — Colour as cephalothorax, suffused with black on lateral surface and on dorsal streak from base mesally toward apex laterally. Very faint stridulating file just visible, composed of broken ridges. Dorsal row with five equidistant teeth, basal tooth small, second and third teeth twice as large, fourth slightly smaller, apical tooth of same size as basal one. Ventral row with four to five teeth, of equal size and equidistant, basal tooth opposite to third tooth of dorsal row. Measurements (of paratype from Angola) in mm:

	I	II	III	IV
Fe	2.15	1.90	1.45	2.00
Pa	0.50	0.45	0.40	0.45
Ti	2.05	1.70	1.15	1.60
Mt	2.15	1.80	1.40	2.00
Ta	1.25	1.00	0.70	0.90

Chaetotaxy. — All spines as in male, but slightly longer. Length of d''-spine on tibia I 0.25-0.37 mm, diameter of segment at base of d''-spine 0.16-0.21 mm; on tibia IV 0.22-0.42 mm and 0.14-0.17 mm, respectively. Tm I 0.17-0.19. Position of d''-spine on tibia I 0.21-0.25.

Abdomen. — Light beige-coloured background with isolated white blotches, and with pattern of dark pigment. General appearance as in *kibonotensis*, but with a tendency to have the dorsal black spots isolated, not connected with each other by latero-dorsal black markings: first pair of spots always isolated. Lateral beige-coloured spots and bands more often fused, and with the white blotches tending to be larger. Ventral surface and ventro-lateral area blackish. Spinnerets and opercula grey-brown.

Epigyne (fig. 220). — Grey-brown, with two large dark brown translucent areas laterally. Posterior margin broadly excised. Scape curved to ventral side.

Vulva (fig. 214, 217). — Width 0.80-0.85 of length. Two and three-fourths coils of spiral groove; entrances of spiral grooves laterally in ventral walls. Turning-point of groove at dorsal side of apex, pointing to the side; receptaculum at ventral side of apex, pointing towards the median plane. Width of epigyneal aperture 0.39-0.52 mm.

Distribution and habitat. — The species has been found so far in Central Africa between 5°N and 15°S, from Tanganyika and Kenya in the East to Nigeria and Angola in the West. The altitudes at which the species has been found range between 1200 and 2500 m. As in *kibonotensis*, the specimens were taken from dead leaves on the ground, under stones, and in detritus. Females have been found nearly the whole year through, males only in March and September.

Material examined.

Kenya. — 1 ♀, Nairobi, Karura forest, 1660 m, 3.xii.1964, A. Holm (ZIU). — 1 ♂, Cherangany Hills, Kapolet Forest, 2150 m, 6.i.1965, A. Holm (ZIU); 1 ♀, do., 1900 m, 7-10.i.1965 (ZIU); 1 ♀, do., Kamatira River, 2440 m, 22.i.1965 (ZIU).

Uganda. — 1 ♀, Entebbe, Botanical garden, 1200 m, sifted from leaves under cocoa-tree, 26.ii.1938, A. Holm (ZIU).

Ruanda. — 3 ♀ 1 ♂, Ruanda (SMF).

Burundi. — 1 ♀ 1 ♂, Prov. Bubanza, mountainous ridge between Congo River and Nile, 2000 m, iii.1967, S. Ndani (MT).

Tanganyika. — 1 ♂, Arusha, 1905, K. Kittenberger (*Linyphia kibonotensis*; Di Caporiacco, 1947 (p.p.); MZF). 1 ♂, Tanga (SMF).

N. Rhodesia. — 1 ♀, Abercorn, gallery forest along Mwengo River at 8 mi N. of Abercorn, 1800 m, vi.1959, N. Leleup (MT).

Congo-Kinshasa. — 1 ♀, Orientale, Kwandrumba, 1.vi.1930, leg. Bredo (MT). 3 ♀, Djugu, v.1937, leg. Bredo (MT). — 1 ♀, Kivu, Mulege River near Butembo (Nile basin), 2480 m, 27.ix.1952, P. Bergmans (MT). 1 ♂, Butembo, 1740 m, iii.1965, M. J. Celis (ML). 1 ♀, region of Mokoto Lakes near Masisi, 1800 m, vi.1959, N. Leleup (MT). 1 ♀, Shabunda, 26.xi.1964, J. Bafort (ML). — 1 ♀, Katanga, Mt. Kabobo, basin of Upper Kiyambi, in detritus near source, 1700 m, ix.1958, N. Leleup (MT).

Angola. — 4 ♀ 2 ♂, Boca da Humpata, under stones on bank of river, 1900 m, 18.ix.1949, A. de Barros Machado (♂ holotype (MD) and paratypes (BM)).

Nigeria. — 2 ♀, Mt. Cameroons, 2000 m and above, i-ii.1932, M. Steele (BM).

***Neriene natalensis* spec. nov.**

(fig. 226-235)

Types. — ♂ holotype, S. Africa, Natal, Pietermaritzburg, 1917, C. Akerman (NM). The other specimens are paratypes.

Male. — Measurements in mm. Total length 4.4; cephalothorax, length 2.2, width 1.65; abdomen, length 2.4, width 1.1, height 1.15; chelicerae, length 0.9, width 0.4.

Cephalothorax. — Light brown, faintly suffused with black, narrowly darkened at margins. Striae faintly indicated. Posteriorly broadly cut off, sides evenly and rather firmly rounded towards head, not constricted at border of cephalon and thorax. Width 0.75 of length; width of head 0.5 of width of thorax. From side, rounded posteriorly, becoming level at fovea, dorsal line of cephalon rising more steeply; clypeus straight, perpendicular to lower margin of cephalothorax. Surface of thorax smooth, with very short, barely visible hairs; head with two rows of short hairs from fovea to region behind PLE, and with a median row of stronger hairs; eye-region with long hairs and some spinehairs; upper three-fourths of clypeus with short hairs.

Eyes. — Posterior row of eyes straight, anterior row procurved. Eye-region as wide as head. PME on black tubercles. Diameter of PME 0.09 mm. PME separated from each other by 3.0 diams., from PLE by 1.6 diams.,

and from AME by 1.7 diams. of PME. AME smaller, their diameter 0.7 of diam. of PME, and separated by their own diameter. Height of clypeus 0.23 of length of cephalothorax.

Chelicerae. — Yellow-brown, lightly suffused with black. Basal tubercle small but distinct. Broken ridges of stridulating files barely visible. Ventral row of cheliceral teeth numbering four, equidistant, situated near base of fang. Dorsal row with five teeth, basal pair rather large and placed more ventrally than apicals, nearly in one line with ventral row. Third dorsal tooth as large as ventral teeth, and situated opposite to basal tooth of ventral row, fourth and fifth very small.

Gnathocoxae. — Light brown, faintly suffused with black, apices lighter. Labium brown, suffused with black, anterior border lighter. Sternum brown suffused with black; width 0.7 of length. Distance between coxae IV larger than between two successive coxae on one side.

Legs. — Yellow, femora with light brown streaks. Legs long and slender, length of femur I 1.3 times length of cephalothorax, length of tibia I 17 diams. of segment. Measurements (of holotype) in mm:

	I	II	III	IV	palp
Fe	2.90	2.55	2.00	2.75	1.00
Pa	0.60	0.55	0.45	0.50	0.25
Ti	2.95	2.30	1.60	2.30	0.18
Mt	3.30	2.75	2.00	3.00	—
Ta	1.65	1.25	0.85	1.20	0.94

Chaetotaxy. — Fe I dl'; II-IV d. Pa I-IV d''d', basal spine rather weak.

Ti	I - II	v _b '	d''	v'	v''	l'	v'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III - IV		d''	v'		l'		l''	d'	[l' _a l'' _a v' _a v'' _a]
Mt	I - IV	dl'	l''	vd						

Length of d''-spine on tibia I 0.32 mm, diameter of tibia at base of d''-spine 0.17 mm; d''-spine on tibia IV broken off, diameter at base of spine 0.15 mm. Tm I 0.20. Position of d''-spine on tibia I 0.20.

Abdomen. — Cylindriform, caved in dorsally, rounded posteriorly. Dorsally a light brown background, irregularly suffused with black. Postero-dorsal tubercle not much protruding above spinnerets, blackish dorsally. Sides with some obscure light brown patches with few white spots. Ventrally uniformly light brown, suffused with black, but lighter than dorsal surface. Opercula light brown, spinnerets as ventral surface.

Palp (fig. 227, 230). — All segments light brown, femur suffused with black. Patella with curved spine about one and a half times as long as segment, or slightly more. Tibia higher than long, with about 15 spines on

dorsal and lateral surfaces; longest spines more than two times as long as height of segment. Cymbium with a dorsal spine on distal half. Paracymbium with broad and flattened distal arm (fig. 229); subapical appendage pointing backwards, apical appendage pointing forwards, both markedly slender, triangular; subapical one longest, nearly three times as long as wide. Tegulum not excavated on ventral side. Median apophysis (fig. 228) curved in dorsal direction and backwards, extreme tip hook-shaped. Embolus (fig. 231) with large pigmented blunt tooth at base of apically rounded distal appendage. Terminal apophysis (fig. 234) with slightly more than two coils, second one occupying larger part of element; basal coil saucer-shaped, concave anterior side lying against axial part of second coil; anterior half of second coil chitinous and obscurely transversely grooved, posterior half membranous; tip of element blunt and without sharp tip as in *flammea*. Lamella (fig. 235) with slender proximal tip, mesal and anterior margin evenly curved to blunt antero-lateral tip; lateral arm short and without free projection. Transversal sclerite small, oblong, situated between lateral arm of lamella and anterior tip of radix.

Female. — Measurements of ♀ paratypes in mm. Total length 5.2-5.4; cephalothorax, length 1.95-2.0, width 1.3; abdomen, length 3.0-3.15, width 2.1, height 2.1-2.5; chelicerae, length 0.95-1.02, width 0.44-0.45.

Cephalothorax. — Brown, heavily suffused with black, forming dark striae and broad marginal area, head slightly darker; margin of clypeus grey-brown in the middle, devoid of black suffusion at sides. Not incised posteriorly. Width 0.65 of length, width of head 0.6 of width of thorax. Eye-region and clypeus with short hairs; some spinehairs at eye-region. Diameter of PME 0.13 mm. PME separated from each other by 1.9 diams., from PLE by 1.3 diams., and from AME by 1.15 diams. of PME. AME separated by slightly more than their own diameter, which measures 0.6 of diameter of PME. Height of clypeus 0.19 of length of cephalothorax.

Chelicerae. — Orange-brown, with dorsal streak of black suffusion from mesally at base towards lateral side at apex; lateral surface with black suffusion. Faint stridulating file present, composed of broken ridges. Dorsal row with six equidistant teeth, basal tooth small, second tooth twice as large, third one slightly larger, then gradually diminishing in size towards very small apical tooth. Ventral row with six small equidistant teeth, apical tooth very small; basal tooth opposite to third tooth of dorsal row.

Legs. — Light brown, lightly suffused with black, with narrow blackish annulations at apices of femora, patellae, and tibiae. Legs long and slender, femur I 1.3-1.4 times as long as cephalothorax, length of tibia I 12 diams. of segment. Measurements (of paratype from Pietermaritzburg) in mm:

	I	II	III	IV
Fe	2.50	2.10	1.75	2.40
Pa	0.60	0.55	0.45	0.50
Ti	2.35	1.95	1.40	1.90
Mt	2.45	2.05	1.55	2.25
Ta	1.30	1.05	0.80	0.95

Chaetotaxy. — As in male. Spines distinctly longer. Length of d''-spine on tibia I 0.49 mm, diameter of tibia I near base of d''-spine 0.20 mm; on tibia IV 0.54 mm and 0.19 mm, respectively. Tm I 0.20-0.24. Position of d''-spine on tibia I 0.23-0.25.

Abdomen. — Short and high, postero-dorsal tubercle small but distinct. Dorsal surface with large V-shaped black marking anteriorly, free ends pointing backwards, tip connected with blackish anterior surface; a pair of oblong black spots on second quarter of abdomen, parallel to axis of abdomen; posterior half with two pairs of more rounded spots, which are vaguely fused on the median line, but distinctly separated from the black dorsal surface of the postero-dorsal tubercle by a light transverse bar. All spots surrounded by beige-coloured areas which bear small white blotches. Lateral surface with a blackish bar, followed by two spots, the posterior spot close to and vaguely fused with the black postero-dorsal tubercle; a light band, beige-coloured with white blotches, from dorsal margin of operculum to posterior surface; ventro-lateral and ventral surfaces uniformly blackish. Opercula and spinnerets blackish-brown.

Epigyne (fig. 226). — Large, grey-brown, with two black-brown lateral areas. Posterior margin incised mesally. Scape curved in ventral direction.

Vulva (fig. 232, 233). — Barely wider than long. Spiral grooves with two and one-fourth coils; entrances of spiral grooves in ventral wall; turning-point near median plane at ventral side, pointing in mesal direction; receptacula near median plane and curving outwards. Width of epigyneal aperture 0.55-0.56 mm.

Distribution and habitat. — South Africa, Natal. From the few available data one might conclude that *N. natalensis* occurs above 600 m; *N. flammea* might be looked upon as a lowland species, but this again is based upon too few data. For a better understanding of the distribution of the species, we must set our hopes on more detailed searches in this interesting region.

Material examined.

South Africa, Natal. — 1 ♂, Pietermaritzburg, 1917, C. Akerman (holotype; NM); 1 ♀, do., v.1951, R. F. Lawrence (NM). 1 ♀, Drakensbergen, Champagne Castle, in leaf-litter, x.1960, N. Leleup (MT).

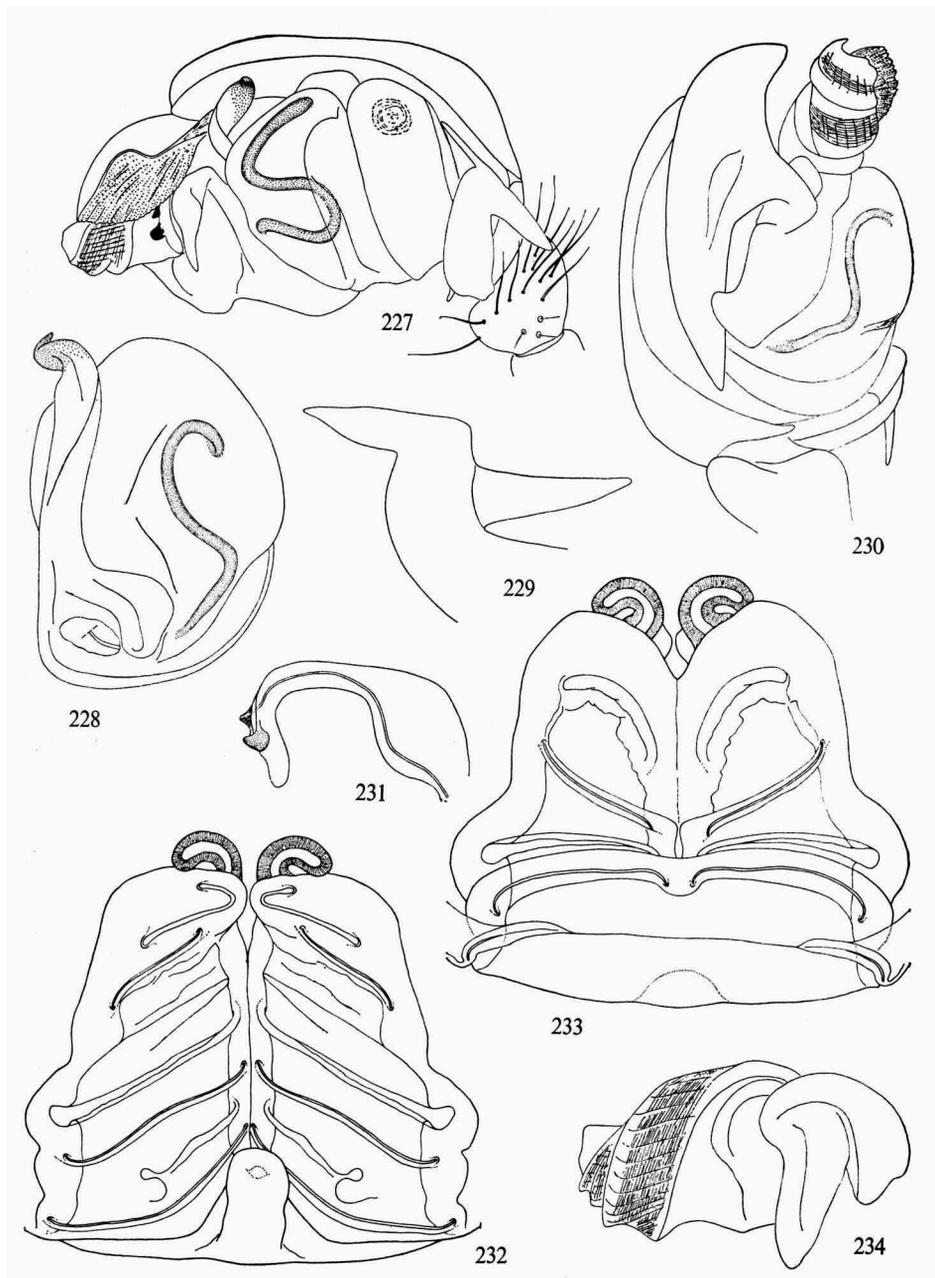


Fig. 227-234. *Neriene natalensis*. 227, male palp, lateral aspect; 228, tegulum with median apophysis, mesal aspect; 229, tip of paracymbium; 230, male palp, ventral aspect; 231, embolus, dorsal aspect; 232, vulva, ventral aspect; 233, do., dorsal aspect; 234, terminal apophysis. 227, 230, $\times 49$; 228, 231, $\times 67$; 229, 234, $\times 95$; 232, 233, $\times 89$.

***Neriene flammea* spec. nov.**

(fig. 236-242)

Types. — ♂ holotype from Union of South Africa, Natal, Alfred Distr., Oribi Gorge, in leaf-litter, xi.1961, N. Leleup (MT). ♂ paratype from Union of South Africa, Cape of Good Hope, Humansdorp Distr., Witelsbos, in leaf-litter, i.1961, N. Leleup (MT).

This species can easily be distinguished from the other members of the species-group by the light orange cephalothorax, and by the light abdomen, which is only sparsely pigmented in comparison with the other species of the group. The male palp resembles that of *N. natalensis* very closely, but the terminal apophysis is quite distinct. The female has not yet been found.

Male. — Measurements of holotype in mm. Total length 4.6; cephalothorax, length 2.2, width 1.7; abdomen, length 2.5, width 1.25, height 1.25; chelicerae, length 0.96, width 0.41. — Paratype. Total length 5.2; cephalothorax, length 2.25, width 1.75; abdomen, length 2.9, width 1.5, height 1.45; chelicerae, length 1.0, width 0.41.

Cephalothorax. — Light orange-brown, without any traces of suffusion. Sides without constriction at border of head and thorax, evenly rounded and passing into posterior margin, which is not excised; ratio width to length 0.75-0.8, width of head 0.55 of width of thorax. From side, dorsal line of thoracic part slightly rounded towards fovea, straight from there towards eye-region; clypeus straight. Margins and striae with very short hairs, eye-region and upper two-thirds of clypeus with long hairs.

Eyes. — Eye-region slightly narrower than head. Anterior row lightly procurved, posterior row straight. PME on large black tubercles which are fused with the black spot of the AME. Diameter of PME 0.12-0.13 mm, diameter of AME about 0.6 of PME, laterals barely larger than AME. PME separated from each other by 2.0 diams., from PLE by 1.0 diam., and from AME by 1.2 diams. of PME. Height of clypeus 0.26-0.27 of length cephalothorax.

Chelicerae. — Orange-brown as cephalothorax, without any suffusion. Basal tubercle on latero-dorsal corner distinct. Lateral surface with faint broken ridges on basal half. Dorsal row with five cheliceral teeth; basal pair slightly more ventral in position than apical triad; second tooth twice as large as basal tooth, apicals much smaller and close together, less than half as large as basal tooth; ventral row with five small teeth, gradually diminishing in size in apical direction, basal tooth opposite to and as large as third tooth of dorsal row.

Gnathocoxae. — Colour as cephalothorax, very lightly suffused with grey; sides converging towards front, apices rounded. Labium orange-brown, anterior margin raised but barely lighter. Sternum orange, with very faint suffusion; narrowly produced between coxae IV, width 0.9 of length or slightly more.

Legs. — Coxae and femora light orange-brown, fading into yellow-brown on tibiae and following segments; faintly suffused with grey, strongest on posterior legs. Legs long and slender; femur I 1.2 times as long as cephalothorax, length of tibia I 13.5-14.5 diams. of segment. Measurements in mm (of holotype):

	I	II	III	IV	palp
Fe	2.60	2.30	1.80	2.55	0.89
Pa	0.55	0.50	0.45	0.50	0.26
Ti	2.55	2.10	1.40	2.00	0.19
Mt	2.90	2.45	1.80	2.60	—
Ta	1.50	1.15	0.85	1.05	0.97

Chaetotaxy. — Fe I dl'; II-IV d. Pa I-IV d''d', basal spine slightly shorter than apical one.

Ti	I - II	v'' _b	d''	v'	v''	l'	v'	l''	d'	[l'' _a l'' _a v'' _a v'' _a]
	III	v'' _b	d''	v'		l'			d'	[l'' _a l'' _a v'' _a v'' _a]
	IV		d''	v'		l'		l''	d'	[l'' _a l'' _a v'' _a v'' _a]

Mt I-IV dl'l''v_a

Length of d''-spine on tibia I 0.34 mm, diameter of segment at base of d''-spine 0.17-0.19 mm; on tibia IV 0.45 mm and 0.16 mm, respectively. Tm I 0.21-0.22. Position of d''-spine on tibia I 0.24-0.25.

Abdomen. — Cylindriform with a conspicuous postero-dorsal tubercle. Abdomen very light cream-coloured with relatively few black markings, differing in this respect from all other known species of the group. One pair of small oblong blackish spots present dorso-laterally on half length of abdomen, postero-dorsal tubercle blackish dorsally and posteriorly (holotype); paratype with two more pairs of small blackish dorso-lateral spots, approximately on one-fourth and three-fourths of length of abdomen. Posterior surface grey, ventral surface with a pair of ill-defined dark grey lateral spots on half length of abdomen, remainder of ventral surface, spinnerets and genital region lightly suffused with grey. Paratype with some very small white blotches dorso-laterally and laterally.

Palp (fig. 237, 238). — Segments orange-coloured, tibia with grey suffusion, cymbium heavily suffused with black. Patella short, dorsal spine slightly more than one and a half times as long as segment. Tibia equally short, much higher than long, with 12 to 15 long spines along anterior margin laterally and dorsally, spines as long as height of segment. Cymbium with

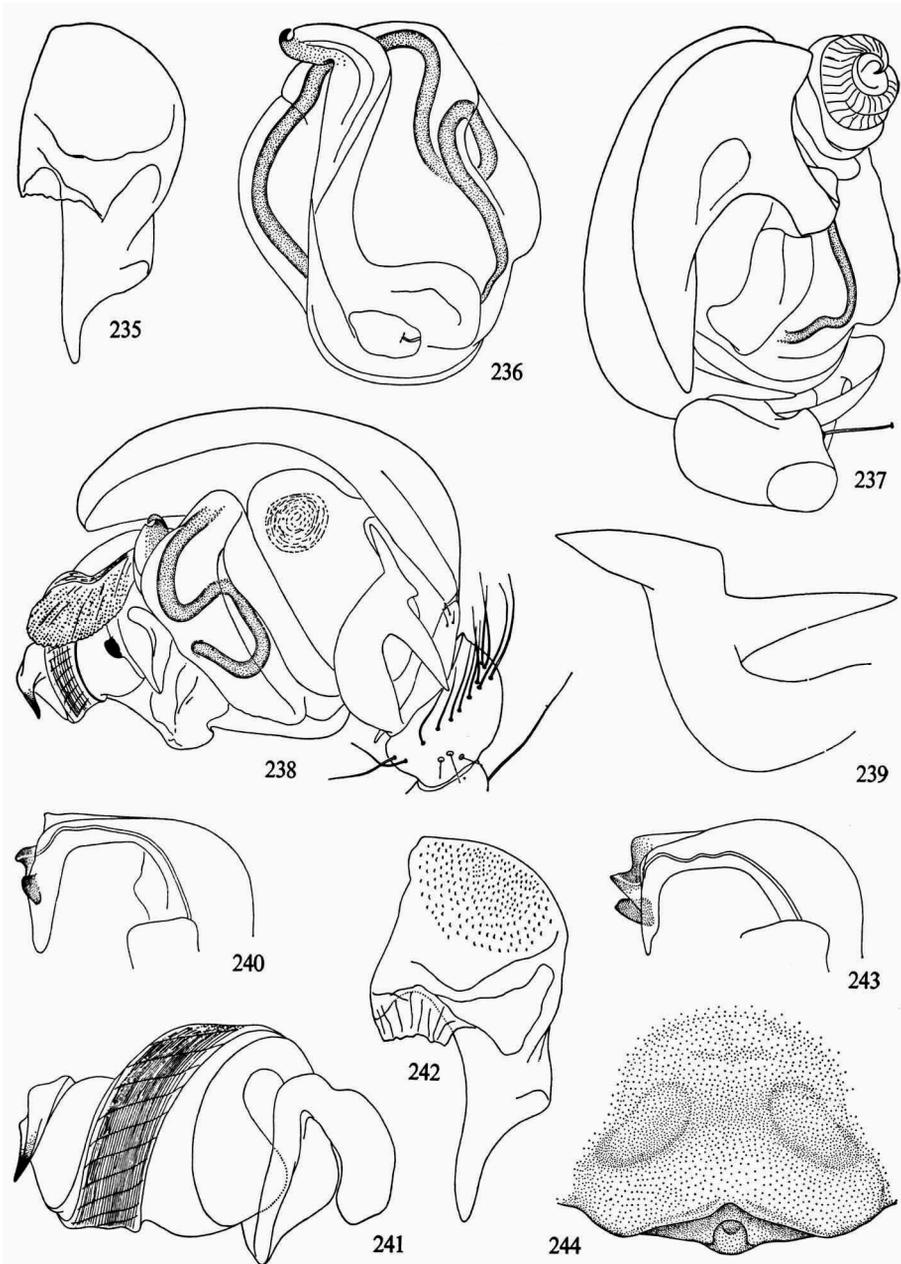


Fig. 235. *Neriene natalensis*, lamella, dorsal aspect. Fig. 236-242. *N. flammea*. 236, tegulum with median apophysis, mesal aspect; 237, male palp, ventral aspect; 238, do., lateral aspect; 239, tip of paracymbium; 240, embolus, dorsal aspect; 241, terminal apophysis; 242, lamella, dorsal aspect. Fig. 243-244. *N. conica*. 243, embolus, dorsal aspect; 244, epigyne. 235, $\times 49$; 236, 240, 244, $\times 67$; 237, 238, 242, $\times 53$; 239, 241, 243, $\times 95$.

a dorsal spine on distal half. Paracymbium with broad and flat distal arm (fig. 239), with the usual appendages apically and subapically; subapical appendage long and narrow, three times as long as wide at base, pointing backwards and tapering to a point, nearly parallel with distal arm; apical appendage pointing in anterior direction, barely shorter than subapical appendage but slightly broader. Tegulum not excavated ventrally. Median apophysis (fig. 236) curved perpendicularly backwards well before hook-shaped tip. Apical appendage of embolus (fig. 240) with rounded tip, and with large blunt and heavily pigmented tooth at base of appendage just distally of spermduct-tooth. Terminal apophysis (fig. 241) with slightly less than three coils; first coil saucer-shaped, second coil broad, last coil with narrow and sharply pointed tip, which points in ventral direction; axial body of second coil supported by concave anterior side of basal coil; anterior halves of second and third coils transversely grooved. Lamella (fig. 242) with narrow proximal tip tapering to a point, mesal and anterior margins evenly curved to blunt antero-lateral tip; lateral arm short, without free projection; lateral margin in front of arm straight; anterior two-fifths of dorsal surface in front of connecting membranes very lightly rugose. Transversal sclerite present, oblong, between anterior tip of radix and lateral arm of lamella.

Distribution and habitat. — South Africa (Natal and Cape Province). Both specimens originate from relatively low altitudes, probably below 600 m, but exact data on this point were not indicated on the labels. In both cases the specimen was found in leaf-litter. Adult in November and January.

Neriene conica (Locket) comb. nov.

(fig. 243-249)

Linyphia conica Locket, 1969, Public cult. Comp. Diamant. Angola, 77: 124, fig. 45, 46, 47C (description ♂, Angola).

Linyphia kibonotensis; Di Caporiacco, 1949, Comment. Pont. Acad. Scient., 13: 354 (p.p.; Kenya).

Types. — ♂ holotype from Angola, Alto Chicapa, at junction of Tchis-sango River and Cuango Muqué (MD); ♂ paratype from Alto Chicapa at base of Camutongola falls (BM).

Remarks. — Mr. G. H. Locket has been so kind as to allow me to examine the material of this species, when he was still describing it. The species is characterized by the very conspicuous postero-dorsal tubercle. The palp is of similar structure as in the other species of the *hammeni*-group, with a "hoe-shaped" paracymbium, and a typical saucer-shaped first coil of the terminal apophysis. The female is described here for the first time.

Male. — Measurements in mm. Total length 4.1-4.7; cephalothorax, length 1.8-2.1, width 1.2-1.35; abdomen, length 2.1-2.6, width 0.85-1.2, height 1.0-1.4; chelicerae, length 0.80-0.90, width 0.35-0.42.

Cephalothorax. — Light brown, lightly suffused with black, forming faint striae and narrow black margins along thorax. Sides evenly curved towards head, barely constricted at border of head and thorax, broadly cut off posteriorly. Width 0.7 of length, width of head 0.7 of width of thorax. From side, cephalothorax rising evenly from behind to eye-region; clypeus straight. Thorax smooth, with very small forwardly directed hairs on striae; eye-region and upper half of clypeus with spine-like hairs.

Eyes. — Both rows straight. Eye-region slightly narrower than head. PME on black tubercles. Diameter of PME 0.09 mm. PME separated from each other by 2.2-3.0 diams., from PLE by 1.3-1.6 diams., and from AME by 2.0 diams. of PME. AME smaller, their diameter 0.7 of PME, separated from each other by little more than their own diameter. Height of clypeus 0.22-0.24 of length of cephalothorax.

Chelicerae. — Light brown, lightly suffused with black. Evenly covered with short hairs, apical hairs longer. Basal tubercle small and blunt at latero-dorsal corner. Broken ridges of stridulating file faintly visible. Ventral row of cheliceral teeth with four to five teeth, small, evenly spaced, in a row near base of fang. Dorsal row with four to five teeth, second tooth large and more ventral than others.

Gnathocoxae. — Light brown, suffused with black, apically whitish. Labium brown, suffused with black, with light brown anterior border. Sternum black-brown; width 0.8 of length.

Legs. — Light yellow-brown, coxae IV lightly suffused with black, small black apical rings on femora and tibiae. All segments long and slender, length of femur I 1.4 times length of cephalothorax, length of tibia I 19-20 diams. of segment. Measurements in mm (of holotype from Angola):

	I	II	III	IV	palp
Fe	2.55	2.25	1.70	2.50	0.71
Pa	0.45	0.42	0.40	0.40	0.20
Ti	—	—	1.40	2.05	0.18
Mt	—	—	1.70	2.60	—
Ta	—	—	0.80	1.05	0.70

Chaetotaxy. — Fe I dl'l'; II-IV d. Pa I-IV d''d', basal spines weak.

Ti I - II v_b' d'' v' v'' l' v' l'' d' [l'_a l''_a v'_a v''_a],
 v_b' - spine not always present on tibia I.
 III d'' v' l' d' [l'_a l''_a v'_a v''_a]
 IV d'' v' l' l'' d' [l'_a l''_a v'_a v''_a]
 Mt I-IV dl'l''vd

Length of d''-spine on tibia I 0.21-0.27 mm, diameter at base of d''-spine 0.12-0.15 mm; on tibia IV 0.36 mm and 0.12-0.13 mm, respectively. Tm I 0.17-0.20. Position of d''-spine on tibia I 0.22-0.24.

Abdomen. — Cylindriform with large black postero-dorsal tubercle, protruding above spinnerets, and with black markings on light brown background. Dorsally a pair of black spots on one-third of length, connected with black base; two pairs of black spots on second third; narrow black transverse bar at base of posterior third, separated from black tubercle by a narrow light brown area; remainder of background light brown. Laterally with black markings, which are connected with the black base, transverse bar and postero-dorsal tubercle; a latero-dorsal light brown band running from front to dorsal black transverse bar; a bifid light brown latero-ventral stripe beginning just dorsally of operculum, and, turning in dorsal direction near spinnerets, reaching posterior surface of postero-dorsal tubercle; a perpendicular light brown bar connecting latero-ventral stripe with light brown dorsal background area; dorsal transverse bar in front of postero-dorsal tubercle and ditto band from behind posterior pair of dorsal spots running to some extent on lateral surface, but not reaching latero-ventral stripe. Ventral surface brownish-grey, opercula and genital area dark brown; spinnerets blackish.

Palp (fig. 248, 249). — All segments light brown, suffused with black. Patella short, dorsal spine measuring 1.5 times length of segment. Tibia with about 15 dorsal and lateral spines, which are slightly longer than greatest length of segment. Cymbium with a dorsal spine on distal half. Paracymbium with broad distal arm (fig. 248), which bears a subapical triangular appendage pointing in proximal direction, and an apical appendage pointing in distal direction, both two times as long as wide. Tegulum with a small protrusion on lateral surface, without ventral excavation. Median apophysis curved in ventral direction shortly before hook-shaped tip. Embolus (fig. 243) bent perpendicularly just proximally of spermduct-tooth; apical appendage short and narrow, with a comparatively very large truncate tooth close beside the equally large spermduct-tooth. Terminal apophysis (fig. 245) short, composed of a saucer-shaped basal coil and a broad apical coil, the latter ending bluntly at ventral side; element as a whole of short and rounded appearance. Lamella (fig. 249) with proximal tip narrowly pointed, mesal and anterior margins evenly rounded towards comparatively salient antero-lateral tip; lateral arm short, without free projection. Transversal sclerite small, oblong.

Female. — Measurements in mm. Total length 4.4; cephalothorax, length

1.9, width 1.25; abdomen, length 2.5, width 1.45, height 1.35; chelicerae, length 0.88, width 0.41.

Cephalothorax. — Blackish-brown, darkest at margins. Sides lightly constricted at border of head and thorax, posterior margin nearly straight. Width 0.65 of length. From side, dorsal line horizontal at fovea, lightly rising in front of fovea; clypeus straight. Eye-region and clypeus shortly haired, thorax with very short hairs on striae and along margins. Sizes of eyes as in male; PME separated from each other by 2.2 diams., from PLE by 1.0 diam., and from AME by 1.4 diams. of PME. Height of clypeus 0.20 of length of cephalothorax.

Chelicerae. — Brown, with blackish lateral surface and an oblique dorsal streak each. Stridulating file with broken ridges only. Dorsal row with five equidistant teeth; second and third teeth slightly larger than basal and fourth teeth, which are of equal size, fifth tooth small. Ventral row with five small equidistant teeth, basal tooth opposite to third dorsal tooth, all as small as apical dorsal tooth. Gnathocoxae, labium and sternum slightly darker than in male.

Legs. — Yellow-brown to light brown, with grey suffusion and streaks; coxae, femora, patellae and tibiae with narrow dark grey apical rings; streaks and suffusion heaviest on legs III and IV. Length of femur I 1.35 times length cephalothorax, length of tibia I 12 diams. of segment. Measurements in mm (of available specimen from Kenya):

	I	II	III	IV
Fe	2.60	2.25	1.75	2.55
Pa	0.55	0.55	0.45	0.50
Ti	2.50	1.95	1.35	1.95
Mt	2.60	2.15	1.65	2.40
Ta	1.40	1.10	0.75	1.05

Chaetotaxy. — As in male, v_b'' -spine present on tibiae I and II. Length of d'' -spine on tibia I 0.45 mm, diameter of segment at base of d'' -spine 0.21 mm; on tibia IV 0.50 mm and 0.19 mm, respectively. Tm I 0.25. Position of d'' -spine on tibia I 0.25.

Abdomen. — Postero-dorsal tubercle conspicuously large and protruding far posteriorly of spinnerets. Dorsal surface blackish on anterior third, followed by a lighter mesal area flanked by three pairs of blackish spots; first pair connected laterally with black markings at sides, others about isolated; dorsal surface of postero-dorsal tubercle black; anterior spot bordered by white spotted streaks, which continue towards postero-dorsal tubercle and reach between the dorsal spots. Lateral surface blackish, with a light horizontal band on anterior third, followed by two light spots; first spot on

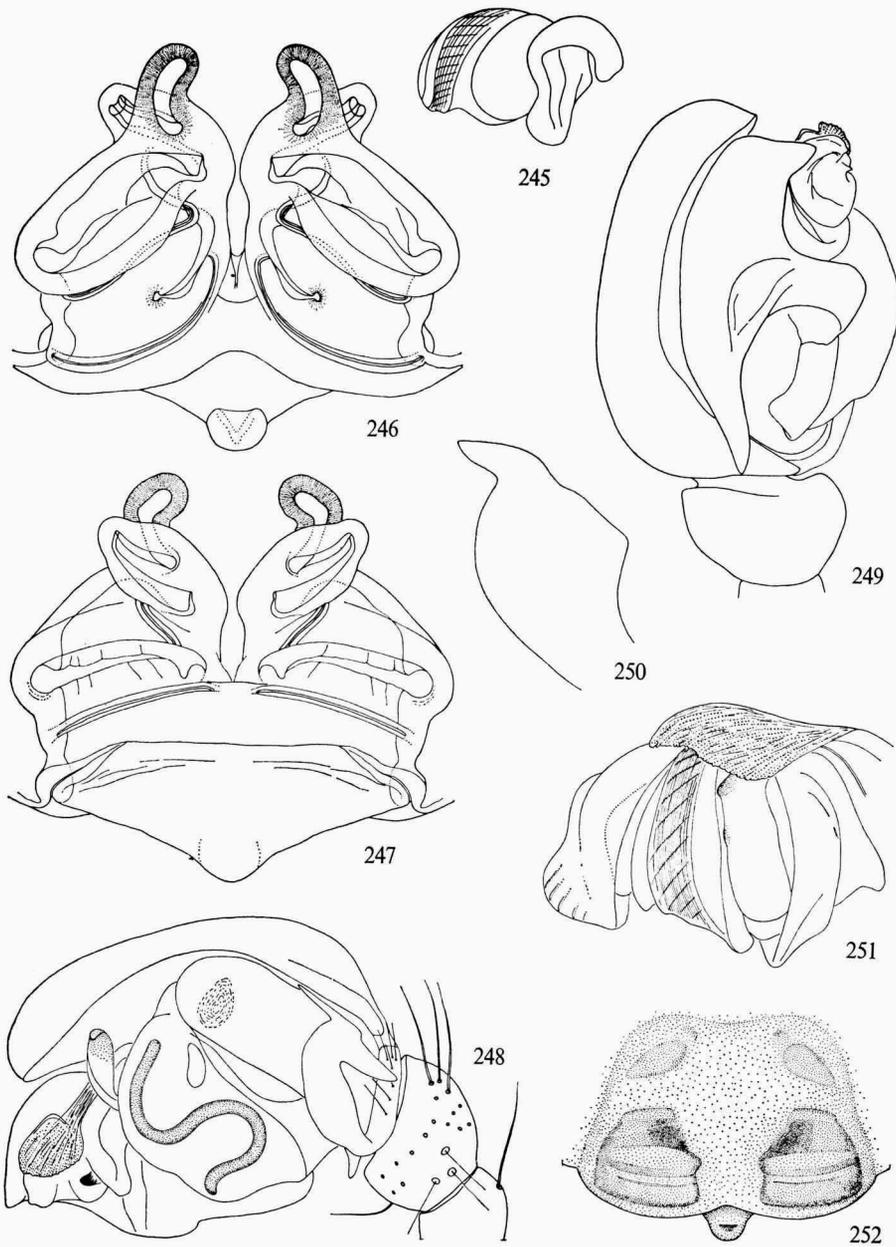


Fig. 245-249. *Neriene conica*. 245, terminal apophysis; 246, vulva, ventral aspect; 247, do., dorsal aspect; 248, male palp, lateral aspect; 249, do., ventral aspect. Fig. 250-252. *N. beccarii*. 250, tip of paracymbium; 251, terminal apophysis with tips of embolus and embolic membrane, lateral aspect; 252, epigyne. 245, 250, 251, $\times 95$; 246, 247, $\times 113$; 248, 249, $\times 67$; 252, $\times 54$.

half length of abdomen, fused with light dorso-lateral band, second spot small and isolated; posterior surface with a narrow light streak on either side, reaching tip of postero-dorsal tubercle; lateral and posterior bands and spots with many white blotches. Ventral surface uniformly black. Opercula and spinnerets black. Spinnerets surrounded by small light points.

Epigyne (fig. 244). — Brown with black suffusion; one pair of comparatively small clear brown translucent areas, broadly separated from posterior margin. Posterior margin shallowly excised in the middle and rounded at sides. Scape curved to ventral side.

Vulva (fig. 246, 247). — Slightly wider than long. Spiral grooves with slightly less than two coils; entrances in the middle of ventral wall of either atrium, turning-points laterally of receptacula, which stick out at anterior side. Width of epigyneal aperture 0.38 mm.

Distribution and habitat. — Central Africa (Kenya, Ruanda, Angola). Apparently the species is much scarcer than *N. kibonotensis* and *helsdingeni*. As habitat, detritus, low plants and shrubs are recorded.

Material examined.

Angola. — 1 ♂ 2 subadult ♀, Alto Chicapa, at junction of Tchissango River and Cuango Muqué, gallery forest, soil and litter, 16.vii.1954, A. de Barros Machado (holotype; MD). 1 ♂, Alto Chicapa, base of falls of Camutongola, swept from herbaceous plants, 24.vi.1954 (paratype; BM).

Ruanda. — 1 subadult ♀, Nyanza, 1939, A. Lestrade (MT).

Kenya. — 1 ♂, Nairobi, 1944, A. Toschi & Meneghetti (*Linyphia kibonotensis*; Di Caporiacco, 1949 (p.p.); LZAB). 1 ♀, Wispers Farm near Nairobi, 1900 m, on rose-bush, 24.ix.1965, V. Mahnert (ZII).

Nerienne beccarii (Thorell) comb. nov.

(fig. 250-256)

Linyphia beccarii Thorell, 1890, Ann. Mus. civ. Stor. nat. Genova, 28: 250 (description ♀ ♂, Sumatra); 1892, Ann. Mus. civ. Stor. nat. Genova, 31: 464 (catalogue). — Simon, 1894, Hist. nat. Araign., 1: 693 (note).

Types. — ♂ lectotype, by present designation, from Sumatra, Mt. Singgalang (MG); 8 ♀ paralectotypes from same locality (5 ♀ MG, 3 ♀ MS). The syntype-series apparently was divided between Genova and Stockholm.

Male. — Measurements of lectotype in mm. Total length 3.9; cephalothorax, length 1.8, width 1.3; abdomen, length 2.0, width 1.0, height 1.1; chelicerae, length 0.79, width 0.36.

Cephalothorax. — Light brown (faded specimen) with faint striae. Posteriorly not incised, sides evenly curved, not constricted at border of thorax and head. Width of cephalothorax 0.7 of length; width of head near PME

0.55 of width of thorax. From side, rounded posteriorly and rising towards fovea, dorsal line of head rising more steeply to eye-region; clypeus straight. Eye-region and upper half of clypeus with hairs, some of which are spine-like.

Eyes. — Eye-region occupying whole width of head. Posterior row slightly recurved, anterior row slightly procurved. PME situated on conspicuous black tubercles. PME separated from each other by slightly more than 2.0 diams., from PLE by 1.2 diams., from AME by 1.3 diams. of PME. Diameter of PME 0.11 mm, AME smaller, their diameter 0.65 of diam. of PME, separated from each other by their own diameter. Height of clypeus 0.24 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Basal tubercle small, blunt. Stridulating files composed of broken ridges. Six teeth in dorsal row, basal three situated more ventrally than apical three; second tooth largest, others ranging from half its size to slightly smaller apical tooth; third tooth close beside second one, others equidistant. Ventral row with six teeth, equidistant, basal tooth as large as and opposite to third tooth of dorsal row, other teeth of same size, except apical one, which is slightly smaller.

Gnathocoxae. — Light brown, lightly suffused with black, apices whitish; sides straight, slightly converging; apices curved inwards. Labium blackish brown, rebordered third lighter. Sternum light brown, suffused with black; width 0.85 of length, produced between coxae IV.

Legs. — Uniformly light brown. Legs long and slender, length of femur I 1.2 times length of cephalothorax, length of tibia I 15.5 diams. of segment. Measurements (of lectotype) in mm:

	I	II	III	IV	palp
Fe	2.20	1.95	1.40	1.95	0.75
Pa	0.47	0.45	0.40	0.40	0.22
Ti	2.15	—	1.20	1.65	0.30
Mt	2.40	—	1.45	2.20	—
Ta	1.35	—	0.70	1.00	0.87

Chaetotaxy. — Fe I 1' on one side, the other femur I bearing no spines; II-III d; IV -. Pa I-IV d''d', basal spine small.

Ti	I	d''	v'	v''	l'	v'	l''	d'	[l'' _a l'' _a v' _a v'' _a]
	II	(missing)							
	III	d''			l'	v'		d'	[l'' _a l'' _a v' _a v'' _a]
	IV	d''			l'	v'	l''	d'	[l'' _a l'' _a v' _a v'' _a]
Mt	I-IV	d'l''vd							

Length of d''-spine on tibia I 0.25 mm, diameter of tibia at base of d''-spine 0.14 mm; on tibia IV 0.37 mm and 0.13 mm, respectively. Tm I 0.17. Position of d''-spine on tibia I 0.21.

Abdomen. — Cylindriform, postero-dorsal tubercle not accentuated. Light cream-coloured background, with blackish pattern, resembling that of female (abdomen of lectotype badly preserved, wrinkled). Ventrally uniformly blackish.

Palp (fig. 253, 256). — I have not dissected a palp of the only available male, viz., the lectotype. The description and figures are, therefore, based on external examination only.

Segments light brown, cymbium slightly darker. Patella with dorsal spine slightly longer than segment. Tibia with 18 spines on dorso-lateral and ventro-lateral surfaces, not much longer than segment. Cymbium with a distinct dorsal spine on distal half. Paracymbium (fig. 250) with posterior margin of broad and flat distal arm obtusely angular in the middle, but not drawn out into an appendage; narrow tapering apical appendage pointing slightly in anterior direction, anterior margin of arm curving strongly backwards shortly below this appendage. Tegulum without excavation ventrally. Median apophysis with hook-shaped tip pointing in dorsal direction. Embolus with barely raised pigmented spot distally of spermduct-tooth; apex of apical lobe rounded. Terminal apophysis (fig. 251) with three coils; general structure as in *sundaica* and *macella*, but last coil nearly parallel with second coil. Lamella with short lateral arm, without free lateral projection. Transversal sclerite present between lateral arm of lamella and tip of radix.

Female. — Measurements in mm. Total length 3.95-4.7; cephalothorax, length 1.5-1.8, width 0.95-1.1; abdomen, length 2.4-2.9, width 1.35-1.85, height 1.2-1.9; chelicerae, length 0.75-0.82, width 0.35-0.37.

Cephalothorax. — Brown, suffused with black, particularly at eye-region and sides; with narrow grey-brown lateral margins. In dark specimens cephalothorax black-brown, only central area lighter. From above, posteriorly broadly but superficially excised, barely constricted at border of head and thorax; width 0.6-0.65 of length, width of head 0.7 of width of thorax. From side, dorsal line rising evenly from posterior margin towards eye-region, interrupted by more level fovea; clypeus straight. Diameter of PME 0.11-0.12 mm, lateral eyes barely smaller, diameter of AME 0.6 of diam. of PME. PME separated from each other by 1.7 diams., from PLE by 0.7 diam., and from AME by 1.1 diams. of PME. AME separated by their own diameter. Height of clypeus 0.17-0.20 of length of cephalothorax.

Chelicerae. — Brown, suffused with black on lateral surface and on dorsal streak from mesally at base towards laterally at apex. Very faint, broken ridges visible on lateral surface. Six teeth in dorsal row, second and third teeth large, others diminishing in size towards base and apex, apical tooth

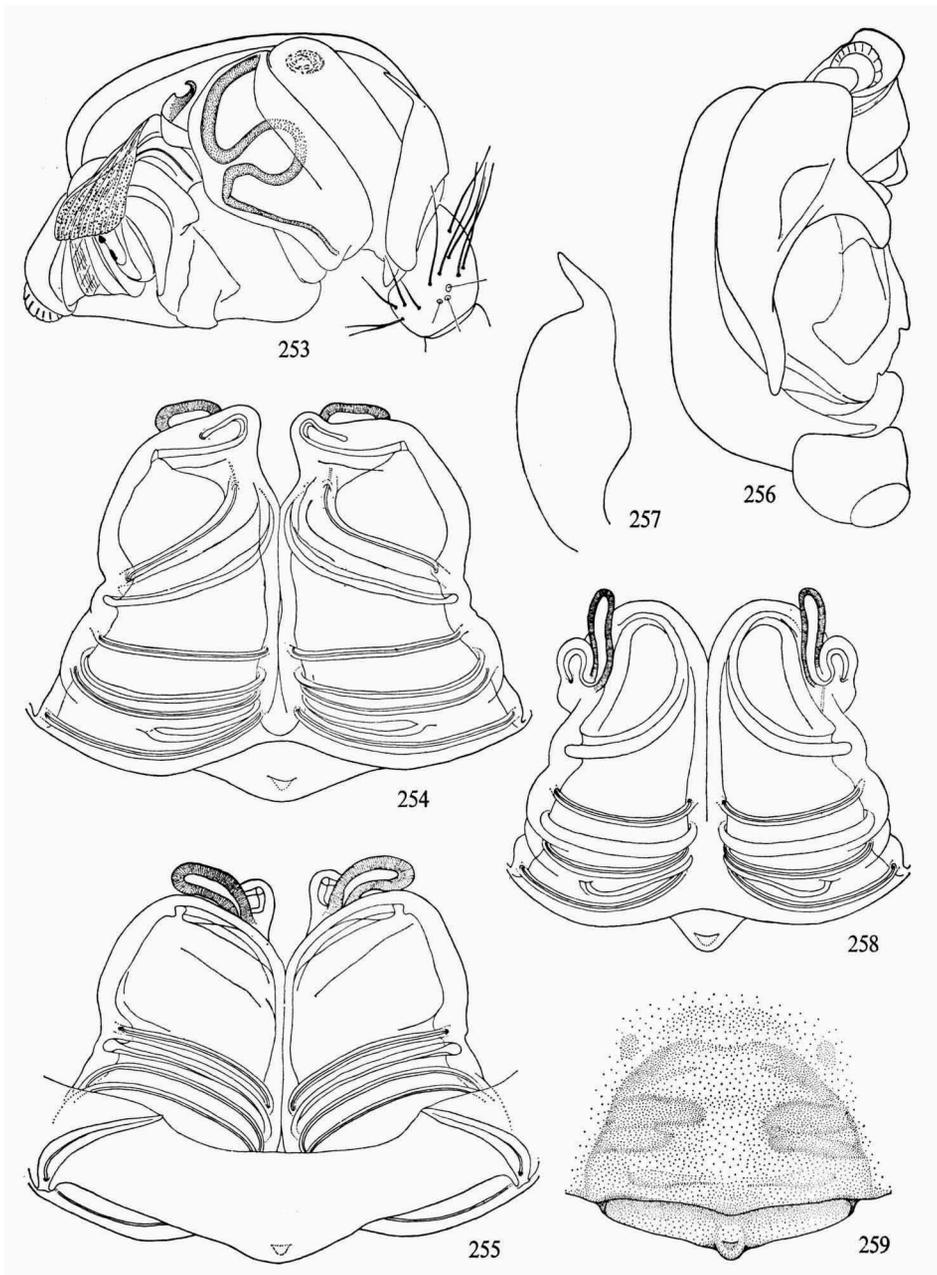


Fig. 253-256. *Neriene beccarii*. 253, male palp, lateral aspect; 254, vulva, ventral aspect; 255, do., dorsal aspect; 256, male palp, ventral aspect. Fig. 257-259. *N. macella*. 257, tip of paracymbium; 258, vulva, ventral aspect; 259, epigyne. 253, 256, $\times 57$; 254, 255, 258, $\times 89$; 257, $\times 95$; 259, $\times 67$.

very small; all equally spaced. Ventral row with six teeth, basal to fourth teeth of same size and equidistant, apicals smaller and close together; basal tooth opposite to third tooth of dorsal row.

Legs. — Yellow-brown, without annulations; dark specimens have the legs suffused with black to some degree, notably legs III and IV. Legs long and slender, length of femur I 1.3-1.5 times length of cephalothorax, length of tibia I 13-14 diams. of segment. Measurements (of paralectotype) in mm:

	I	II	III	IV
Fe	2.30	1.95	1.45	2.10
Pa	0.45	0.45	0.40	0.40
Ti	2.30	1.75	1.15	1.75
Mt	2.35	1.95	1.40	2.00
Ta	1.30	1.00	0.70	0.95

Chaetotaxy. — Fe I dl', some specimens with 2 l'-spines; II-III d; IV- . Pa I-IV d''d', basal spine weak.

Ti I - II d'' v' v'' l' v' l'' d' [l'_a l''_a v'_a v''_a]
 III - IV d'' l' v' d' [l'_a l''_a v'_a v''_a]
 Mt I-IV dl'l''v_dv_a

Length of d''-spine on tibia I 0.36-0.42 mm, diameter of tibia I near base of d''-spine 0.17-0.19 mm; on tibia IV 0.50-0.56 mm and 0.14-0.16 mm, respectively. Tm I 0.14. Position of d''-spine on tibia I 0.19-0.24.

Abdomen. — Light beige-grey background with white blotches and black-brown pigmented areas. Dorsally with central area of background colour, lightly suffused with black; this area occupying half width of abdomen from base to postero-dorsal tubercle, slightly attenuated in front; a row of two narrow background patches with white blotches sometimes present along border of the anterior half of the light central area; a large vertical background-coloured spot with white blotches on the lateral surface on half length of the abdomen, reaching the dorsal central light area; remaining part of dorsal surface with black pigment. Lateral surface with a series of background-coloured spots with white blotches from dorsal margin of operculum towards upper half of posterior surface; first spot horizontal, isolated, or fused with second vertical spot, which reaches dorsal surface; followed by two oval spots, the last one on the posterior surface, separated from corresponding spot on other side; remainder of lateral surface and ventral surface uniformly black-pigmented. Opercula and spinnerets light brown, suffused with black. In dark specimens the lateral spots relatively small and all isolated; central dorsal area heavily suffused with black and barely distinct from the pigmented parts of dorsal and lateral surface, the light dorsal spots

bordering this area on the anterior half of the abdomen very small or absent.

Epigyne (fig. 252). — Light brown, suffused with black, and with two large lateral brown translucent areas, which are connected with the posterior margin; scapus broad and blunt, small.

Vulva (fig. 254, 255). — About three and a quarter coils of spiral groove, from entrances in the middle of the ventral wall of either atrium towards the turning-points, the latter pointing in median direction; receptacula curved outwards. Width of epigyneal aperture 0.61-0.65 mm.

Distribution. — Sumatra.

Material examined.

Sumatra. — 8 ♀ 1 ♂, Mt. Singgalang, vii.1878, O. Beccari (♂ lectotype, ♀ paralectotypes; 1 ♂ 5 ♀ MG, 3 ♀ MS). 1 ♀, Sumatra (NMW).

Neriene macella (Thorell) comb. nov.

(fig. 257-262)

Linyphia macella Thorell, 1898, Ann. Mus. civ. Stor. nat. Genova, 39: 319 (description ♂, Burma).

Linyphia multidentis Thorell, 1898, Ann. Mus. civ. Stor. nat. Genova, 39: 321 (description ♀, Burma). [new synonymy].

Linyphia passercula Simon, 1901, Proc. Zool. Soc. London, 1901(2): 54 (description ♂, Malay Peninsula); 1905, Mitt. naturh. Mus. Hamburg, 22: 60 (note). [new synonymy].

Types. — ♂ holotype of *Linyphia macella* Thorell, from Burma, Bhamo (MG). ♀ lectotype of *Linyphia multidentis* Thorell, by present designation, from Burma, Bhamo; 5 paralectotypes (2 ♀ 3 subadults), from same locality (lectotype and 4 paralectotypes in MG; 1 ♀ MS). ♂ holotype of *Linyphia passercula* Simon, from Malay Peninsula, Thailand, Jalor (ZUC).

Remarks. — In the course of the present study it became evident, that the male specimen of *L. macella* and the female specimen of *L. multidentis*, both described by Thorell from Bhamo in Burma, belong to the same species. The shapes of the terminal apophysis and female atrium agree very well. The epigyneal aperture and male palp are smaller than in *Neriene sundaica* (see remarks under that species), which it resembles closely in all other characters. Both *macella* and *multidentis* probably were collected at the same locality and at the same time.

The ♂ holotype of *L. passercula* clearly belongs to this species too, having the same short terminal apophysis. The description of the male is mainly based on this specimen, because the only other available male, the holotype

of *macella*, is in a very bad condition; most legs are missing, and only one palp is left. I was not allowed to dissect a palp of either of the unique specimens of *passercula* or *macella*, and the elements of this organ are, therefore, depicted and described only in so far as they are visible at the unexpanded palp.

Male. — Measurements in mm. Total length 3.7-3.9; cephalothorax, length 1.8-1.95, width 1.25-1.4; abdomen, length 1.7-1.8, width 1.0-1.1, height 0.95-1.0; chelicerae, length 0.82-0.84, width 0.35-0.37.

Cephalothorax. — Light brown to light orange-brown, lightly suffused with black; striae not visible. From above, posterior margin barely excised, sides evenly curved with very shallow constriction at border of head and thorax; width 0.7-0.75 of length, width of head 0.55 of width of thorax. From side, rounded posteriorly, dorsal line of head rising slightly steeper than thorax; clypeus straight. Surface smooth, eye-region and upper half of clypeus with moderately long hairs and spinehairs.

Eyes. — Eye-region occupying nearly whole width of head. Both rows of eyes slightly procurved. PME on large black tubercles. Diameter of PME 0.10 mm, laterals smaller, diameter of AME 0.7 of diameter of PME. PME separated from each other by 2.0-2.1 diams., from PLE by 0.9-1.0 diam., and from AME by 1.3-1.4 diams. of PME. AME separated by about their own diameter. Height of clypeus 0.24 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax, lightly suffused with black. Small hairs on lateral and dorsal surfaces, long hairs near rows of cheliceral teeth. Basal tubercle small, blunt. Stridulating ridges not visible. Dorsal row with five to six teeth; basal pair situated more ventrally than others, nearly in line with ventral row; second tooth largest, basal and third teeth half as large, apicals small; all teeth equidistant. Ventral row with five small equidistant teeth, basal tooth opposite to third tooth of dorsal row.

Gnathocoxae. — Brown, suffused with black, apices lighter. Labium brown, heavily suffused with black, anterior border brown. Sternum brown, heavily suffused with black; width 0.8 of length.

Legs. — Yellow-brown, posterior pairs suffused with black on femora, patellae, and tibiae. Legs long and slender, length of femur I 1.3 times length cephalothorax, length of tibia I 18 diams. of segment. Measurements (of holotype of *L. passercula*) in mm:

	I	II	III	IV	palp
Fe	2.40	2.05	1.50	2.15	0.79
Pa	0.45	0.40	0.35	—	0.20
Ti	2.50	1.95	1.25	—	0.25
Mt	2.75	2.25	1.55	—	—
Ta	—	1.05	—	—	0.81

Chaetotaxy. — Fe I d' (or with 2 l'); II-IV d (IV sometimes without spine). Pa I-IV d''d', basal spine weak.

Ti	I - II	d''	v'	v''	l'	v'	l''	d'	[l'_a	l''_a	v'_a	v''_a]
	III	d''			l'	v'		d'	[l'_a	l''_a	v'_a	v''_a]
	IV	missing												

Mt I-IV dl''vd, v_a sometimes present.

Length of d''-spine on tibia I 0.15 mm, diameter of tibia I at base of d''-spine 0.14 mm; tibia IV missing. Tm I 0.13.

Abdomen. — Cylindriform, broadly rounded posteriorly. Faint dorsal pattern of grey pigmentation, background light-brown. Ventral surface uniformly grey-brown.

Palp (fig. 260). — Segments yellow-brown, cymbium darker. Patella with slightly twisted spine near distal margin, not much longer than segment. Tibia with about 15 spines on dorso-lateral and ventro-lateral surfaces; longest spines one and a half times as long as segment. Cymbium with a single dorsal spine on distal half. Paracymbium (fig. 257) with broad and flat distal arm, distal margin curving abruptly backwards near tip, leaving a narrow tapering appendage only. Tegulum not excavated ventrally. Median apophysis curved in dorsal direction proximally of hook-shaped tip. Embolus with pigmented tooth or wart distally of spermduct-tooth, and with apically rounded appendage. Terminal apophysis (fig. 262) with more than three coils; structure as in *sundaica*, without free projection at tip of short lateral arm; dorsal surface of apical third covered with small papillae. Transversal sclerite present.

Female. — Measurements in mm. Total length 3.9-4.25; cephalothorax, length 1.6, width 1.0; abdomen, length 2.1-2.45, width 1.35-1.6, height 1.4-1.75; chelicerae, length 0.80, width 0.37.

Cephalothorax. — Yellow-brown, lightly suffused with black; margins narrowly grey. Posteriorly superficially excised; width 0.6 of length, width of head 0.6 of width of thorax. From side, dorsal line nearly straight from posterior margin to eye-region. Eye-region and upper half of clypeus with short hairs. Both rows of eyes straight. Diameter of PME 0.11 mm, laterals slightly smaller, diameter of AME 0.65 of PME. PME separated from each other by 1.8 diams., from PLE by 0.8 diam., and from AME by 1.1 diams. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.19 of length of cephalothorax.

Chelicerae. — Yellow-brown, suffused with black on lateral surface, and on dorsal streak from mesally at base towards laterally at apex. Broken ridges of stridulating file barely visible. Dorsal row with six cheliceral teeth, basal tooth small, second and fourth larger, third tooth largest, twice as long as

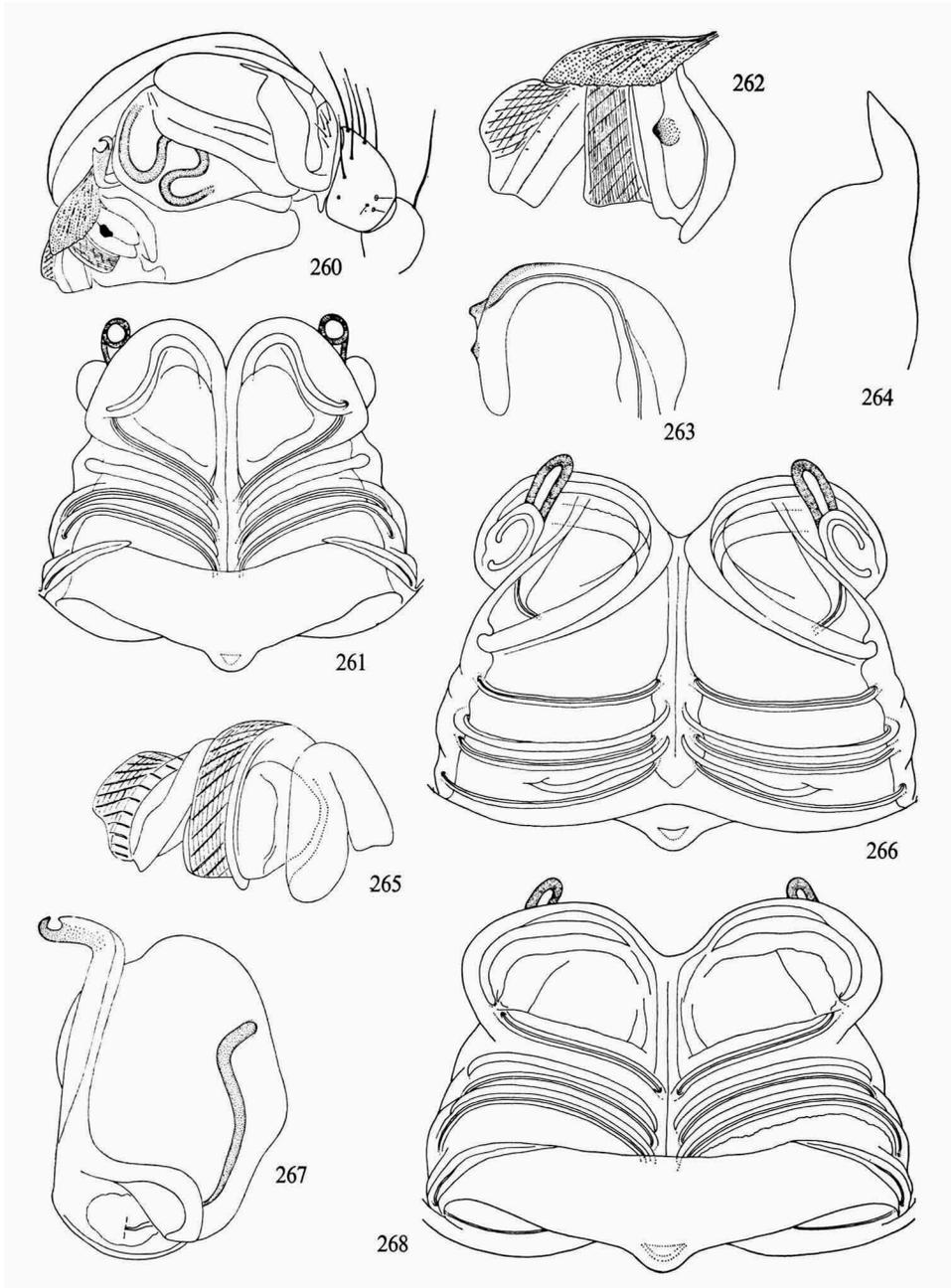


Fig. 260-262. *Neriene macella*. 260, male palp, lateral aspect; 261, vulva, dorsal aspect; 262, terminal apophysis with tips of embolus and embolic membrane, lateral aspect. Fig. 263-268. *N. sundaica*. 263, embolus, dorsal aspect; 264, tip of paracymbium; 265, terminal apophysis; 266, vulva, ventral aspect; 267, tegulum with median apophysis, mesal aspect; 268, vulva, dorsal aspect. 260, $\times 48$; 261, 266, 268, $\times 89$; 262, 264, 265, $\times 95$; 263, 267, $\times 67$.

basal tooth, apicals small. Ventral row with five small teeth, equidistant, diminishing in size from basal to apical tooth, basal tooth opposite to third tooth of dorsal row.

Legs. — Light yellow-brown, suffused with black, particularly on coxae, femora, patellae, and tibiae of legs III and IV; without annulations. Length of femur I 1.4-1.5 times length of cephalothorax, length of tibia I 14-15 diams. of segment. Measurements in mm (of the paralectotype in the Stockholm museum):

	I	II	III	IV
Fe	2.35	1.90	1.30	2.00
Pa	0.45	0.40	0.35	0.40
Ti	2.40	1.75	1.10	1.65
Mt	2.50	1.95	1.30	2.05
Ta	1.30	0.95	0.65	0.90

Chaetotaxy. — Fe I d1'; II-III d; IV spineless. Pa I-IV d''d', basal spine weak.

Ti I - II d'' v' v'' l' v' l'' d' $\begin{bmatrix} l'_a l''_a v'_a v''_a \end{bmatrix}$
 III - IV d'' l' d' $\begin{bmatrix} l'_a l''_a v'_a v''_a \end{bmatrix}$
 Mt I-IV d1''vd

Length of d''-spine on tibia I 0.25 mm, diameter of tibia I at base of d''-spine 0.16 mm; on tibia IV 0.31 mm and 0.14 mm, respectively. Tm I 0.13.

Abdomen. — Light yellow-brown background with black pigmentation and white blotches. Dorsal surface with a pair of small light spots with white blotches on one-third of length of abdomen. On half length of abdomen a vertical spot on lateral surface, yellow-brown with white blotches, reaching the dorsal surface. Lateral surface with a row of light spots; first spot small and round, second spot vertical, reaching dorsal surface, third spot small, fourth spot reaching posterior surface of abdomen. A small light area present at either side of spinnerets. Remaining parts of dorsal, lateral, and ventral surfaces dark grey-brown. Opercula and spinnerets of same colour.

Epigyne (fig. 259). — Very large, with two lateral translucent areas, which reach the posterior margin.

Vulva (fig. 258, 261). — Slightly wider than long, ratio 0.8 or slightly more. Spiral groove with two coils; entrances of grooves in ventral wall in the middle of either atrium near posterior margin; turning-point and receptaculum situated laterally of apex of atrium, both pointing in anterior direction. Dorsal wall with small scapus. Width of epigyneal aperture 0.50-0.53 mm.

Distribution. — Burma, Malay Peninsula.

Material examined.

Burma. — 1 ♂, Bhamo, L. Fea (♂ holotype of *Linyphia macella*; MG); 3 ♀ 1 subadult ♀, 2 subadult ♂, do. (♀ lectotype and paralectotypes of *Linyphia multidentis*; 1 ♀ paralectotype MS, others MG).

Malay Peninsula. — 1 ♂, Thailand, N. of Patani State, Jalor (or Jala), Mt. Bukit Besar, ix.1899, Skeat Expedition (holotype of *Linyphia passeracula*; ZUC)¹).

***Neriene sundaica* (Simon) comb. nov.**

(fig. 263-272)

Linyphia sundaica Simon, 1905, Mitt. naturh. Mus. Hamburg, 22: 59 (description ♀, Lombok, and ♂, Java). — Rack, 1961, Mitt. Hamburg Zool. Mus. Inst., 59: 36 (catalogue).

Types. — ♂ lectotype, by subsequent designation, from Java, Tjibodas (ZMH); 3 paralectotypes (2 ♀ 1 ♂), from Lombok (MNP).

Rack (1961), in her catalogue of type-specimens in the Zoologisches Museum at Hamburg, listed the ♂ holotype of *L. sundaica* to be present in the collection. Simon, however, did not select a holotype, and consequently I consider the ♂ specimen at Hamburg to be the lectotype of the species, designated by Rack (1961). The collection at the Museum National d'Histoire naturelle at Paris contains one tube with 2 ♀ and 1 ♂ of *sundaica* from Lombok, which are to be looked upon as paralectotypes.

Remarks. — The species seems related to *beccarii*, from which it can easily be distinguished by the differences in shape of the terminal apophysis in the male, and by the positions of the turning-points and receptacula in the vulva of the female.

Much greater is the resemblance between *sundaica* and *macella*. I cannot find morphological differences between the genitalia of the two species, but there is a difference in size of some parts at least of palp and vulva. In the male palp the length of the terminal apophysis, from posterior surface of first saucer-like winding to the tip of the element, measures 0.34 mm in *macella*, 0.39-0.42 mm in *sundaica*. The epigyneal aperture of the female vulva measures 0.50-0.53 mm in *macella*, corresponding with a width of vulva of 0.52-0.55 mm; in *sundaica* the epigyneal aperture measures 0.64-

1) The information about the locality, as given by Simon, is very short: "Jalor, Bukit Besar". On the tube label "September, 1899" is given as date of collecting. Skeat (1901: 585) listed all localities visited during the "Skeat Expedition", and from his paper we may infer, that Bukit Besar (or Indrigiri) is a mountain of 1000 m near Jalor [Jala, Yala] at the north of the Patani District, i.e. at the southern tip of Thailand on the Malay Peninsula.

0.68 mm, corresponding with a vulva width of 0.68-0.73 mm. The length of the vulva is the same in both species. The total length of males and females is also smaller in *macella* than in *sundaica*, but there is no difference in length of cephalothorax and femur I, which means that the differences in body-size are due to differences in abdominal size.

The small number of available specimens, 3 ♀ and 2 ♂ of either species, makes it impossible to decide with certainty about the true status of *sundaica*, and consequently I will provisionally treat it as a distinct species in this paper.

Male. — Measurements in mm. Total length 4.0-4.35; cephalothorax, length 1.75-2.15, width 1.35-1.55; abdomen, length 2.15-2.2, width 1.0-1.1, height 0.9-1.0; chelicerae, length 0.82-0.93, width 0.35-0.39.

Cephalothorax. — Light brown to light orange-brown, lightly suffused with black. Very superficially excised posteriorly, sides evenly curved, border of head and thorax barely constricted. Width of cephalothorax 0.75 of length; width of head 0.5 of width of thorax. From side, rounded posteriorly, becoming level near fovea, then rising slightly to eye-region; clypeus straight. Eye-region and upper half of clypeus with some hairs.

Eyes. — Eye-region occupying whole width of head. Posterior row straight, anterior row slightly recurved. PME on large black tubercles. PME separated from each other by 2.0 diams., from PLE by 1.0 diam., from AME by 1.2 diams. of PME. Diameter of PME 0.11-0.12 mm; AME smaller, their diameter 0.6 of diam. of PME, separated from each other by their own diameter. Height of clypeus 0.24-0.25 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax, lightly suffused with black. Basal tubercle small, blunt. Stridulating file barely visible. Five teeth in dorsal row, basal pair placed more ventrally than other three, which stand in a curved line towards base of fang; basal tooth rather small, second tooth two times as large, third small and close to second tooth, apical pair very small and close together, at some distance from third tooth; apical tooth rather at a distance from base of fang. Ventral row with five teeth, equidistant, all of approximately same size, as large as basal tooth of dorsal row; basal tooth opposite to third tooth of dorsal row.

Gnathocoxae. — Light brown, suffused with black; sides rather straight, converging, apically truncated obliquely. Labium light brown, heavily suffused with black, rebordered third lighter. Sternum light brown, heavily suffused with black; width 0.8 of length, produced between coxae IV.

Legs. — Uniformly light yellow-brown. Legs long and slender, length of femur I 1.2-1.4 times length cephalothorax, length of tibia I 18 diams. of tibia. Measurements (of lectotype) in mm:

	I	II	III	IV	palp
Fe	2.50	2.15	1.50	2.35	0.81
Pa	0.50	0.45	0.42	0.42	0.24
Ti	2.55	2.00	1.30	1.90	0.26
Mt	2.90	2.40	1.70	2.55	—
Ta	1.50	1.10	0.70	1.00	0.88

Chaetotaxy. — Fe I dl'^l; II-III d; IV -. Pa I-IV d''d', basal spine weak.

Ti I - II d'' v' v'' l' v' l'' d' [_al''_av''_av''_a]
 III - IV d'' l' v' d' [_al''_av''_av''_a]
 Mt I-IV dl''vd, v_a on Mt IV

Length of d''-spine on tibia I 0.18 mm, diameter of tibia at base of d''-spine 0.14 mm; on tibia IV 0.34 mm and 0.13 mm, respectively. Tm I 0.17. Position of d''-spine on tibia I 0.18-0.23.

Abdomen. — Cylindriform, postero-dorsal tubercle not very distinct. Light brown background-colour with pattern of dark grey, caused by pigmentation of outer layer. Pattern like female, but more obscure. Ventral side uniformly dark grey, opercula and spinnerets included.

Palp (fig. 269, 270). — Segments light yellow-brown, cymbium darker. Patella with slightly twisted dorsal spine near distal margin, not much longer than segment. Tibia with about 15 spines, arranged dorso-laterally and ventro-laterally, the longest of which are one and a half times as long as segment. Cymbium with a single dorsal spine on distal half. Paracymbium (fig. 264) with broad and flat distal arm, distal margin strongly curved backwards, leaving only a narrow tapering appendage. Tegulum without ventral excavation. Median apophysis (fig. 267) slender, curved in dorsal direction and backwards well before hook-shaped tip. Embolus (fig. 263) with a small pigmented wart on outer margin of apical appendage, not very close to spermduct-tooth as in African species; appendage apically rounded. Terminal apophysis (fig. 265) with three coils; basal coil saucer-shaped with concave distal side, which fits around axial part of second coil; second coil with a distinct rib between proximal membranous part and chitinous distal half, the latter transversely grooved; third coil emerging obliquely from second coil in lateral view; the sharp tip of the element lying mesally. Lamella (fig. 271) with short narrow proximal tip; mesal and anterior margins irregularly curved towards bluntly rounded antero-lateral tip; lateral arm short and broad, without free projection at tip; dorsal surface of distal third slightly roughened. Transversal sclerite present between anterior tip of radix and lateral arm of lamella.

Female. — Measurements in mm. Total length 4.4-4.5; cephalothorax, length 1.5-1.8, width 1.1-1.2; abdomen, length 2.6-2.8, width 1.6-1.7, height 1.8-1.9; chelicerae, length 0.81, width 0.36-0.39.

Cephalothorax. — Brown, suffused with black, with narrow grey margin. Shape as in male, but sides slightly more constricted at border of head and thorax; width 0.65 of length, width of head 0.6 of width of thorax. Both rows of eyes nearly straight. Diameter of PME 0.12-0.13 mm, laterals of same size, AME smaller, their diameter 0.6 of PME. PME separated from each other by 1.7-1.9 diams., from PLE by 0.6-0.65 diam., and from AME by 1.0 diam. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.19 of length of cephalothorax.

Chelicerae. — Brown, suffused with black on lateral surface and on dorsal streak from mesally at base towards laterally at apex. Lateral surface with obscure stridulating file, composed of very fine broken ridges. Dorsal row with six teeth, equidistant, basal tooth small, second tooth twice as large, third tooth slightly larger, then diminishing in size towards very small apical tooth. Ventral row with five to six equal and equidistant teeth, basal tooth opposite to third tooth of dorsal row, apical tooth, if present, very small and close to fifth.

Legs. — Uniformly light yellow-brown, without annulations. Length of femur I 1.45-1.5 times length of cephalothorax, length of tibia I 13-15 diams. of segment. Measurements in mm (of paralectotype from Lombok):

	I	II	III	IV
Fe	2.65	2.25	1.65	2.30
Pa	0.55	0.50	0.45	0.45
Ti	2.70	2.05	1.30	1.90
Mt	2.75	2.20	1.60	2.45
Ta	1.50	1.10	0.70	1.05

Chaetotaxy. — As in male, spines longer, as usual. Length of d''-spine on tibia I 0.36-0.37 mm, diameter of tibia I at base of d''-spine 0.19 mm; on tibia IV 0.50 mm and 0.14-0.16 mm, respectively. Tm I 0.12-0.13. Position of d''-spine on tibia I 0.19-0.22.

Abdomen. — Beige-coloured background with white blotches and black-pigmented areas. Latero-dorsal bands on basal half and three chevrons on posterior half of background colour with white blotches; remaining surface blackish, postero-dorsal tubercle included. Lateral surface with a series of background-coloured spots with white blotches; first spot oblong, horizontal, from dorsal margin of operculum to one third of length of abdomen; second spot oblong, vertical, on half length of abdomen; third spot vertical, smaller than second, fourth spot oblique, reaching posterior surface of postero-dorsal

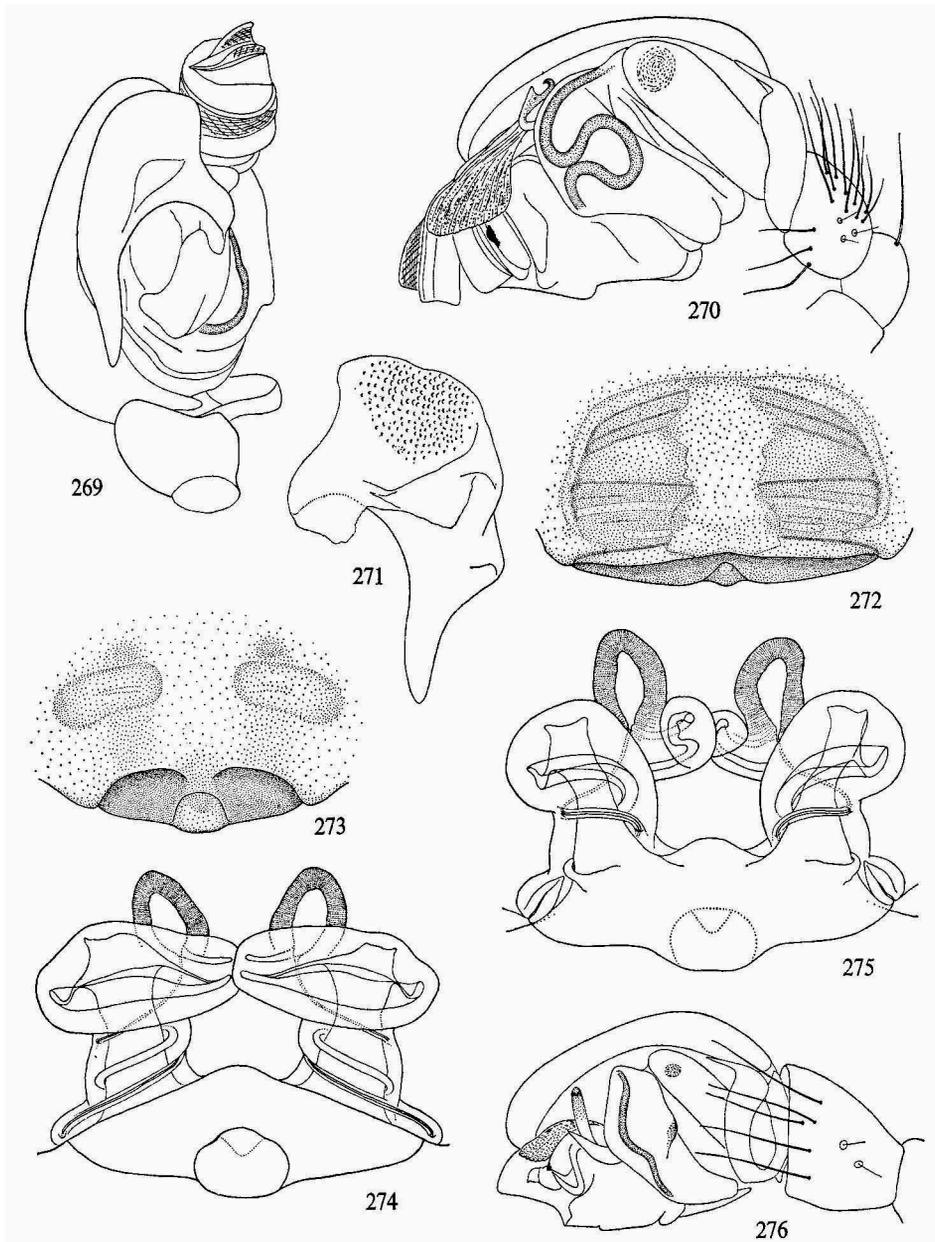


Fig. 269-272. *Neriene sundaica*. 269, male palp, ventral aspect; 270, do., lateral aspect; 271, lamella, dorsal aspect; 272, epigyne. Fig. 273-276. *N. amiculata*. 273, epigyne; 274, vulva, ventral aspect; 275, do., dorsal aspect; 276, male palp, lateral aspect. 269, 270, $\times 49$; 271, $\times 67$; 272, $\times 57$; 273, $\times 123$; 274, 275, $\times 213$; 276, $\times 100$.

tubercle; a small spot present on either side of spinnerets; remainder of lateral surface and whole ventral surface uniformly blackish. Opercula and spinnerets of same colour.

Epigyne (fig. 272). — Very large, with two clear brown translucent areas, which are narrowly separated by a mesal strip of normal hairy epidermis; translucent areas connected with posterior margin, and reaching as far as anterior tip of vulva.

Vulva (fig. 266, 268). — Wider than long, ratio 0.75 or less. Spiral grooves with three coils; entrances in ventral wall in the middle of either atrium near posterior margin; turning-points and receptacula ventro-laterally of apices, pointing in anterior direction and slightly to the mesal side. Dorsal wall with small scapus. Width of epigyneal aperture 0.64-0.68 mm.

Distribution. — Java, Lombok. No data about habitat available.

Material examined.

Java. — 1 ♂, Tjibodas, 25-28.iii.1904, K. Kraepelin (♂ lectotype; ZMH). 1 ♀, Java, iv.1908, A. H. Crook (HDO).

Lombok. — 2 ♀ 1 ♂, Lombok (paralectotypes; MNP).

***Neriene amiculata* (Simon) comb. nov.**

(fig. 273-280)

Linyphia amiculata Simon, 1905, Mitt. naturh. Mus. Hamburg, 22: 60 (description ♀ ♂, Java). — Rack, 1961, Mitt. Hamburg. Zool. Mus. Inst., 59: 36 (catalogue).

Types. — ♀ lectotype, by subsequent designation, from Java, Tjibodas (ZMH); 3 paralectotypes (2 ♀ 1 ♂) from same locality (MNP).

Rack (1961) recorded the ♀ holotype to be present in the collection of the Zoologisches Museum at Hamburg. This should be the ♀ lectotype, as Simon did not select a holotype when he described both sexes of the species in 1905. There are three more specimens (2 ♀ 1 ♂) from the same locality in the collection at Paris, which thus are paralectotypes.

Male. — Measurements in mm. Total length 2.6-2.8; cephalothorax, length 1.28-1.30, width 0.92-0.95; abdomen, length 1.5-1.7, width 0.75, height 0.6-0.7; chelicerae, length 0.58-0.60, width 0.25-0.27.

Cephalothorax. — Light brown to yellow (discoloured specimen). Posteriorly slightly excised, sides evenly curved towards head, slightly constricted at border of cephalon and thorax. Width 0.75 of length, width of head 0.55 of width of thorax. From side, rising evenly from behind, becoming slightly

more level near fovea, then rising again to eye-region; clypeus straight. Short hairs on striae as usual; eye-region and upper half of clypeus with short hairs only.

Eyes. — Posterior row slightly recurved, anterior row straight. Eye-region occupying whole width of head. PME on black tubercles. Diameter of PME 0.10 mm, laterals slightly smaller. PME separated from each other by 1.8 diams., from PLE by 0.6 diam., and from AME by 1.1 diams. of PME. AME smaller, separated by their own diameter, which measures 0.6 of diam. of PME. Height of clypeus 0.20 of length of cephalothorax.

Chelicerae. — Light brown as cephalothorax. Basal tubercle not present. Stridulating file obscure, grooves fine and close together, occupying two-thirds of length of chelicera. Ventral row with three to four teeth, small and equidistant. Dorsal row with four teeth, approximately equidistant, but basal tooth closer to second one; second tooth largest, third tooth opposite to ventral basal tooth.

Gnathocoxae. — Light brown, suffused with black. Labium dark brown, narrow anterior border lighter. Sternum brown, suffused with black; width 0.95 of length. Coxae IV separated by only slightly less than their own diameter and much wider than other coxae at one side.

Legs. — Uniformly yellow-brown. Legs long, length of femur I 1.95 times length of cephalothorax, length of tibia I 22 diams. of segment. Measurements (of ♂ paralectotype) in mm:

	I	II	III	IV	palp
Fe	2.50	2.25	1.50	2.10	0.44
Pa	0.42	0.39	0.33	0.33	0.15
Ti	2.50	2.15	1.20	1.80	0.15
Mt	2.75	2.40	1.45	2.25	—
Ta	1.50	—	0.70	1.00	0.39

Chaetotaxy. — Fe I dl'v'; II-III d; IV - . Pa I-IV d''d', basal spine short.

Ti	I - II	d''	v'	v''	l'	v'	l''	d'	[l'_a l''_a v'_a v''_a]
	III - IV	d''			l'	v'		d'	[l'_a l''_a v'_a v''_a]
Mt	I-IV	dl''vd							

The d''-spine on tibia I broken off; diameter at base of d''-spine 0.11 mm; on tibia II length of d''-spine 0.40 mm, diameter 0.11 mm; on tibia IV d''-spine broken off, diameter 0.10 mm. Tm I 0.18. Position of d''-spine on tibia I 0.24-0.25.

Abdomen. — Cylindrical, rounded posteriorly, without postero-dorsal tubercle. Ground-colour light brown to yellow with black-brown pattern. A

latero-dorsal series of three dark patches on posterior half, meeting posteriorly. Posterior surface black-brown. Ventral surface and ventral half of lateral surface brownish-grey, but this area light yellow in the ♂ paratype, probably due to fading of the grey pigmentation. Opercula and spinnerets as ventral surface.

Palp (fig. 276, 280). — Very small when compared with other species of the group. Segments yellow-brown, cymbium slightly darker. Patella short, with straight dorsal spine one and a half times as long as segment. Tibia slightly longer than high, with 5 spines along distal margin laterally. Cymbium spineless. Paracymbium with broad and flat distal arm, curved in distal direction and tapering to a point. Tegulum with small elevation on lateral surface. Median apophysis (fig. 277) slender, curved in dorsal direction on half length, tip hook-shaped. Embolus (fig. 279, *e*) with a rounded apical lobe distally of relatively large spermduct-tooth. Terminal apophysis (fig. 278, 279, *ta*) small, with about one and a half coil and sharp tip. Lamella (fig. 279, *l*) with narrow pointed proximal tip; anterior margin receding from antero-mesal tip towards very short lateral arm; free lateral projection not present. Transversal sclerite (fig. 279, *ts*) situated between lateral arm of lamella and anterior tip of radix.

Female. — Measurements in mm. Total length 3.1-3.45; cephalothorax, length 1.5, width 1.1; abdomen, length 1.8-2.1, width 1.1-1.35, height 1.15-1.25; chelicerae, length 0.75-0.80, width 0.32-0.35.

Cephalothorax. — Light yellow-brown, faintly suffused with black at posterior and lateral margins. Posterior margin straight or very superficially excised. Eye-region and clypeus with scanty short hairs. Width of cephalothorax 0.75-0.85 of length, width of head 0.6 of width of thorax. PME on very conspicuous black-pigmented tubercles, black rings around AME rather narrow, remaining area suffused with black. PME separated from each other by 2.0 diams., from PLE by 0.65 diam., and from AME by 1.1 diams. of PME. Diameter of PME 0.12 mm, diameter of AME 0.65 of diameter of PME; AME separated by their own diameter. Height of clypeus 0.16-0.18 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. No stridulating file visible. Dorsal row with five cheliceral teeth, equally spaced, basal and fourth teeth small, second and third twice as large, apical tooth very small. Ventral row with five teeth, equidistant, basal tooth as large as fourth tooth of dorsal row, situated opposite to third dorsal tooth. Ventral teeth gradually diminishing in size from base to apex.

Legs. — Light yellow-brown, without annulations. All segments long and

slender, femur I 1.6-1.7 times as long as cephalothorax, length of tibia I 15-16 diams. of segment. Measurements (of lectotype) in mm:

	I	II	III	IV
Fe	2.60	2.30	1.65	2.25
Pa	0.50	0.45	0.40	0.42
Ti	2.55	2.10	1.30	1.85
Mt	2.60	2.25	1.55	2.20
Ta	1.45	1.20	0.75	1.00

Chaetotaxy. — As in male. In one of the specimens small v_b'' -spines present on tibia I and II. Length of d'' -spine on tibia I 0.46-0.51 mm, diameter of tibia I near base of d'' -spine 0.15-0.16 mm; on tibia IV 0.55 mm and 0.14 mm, respectively. Tm I 0.17-0.18. Position of d'' -spine on tibia I 0.20-0.22.

Abdomen. — Light beige-coloured with isolated white blotches and darkly pigmented areas. Median dorsal surface beige-coloured up to three-fourths of length of abdomen, separated by a narrow black transverse bar from small spot of same colour on dorsal surface of postero-dorsal tubercle; black latero-dorsal sinuate bands running from base of second third of abdomen towards postero-dorsal tubercle, fused there with black transverse bar and black dorsal surface. Dorsal half of lateral surface beige-coloured with white blotches, posteriorly separated from other side by black posterior surface of abdomen; a small blackish band from dorsal margin of operculum towards first dent of latero-dorsal band on half length of abdomen. Ventral half of lateral surface blackish, ventral surface light brown suffused with black, lighter than ventral half of lateral surface. Opercula and spinnerets of same colour.

Epigyne (fig. 273). — Posterior margin with two lateral entrances of atria, separated by short rounded scape. Two clear brown lateral areas in the yellow-grey ventral surface, corresponding with the two large coils of the vulva.

Vulva (fig. 274, 275). — About one and a half coil of spiral groove towards turning-point, which lies mesally, pointing in dorsal direction. Receptaculum pointing in anterior direction. Entrance of spiral groove in lateral wall. Last coil of spiral groove very large. Epigyeal aperture 0.19-0.22 mm.

Distribution. — Java.

Material examined.

Java. — 1 ♀, Tjibodas, 1904, K. Kraepelin (lectotype; ZMH). 2 ♀ 1 ♂, Tjibodas (1904, K. Kraepelin?) (paralectotypes; MNP). 1 ♂, Buitenzorg (SMF).

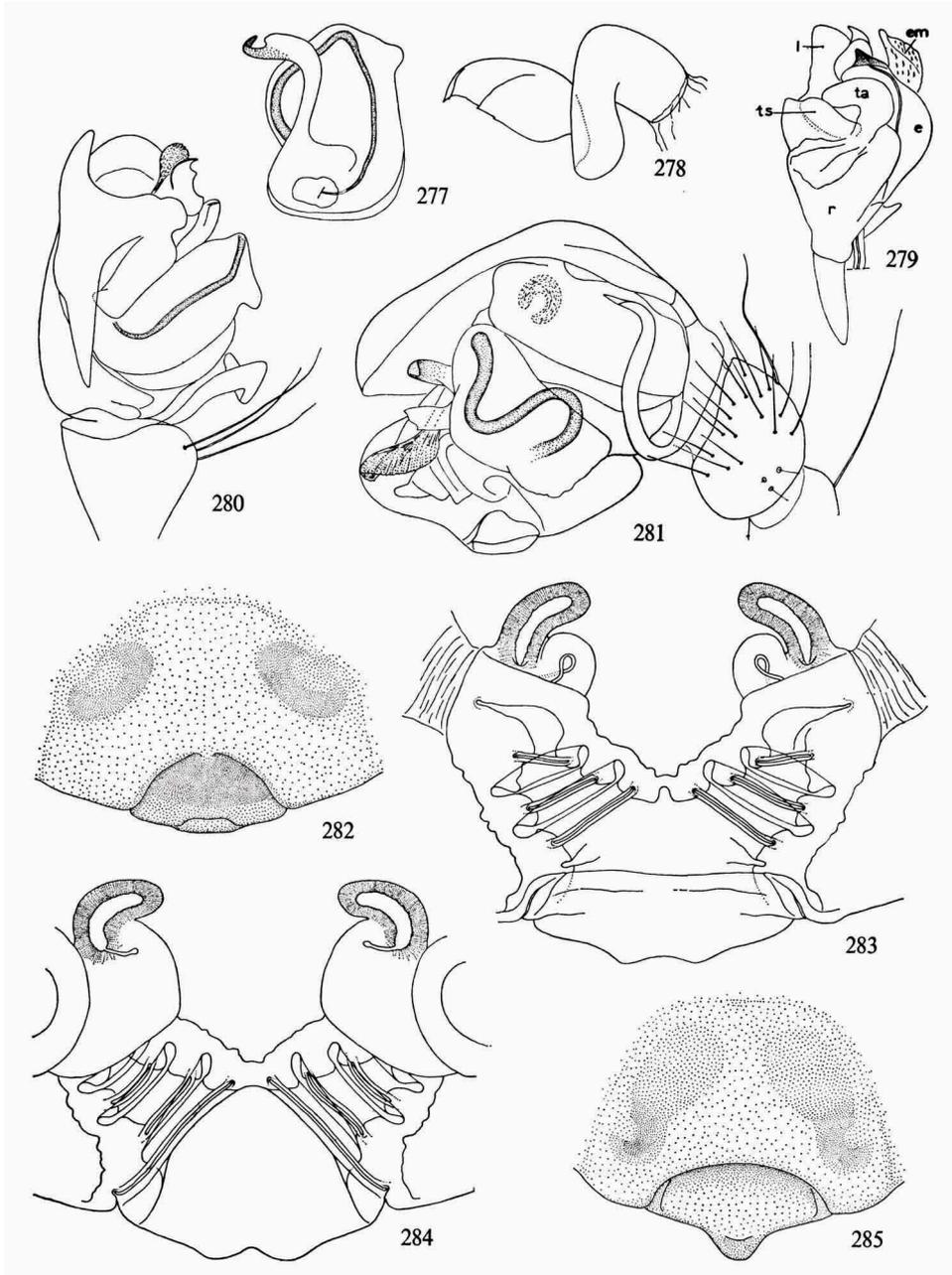


Fig. 277-280. *Neriene amiculata*. 277, tegulum with median apophysis, mesal aspect; 278, terminal apophysis; 279, embolic section, with radix(*r*), embolus(*e*), embolic membrane(*em*), terminal apophysis(*ta*), transversal sclerite(*ts*), and lamella(*l*); 280, male palp, ventral aspect. Fig. 281-284. *N. herbosa*. 281, male palp, lateral aspect; 282, epigyne, dorsal aspect; 283, vulva, dorsal aspect; 284, do., ventral aspect. Fig. 285. *N. brongersmai*, epigyne. 277, 280, $\times 100$; 278, $\times 308$; 279, $\times 123$; 281, 282, 285, $\times 67$; 283, 284, $\times 133$.

Neriene herbosa (Oi) comb. nov.

(fig. 281-284, pl. 2 fig. 4)

Linyphia herbosa Oi, 1960, Journ. Inst. Polyt., D, 11: 232, fig. 368-369 (description ♀, Japan, Honshu); 1964, Journ. Biol., 15: 30, fig. 35 (description ♂, Japan, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue).

Types. — ♀ lectotype, from Japan, Honshu, Kyoto Pref., Ashifu Forest (CO). In his paper Oi (1960) omitted to select a holotype. However, on request he now has selected a lectotype, the designation of which is published here. I have examined a female specimen of the type-series, but not the lectotype.

Remarks. — *Neriene herbosa* and *N. brongersmai*, which closely resemble each other in the structure of the genitalia and other details, deviate from the other species of the group in a number of characters. The paracymbium does not have a very broad and flattened distal arm but is much narrower, though still decidedly broader than in the *clathrata*-group. The median apophysis is not curved in dorsal direction and backwards, but both hook-shaped dorsal tip and membranous ventral tip point forwards, as they do in the *clathrata*-group. The shape of the terminal apophysis, as depicted for *N. brongersmai* (fig. 291), and the presence of a distinct transversal sclerite, seem to justify their inclusion in the *hammeni*-group. The basal coil of the terminal apophysis is distinctly saucer-shaped, and closely fits around the proximal end of the axial body of the element; in the *clathrata*-group the basal coil is always flat, disk-shaped, while there is no distinct chitinous axial body present at the second coil. A transversal sclerite is never present in the *clathrata*-group, and so far it has been found in all species of the *hammeni*-group.

Thanks to the kindness of Prof. Dr. R. Oi of Osaka, Japan, I have been able to examine the only ♂ specimen in his collection. I have not dissected a palp of this unique specimen.

Male. — Measurements in mm. Total length 4.0; cephalothorax, length 2.2, width 1.55; abdomen, length 2.05, width 1.05, height 1.0; chelicerae, length 0.95, width 0.37.

Cephalothorax. — Orange-brown, lightly suffused with black and with faint grey lateral margins, striae barely indicated. Posteriorly broadly but shallowly incised, sides evenly curved towards head, at border of head and thorax barely constricted. Width 0.7 of length, width of head 0.5 of width of thorax. From side, rounded posteriorly, rising evenly towards fovea, level from fovea to eye-region; clypeus straight. Small hairs in a row between

fovea and PME, eye-region and upper two-thirds of clypeus also with short hairs.

Eyes. — Eye-region occupying whole width of head. Posterior row straight, anterior row slightly procurved. PME on large black tubercles. PME separated from each other by 2.0 diams., from PLE by 1.1 diams., from AME by 1.4 diams. of PME. Diameter of PME 0.11 mm; AME smaller, their diameter 0.7 of diameter of PME, separated from each other by their own diameter. Height of clypeus 0.22 of length of cephalothorax.

Chelicerae. — Brown, lightly suffused with black. Basal tubercle small and blunt. Basal two-thirds of lateral surface with broken ridges. Dorsal row with four teeth, basal one situated at end of straight mesal side of chelicera, second tooth more ventral in position, apical pair very small and close together, widely separated from basal pair. Ventral row with five small teeth, apical tooth close to fourth, others equidistant; basal tooth opposite to second tooth of dorsal row.

Gnathocoxae. — Brown at base, fading into yellow-brown and white towards apices; lateral margins straight, obliquely truncated towards mesal tip. Labium brown, suffused with black; anterior border lighter. Sternum brown, lightly suffused with black, notably near margins; width 0.8 of length, produced between coxae IV, which consequently are clearly separated from each other.

Legs. — Light brown, femora with pro- and retro-lateral dark streaks. Femur I 1.1 times as long as cephalothorax, length of tibia I 13 diams. of segment. Measurements in mm:

	I	II	III	IV	palp
Fe	2.45	2.25	1.90	2.65	0.76
Pa	0.55	0.52	0.50	0.52	0.22
Ti	2.40	2.05	1.60	2.25	0.22-0.28
Mt	2.70	2.40	1.90	2.85	—
Ta	1.30	1.20	0.85	1.10	0.71

Chaetotaxy. — Fe I dl'; II-III dl'; IV d. Pa I-IV d''d', basal spine rather weak.

Ti I	v'' _b	d''	v'	v''	l'	v'	v''	l''	d'	[l'' _a l'' _a v' _a v'' _a]
II	v'' _b	d''	v'	v''	l'	v'		l''	d'	[l'' _a l'' _a v' _a v'' _a]
III - IV		d''			l'	v			d'	[l'' _a l'' _a v' _a v'' _a]
Mt I-II	dl''v _a ; III-IV dl'v _a .									

Length of d''-spine on tibia I 0.17 mm, diameter of tibia at base of d''-spine 0.20 mm; on tibia IV 0.20 mm and 0.17 mm, respectively. Tm I 0.26. Position of d''-spine on tibia I 0.22.

Abdomen. — Cylindriform. Blackish with lighter background colour and small lateral spots. Two white spots dorsally near base. Opercula light brown, spinnerets and ventral surface black.

Palp (fig. 281). — Description based on external examination only. All segments brown, suffused with grey. Patella with long straight spine, one and a half times as long as segment. Tibia with dorsal spine twisted and barely longer than segment; dorso-lateral and lateral surfaces with long hairs. Cymbium with a dorsal spine on distal half. Paracymbium with flat but relatively narrow distal arm, which is very lightly S-shaped, the sharp tip pointing forwards. Tegulum without ventral excavation. Median apophysis straight, both membranous ventral tip and hook-shaped dorsal tip pointing in anterior direction; ventral tip truncate. Embolus with an apically rounded appendage, which bears no pigmented spot or wart distally of spermduct-tooth. Terminal apophysis with two and a half coils; the slender tip of the element pointing forwards, not to the ventral side as in *brongersmai*. Lamella with narrow proximal tip and evenly rounded anterior margin; lateral arm of element short, ending in a free lateral projection, which has a sharp, outwardly curved tip. Transversal sclerite discernible between lateral arm of lamella and radix.

Female. — Measurements in mm. Total length 3.8-4.4; cephalothorax, length 1.5-1.75, width 1.15-1.3; abdomen, length 2.25-2.6, width 1.5-1.9, height 1.5-2.1; chelicerae, length 0.71-0.85, width 0.31-0.37.

Cephalothorax. — Light brown, head slightly darker, notably on posterior part. Shape as in male. Width 0.75 of length, width of head 0.6 of width of thorax. Eye-region with short hairs and some spinehairs. Both rows of eyes nearly straight. PME separated from each other by 1.7-1.9 diams., from PLE by 0.8-0.9 diam., and from AME by 1.3 diams. of PME. Diameter of PME 0.12 mm. AME separated by their own diameter, which measures half as long as diameter of PME. Height of clypeus 0.16-0.20 of length of cephalothorax.

Chelicerae. — Light brown as cephalothorax, lightly suffused with black on dorsal streak from mesally at base towards laterally at apex, and on lateral surface. Stridulating file conspicuous, composed of broken ridges, covering three-fifths of chelicera on lateral surface. Five cheliceral teeth in dorsal row, equidistant, basal tooth strong, second to fourth teeth nearly twice as large, apical tooth small. Ventral row with five small teeth, as large as apical tooth of dorsal row, equidistant, basal tooth opposite to third tooth of dorsal row.

Legs. — Light brown to yellow-brown, lightly suffused with black, without

annulations. Fe I 1.15-1.25 times as long as cephalothorax, length of tibia I 9.5-10.5 diams. of segment. Measurements (of lectotype) in mm:

	I	II	III	IV
Fe	2.05	1.90	1.55	2.00
Pa	0.55	0.50	0.45	0.50
Ti	2.00	1.75	1.25	1.75
Mt	2.00	1.80	1.45	2.00
Ta	1.25	1.00	0.70	0.95

Chaetotaxy. — Fe I dl'; II-IV d. Spines on patellae and tibiae as in male, but an additional v_6'' -spine on tibia III present in one specimen. Length of d'' -spine on tibia I 0.25-0.31 mm, diameter of tibia I at base of d'' -spine 0.18-0.21 mm; on tibia IV 0.37-0.41 mm and 0.14-0.17 mm, respectively. Tm I 0.23-0.24. Position of d'' -spine on tibia I 0.23.

Abdomen (pl. 2 fig. 4). — Beige-coloured background, with white blotches and black-brown pigmented areas. Dorsal surface with three large black spots on basal half; first spot on median line, broadly triangular with rather prolonged postero-lateral corners; the following two spots separated on median line, often narrowly connected with basal triangular spot and with the following black markings: apical half of abdomen with three black chevrons, separated from each other by beige-coloured background areas, laterally connected with black dorso-lateral band, last chevron followed by a small triangular beige-coloured spot; basal half with a dorso-lateral white band, composed of white blotches on beige-coloured background. Lateral surface with a horizontal row of beige-coloured spots with white blotches, row running from dorsal margin of operculum towards posterior surface of abdomen, continuous with row on other side; light spots separated by narrow black vertical bands, connecting the dorso-lateral black band with the black ventral half of the lateral surface. Ventral surface uniformly black. Opercula and spinnerets light brown, lightly suffused with black; genital area brown.

Epigyne (fig. 282). — Genital area rather bulging, opening small and semi-circular; a black-brown depressed area laterally on either side; posterior border with a blunt and apically emarginate scape.

Vulva (fig. 283, 284). — Spiral grooves with three and a half coils; entrances of grooves in lateral walls; turning-points at mesal sides of apices; receptacula apically, slightly curved inwards; atria diverging. Width of epigyneal aperture 0.19-0.20 mm.

Distribution and habitat. — Recorded only from Japan (Honshu). According to Oi (1960: 233) *herbosa* builds a web close to the ground on grass in open meadows. The collecting dates recorded by him (1960, 1964) range

from the end of April to the beginning of June, while the only male dates from late in April. From this we may infer the species to be adult in spring and early summer.

Material examined.

Japan, Honshu. — 1 ♀, Kyoto Pref., Ashifu Experimental Forest, 1.iv.1958, R. Oi (paralectotype; Oi, 1960; ML); 1 ♀, do., 25.v.1961, R. Oi (Oi, 1960; ML). 1 ♀ 1 ♂, Osaka Pref., Nara, Okuyama, 29.iv.1957, R. Oi (Oi, 1964; CO).

Neriene brongersmai spec. nov.

(fig. 285-293)

?*Linyphia limbatinella*; Oi, 1960, Journ. Inst. Polyt., D, 11: 229, fig. 358-359 (description ♀, Japan, Kyushu). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue; p.p.); 1962b, Misc. Rep. Res. Inst. Natur. Resources, 56/57: 132 (Japan, Kyushu; in Japanese).

Types. — ♂ holotype and ♀ paratype from Japan, Idzu [? = Izu Peninsula, Honshu], 12.vi.1910, S. Akiyama (BM).

Remarks. — Oi (1960) has recorded a female specimen from Japan, which he supposed to be the female of *Linyphia limbatinella* Bösenberg & Strand [= *Neriene limbatinella* (Bösenberg & Strand)]. *N. limbatinella*, however, belongs to another species-group, having the PME not on black tubercles, and with the PME closer to each other than to the PLE, while Oi mentioned distinct black tubercles, which are also very conspicuous in his figure (fig. 358). In fact *Neriene limbatinella* (Bösenberg & Strand) is the same species as described by Oi as *Prolinyphia bilineata* in the same paper (1960: 220). I have not seen the specimen of *limbatinella* mentioned by Oi, but I presume it to belong to a new species, described here from two specimens from Japan. The female at hand agrees very well with Oi's description (1960: 229) and figures (fig. 358-359).

It is possible that the specimen, mentioned by Yaginuma (1962b: 132) from Kyushu, also belongs to this species. He may have identified his specimen with Oi's description and figures rather than with the original description of Bösenberg & Strand, which is provided only with a very poor figure of the male palp.

It is a pleasure to name this species after Prof. Dr. L. D. Brongersma, Director of the Rijksmuseum van Natuurlijke Historie at Leiden.

Male. — Measurements of holotype in mm. Total length 4.8; cephalothorax, length 2.3, width 1.6; abdomen, length 2.4, width 1.6, height 1.7; chelicerae, length 1.06, width 0.41.

Cephalothorax. — Brown, striae faintly indicated, fovea a dark streak. Posteriorly narrowly incised, sides evenly rounded, sides of head straight. Width 0.7 of length; width of head 0.5 of width of thorax. From side, rounded posteriorly, rising steadily towards fovea, becoming more level there; clypeus straight, perpendicular to lower margin of cephalothorax. Head with two rows of hairs from fovea to PLE, and with some hairs on median line; eye-region and upper half of clypeus with hairs and spinehairs.

Eyes. — Eye-region occupying whole width of head. Both rows of eyes straight. PME largest and placed on black tubercles; diameter of PME measuring 0.11 mm; separated from each other by 2.0 diams., from PLE by 1.2 diams., and from AME by 1.5 diams. of PME. AME smaller, diameter 0.7 of diameter of PME, separated from each other by slightly less than their own diameter. Height of clypeus 0.21 of length of cephalothorax.

Chelicerae. — Brown like cephalothorax. Basal tubercle small and blunt. Stridulating files with broken ridges. Dorsal row of cheliceral teeth numbering four; basal pair situated nearly in one line with ventral row, second one largest; apical pair close together near base of fang, the apical tooth very small. Ventral row with four teeth, as large as basal tooth of dorsal row, equidistant; basal tooth situated slightly more ventral than second tooth of dorsal row.

Gnathocoxae. — Brown with white apices; sides straight, truncated obliquely at tip. Labium dark brown, anterior half lighter. Sternum dark brown; width 0.8 of length, produced between coxae IV.

Legs. — Light orange-brown; femora with pro- and retro-ventral dark streaks. Length of femur I 1.1 times length cephalothorax, length of tibia I 12 diams. of segment. Measurements (of holotype) in mm:

	I	II	III	IV	palp
Fe	2.50	2.35	2.00	2.75	0.81
Pa	0.55	0.55	0.50	0.55	0.22
Ti	2.40	2.10	1.70	2.35	0.25
Mt	2.65	2.35	1.90	2.75	—
Ta	1.50	1.20	0.90	1.10	0.85

Chaetotaxy. — Fe I ddl' ; II dl' ; III-IV d. Pa I-IV $d''d'$, basal spine rather weak.

Ti	I - II	v''_b	d'	v'	v''	l'	v'	l''	d'	$[l'_a l''_a v'_a v''_a]$
	III - IV		d			l'	v'		d'	$[l'_a l''_a v'_a v''_a]$
Mt	I-IV		$dl''vd$							

Length of d'' -spine on tibia I 0.21 mm, diameter of segment at base of d'' -spine 0.20 mm; on tibia IV 0.24 mm and 0.19 mm, respectively. Tm I 0.21. Position of d'' -spine on tibia I 0.25.

Abdomen. — More oval than cylindrical. Brown in ground colour, with obscure black dorsal markings in median area; ventral half of lateral surface black, ventral surface uniformly brown, suffused with black. Two lighter spots with white blotches near base at dorsal side. Opercula brown; genital area brown, suffused with black.

Palp (fig. 288, 292). — All segments brown, suffused with grey. Patella with long twisted spine more than one and a half times as long as segment. Tibia with twisted dorsal spine as long as patellar spine, and with many spinehairs on dorso-lateral and lateral surfaces. Cymbium with a dorsal spine on distal half. Paracymbium with flat narrow distal arm, which is very lightly S-shaped; tip sharp. Tegulum with straight ventral side. Median apophysis (fig. 290) rather robust with bifurcate tip; membranous ventral tip truncate, dorsal tip hook-shaped and chitinous. Embolus (fig. 289) with a curved membranous apical appendage, without any pigmented wart or spot. Terminal apophysis (fig. 291) with about three coils; basal coil saucer-shaped with concave anterior side, giving support to rounded proximal tip of axial part of second coil; the latter with the anterior half transversely grooved, the anterior margin serrate; apical coil not transversely grooved, but with fine ridges lengthwise, its sharp tip pointing in ventral direction; many villi present on axial body between second and third coil. Lamella (fig. 293) with slender and sharp proximal tip; anterior margin rounded from mesal side to lateral "tip", which is barely indicated by a thickening of the margin, and which lies slightly proximally of the anterior-most point of the element; lateral arm short, free lateral projection curved outwards as in *herbosa* but tip less sharp; dorsal surface of anterior third lightly roughened by small papillae. Transversal sclerite small, about diamond-shaped, lying between lateral arm of lamella and tip of radix.

Female. — Measurements of paratype in mm. Total length 4.3; cephalothorax, length 1.7, width 1.35; abdomen, length 2.45, width 1.85, height 2.1; chelicerae, length 0.88, width 0.40.

Cephalothorax. — Orange-brown, lightly suffused with black on striae and margins; eye-region heavily suffused with black; border of thorax and head brown, suffused with black downwards to lateral margins of head. From above, posterior border broadly but superficially excised, sides barely constricted at border of head and thorax. Width of cephalothorax 0.8 of length, width of head 0.6 of width of thorax. From side, dorsal line rising rather steeply towards fovea, dorsal line of head rising less steeply, clypeus straight. Very short hairs on striae, short hairs on posterior part of head, at eye-region, and on clypeus. Posterior row of eyes straight, anterior row

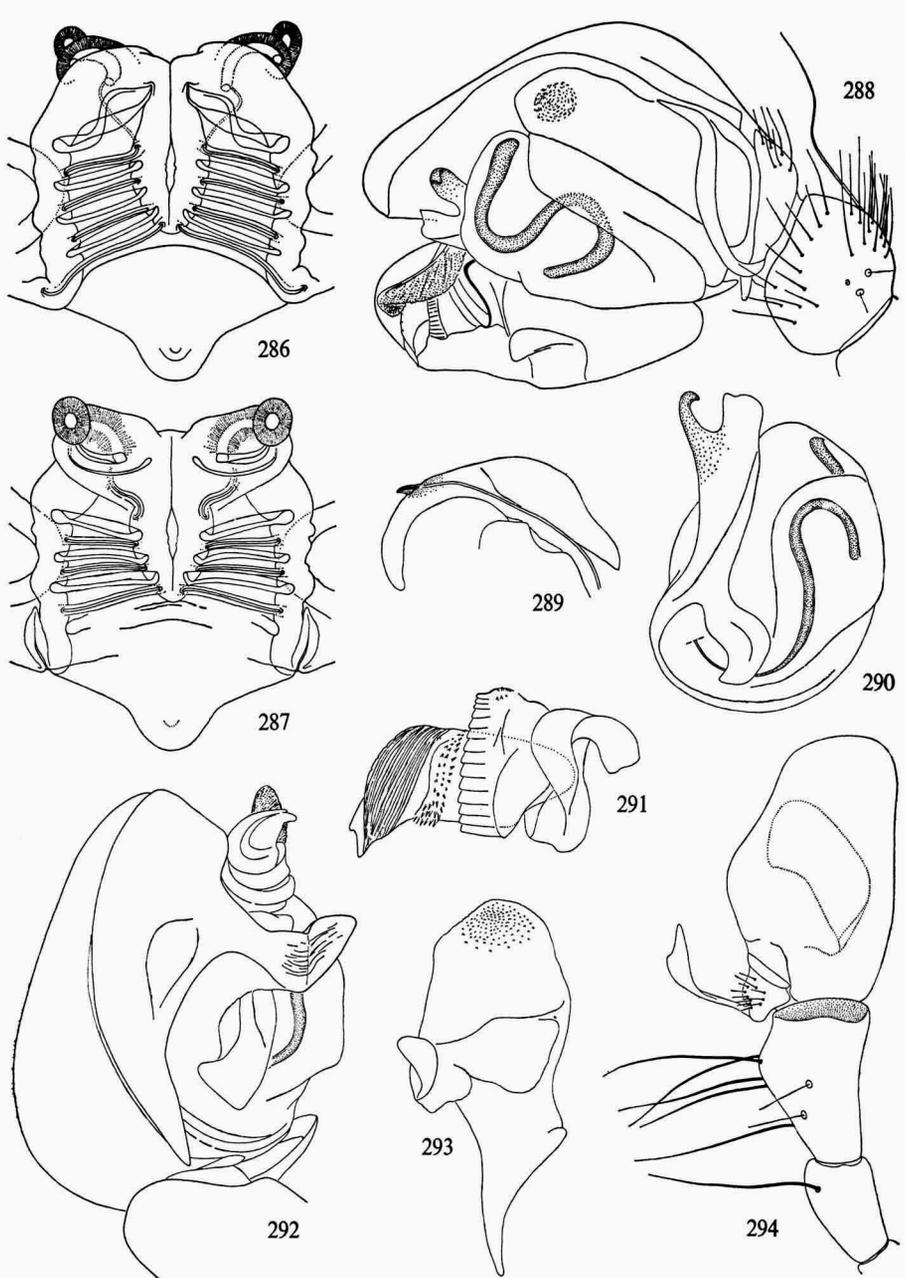


Fig. 286-293. *Neriene brongersmai*. 286, vulva, ventral aspect; 287, do., dorsal aspect; 288, male palp, lateral aspect; 289, embolus, dorsal aspect; 290, tegulum with median apophysis, mesal aspect; 291, terminal apophysis; 292, male palp, ventral aspect; 293, lamella, dorsal aspect. Fig. 294. *Neriene emphana*, male palpal tibia and cymbium, dorsal aspect. 286, 287, 289, $\times 89$; 288, 290, 292, 293, $\times 67$; 291, $\times 123$; 294, $\times 49$.

slightly procurved. PME large, their diameter 0.12 mm, PLE and ALE slightly smaller; diameter of AME 0.6 of diameter of PME. PME separated from each other by 1.8 diams., from PLE by 0.7 diam., and from AME by 1.2 diams. of PME. Height of clypeus 0.18 of length of cephalothorax.

Chelicerae. — Orange-brown as cephalothorax. Stridulating file on second third of lateral surface composed of broken ridges. Dorsal row with four teeth, basal and apical teeth of same size, second and third teeth nearly twice as large, equidistant. Ventral row with four teeth on one side, five on the other side, all of same size and equidistant, with the exception of the apical tooth (present on one side only), which is slightly smaller and situated close to fourth tooth; basal tooth opposite to third tooth of dorsal row.

Legs. — Light orange-brown to yellow-brown, without annulations. Femur I 1.15 times as long as cephalothorax, length of tibia I 8.5 diams. of segment. Measurements (of paratype) in mm:

	I	II	III	IV
Fe	1.95	1.85	1.55	2.00
Pa	0.50	0.50	0.45	0.50
Ti	1.95	1.65	1.20	1.60
Mt	1.90	1.70	1.35	1.75
Ta	1.25	1.05	0.75	0.90

Chaetotaxy. — Fe I d'l'; II-IV d. Spines on other segments as in holotype male. Length of d''-spine on tibia I 0.40 mm, diameter of tibia I near d''-spine 0.22 mm; on tibia IV 0.47 mm and 0.19 mm, respectively. Tm I 0.26. Position of d''-spine on tibia I 0.26.

Abdomen. — Abdomen of only available ♀ specimen preserved rather badly; inner layer of epidermis contracted and detached from outer layer; abdominal pattern obscure in consequence. Beige-coloured background with white blotches and black pigmented areas. Pattern as in *herbosa*, but black dorsal spots smaller, and chevrons narrower than intervening beige-coloured areas, narrowly connected with lateral black areas, as shown in Oi's figure of the abdomen (1960: fig. 358). Dorso-lateral white band composed of white blotches on beige-coloured background, continuous with row of lateral spots on posterior half of abdomen, these spots with many white blotches; remainder of lateral surface black. Ventral surface brown, suffused with black; opercula and spinnerets slightly lighter.

Epigyne (fig. 285). — Genital area bulging, brown, with comparatively small semi-circular opening, and with two lateral black-brown, slightly depressed areas; scape barely projecting, rounded, pointing in posterior direction.

Vulva (fig. 286, 287). — Spiral groove with four coils, entrance of groove in lateral wall; turning-point laterally of apex; receptaculum twisted, curving outwards, then in apical direction. Mesal walls of atria connected.

Distribution. — Japan (Honshu).

The *Neriene emphana* group

Neriene emphana (Walckenaer) comb. nov.

(fig. 294-304)

Linyphia emphana Walckenaer, 1841, Hist. nat. Ins., Aptères, 2: 246 (description ♀, France). — Simon, 1929, Arachn. France, 6(3): 630, 743, fig. 962-964 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 118, pl. 5 fig. 36, pl. 6 fig. 39-42 (genitalia). — Paik, 1957, Korean Journ. Biol., 2: 43, fig. 2-3 (Korea). — Yaginuma, 1957, Acta Arachn., 14: 54, 60, pl. 4 fig. 11 (Japan, Hokkaido); 1958, Misc. Rep. Res. Inst. Natur. Resources, 46/47: 71 (Japan, Honshu); 1960, Spid. Japan Colour: 41, pl. 12 fig. 75 (not 74!), textfig. 40-7 (Japan).

Prolinyphia emphana; Homann, 1952, Zool. Jahrb., Anat., 72: 349 (type-species of new genus *Prolinyphia*). — Wichle, 1956, Tierw. Deutschl., 44: 302, fig. 493-499 (key, Germany). — Oi, 1960, Journ. Inst. Polyt., D, 11: 221, pl. 25 fig. 347-351 (Japan, Hokkaido). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue). — Namkung, 1964, Atypus, 33/34: 35 (Korea). — Paik, 1965a, Educ. Journ., 3: 66, fig. 17-19 (Korea; in Korean).

Linyphia scalarifera Menge, 1866, Preuss. Spinnen, 1: 110, pl. 19 fig. 37 (description ♀ ♂, Danzig, now: Gdansk, Poland). — Thorell, 1870, Rem. syn. Europ. spid.: 47 (= *Linyphia emphana* Walckenaer).

Linyphia triangularis; Ohlert, 1867, Aran. Preussen: 44 (description, Germany). — Thorell, 1870, Rem. syn. Europ. spid.: 47 (= *L. emphana* Walckenaer).

?*Linyphia yunohamensis*; Peelle & Saito, 1933, Journ. Fac. Sci. Hokkaido Imp. Univ., (6) Zool., 2: 120, fig. 8 (Kuril Islands).

Linyphia marginata; Prószyński, 1961, Bull. Acad. polonaise Sci., (2)9: 129, fig. 1-4 (pairing).

For a complete list of synonyms up to 1939, see Bonnet (1957: 2500).

Types. — There are no type-specimens available of *Linyphia emphana* Walckenaer, nor of any of the synonyms. Walckenaer's original specimens cannot be traced in the collection of Simon at Paris. The specimens in the collection of Menge, now at Cambridge, U.S.A., bear no locality labels, and consequently it is not possible to trace the specimens on which he based his description of *Linyphia scalarifera*, if still in existence at all. I have not been able to trace the collection of Ohlert.

Remarks. — The original descriptions of Walckenaer and Menge both mention the characteristic abdominal pattern and the light colour of the cephalothorax and legs. Menge's figures of the genitalia are small but correct. There is no doubt about the identity of the species they described. The description of *Linyphia triangularis* from the hand of Ohlert (1867) unmistak-

ably refers to *Neriene emphana*, though Ohlert himself assumed to have recognized *Linyphia triangularis* (Clerck) sensu Walckenaer (1841: 240) [= *Neriene radiata*]. There are moreover 5 ♀ specimens of *Linyphia triangularis*, from the original collection of Ohlert, in the Senckenberg Museum, and these specimens are identical with *Neriene emphana* (Walckenaer).

The account of the pairing of *Linyphia marginata* by Prószyński (1961) is referred to here, because the figures of the genitalia, web, and habitus of the male (notably the swollen genital region) point to the present species. The specimen of *Linyphia yunohamensis* mentioned by Peelle & Saito (1933) probably belongs to *N. emphana* too, as is apparent from the description.

Male. — Measurements in mm. Total length 3.7-5.6; cephalothorax, length 1.6-2.35, width 1.2-1.65; abdomen, length 2.2-3.2, width 0.9-1.35, height 1.05-1.4; chelicerae, length 0.75-1.05, width 0.36-0.55.

Cephalothorax. — Yellow-brown, slightly darker at border of head and thorax and at fovea. Posterior margin straight, sides evenly curved towards head, constricted at border of head and thorax; width 0.7-0.75 of length, width of head 0.6 of width of thorax. From side, dorsal line rising evenly from posterior margin to PME, clypeus straight. Margins of thorax, striae, and posterior part of head, shortly haired, eye-region and upper two-thirds with longer hairs; some spinehairs behind and between posterior eyes.

Eyes. — Eye-region narrower than head, half as wide as thorax. Posterior row of eyes slightly recurved, anterior row straight. PME with small black triangles in front and behind; AME on a common black spot; LE touching, with narrow black bases. Diameter of PME 0.75-0.85 mm, lateral eyes of same size, AME slightly smaller. PME separated from each other by 1.3-1.5 diams., from PLE by 2.3-2.5 diams., and from AME by 1.6 diams. of PME. AME separated by less than their own diameter. Height of clypeus 0.17-0.18 of length of cephalothorax.

Chelicerae. — Light brown. Basal tubercle large, blunt, more dorsal than lateral. Stridulating file absent. Dorsal row with three to four cheliceral teeth, which are not placed in a line; basal pair situated mesally on apical slant as usual, second tooth twice as large as basal one; third tooth, or third and very small fourth teeth, situated on dorsal surface, closer to basal pair than to base of fang; there is a large blunt tooth on two-thirds of length of chelicera, latero-dorsal in position, which probably is not homologous with the cheliceral teeth. Ventral row with three teeth, basal tooth as large as basal tooth of dorsal row, second tooth smaller, third tooth very small, all close together; basal tooth situated just apically of second tooth of dorsal row.

Gnathocoxae. — Light brown, lightly suffused with black; two times as

long as wide, lateral margins converging towards front, truncated perpendicularly at apices. Labium brown, suffused with black, nearly as long as wide. Sternum brown, suffused with black at margins; width 0.85 of length.

Legs. — Yellow-brown as cephalothorax, with a greenish tinge in live specimens. Legs long and slender; length of femur I 1.7-1.9 times length cephalothorax; length of tibia I 18-21 diams. of segment. Measurements (of specimen from The Netherlands, Epen) in mm:

	I	II	III	IV	palp
Fe	3.50	3.10	2.20	2.90	1.00
Pa	0.65	0.60	0.55	0.50	0.29
Ti	3.55	2.85	1.75	2.50	0.40
Mt	4.25	3.45	2.20	3.25	—
Ta	1.80	1.45	0.90	1.25	0.68

Chaetotaxy. — All femora with a pair of dorsal spines near base, and usually with one additional dorsal spine on 0.25-0.3; one to three proteral spines present on anterior femora, sometimes on femora of third pair also. Pa I-IV $d''d'$, basal spine weaker than apical one.

Ti	I - II	v''_b	d''	v'	v''	l'	v'	v''	l''	l	d'	$[l'_a l''_a]$
	III		d''	v'	v''	l'	v'		l''		d'	$[l'_a l''_a]$
	IV		d''	v'		l'	v'		l''		d'	$[l'_a l''_a]$
Mt	I - IV	$d'l'$	l''	vdl'	v							

Length of d'' -spine on tibia I 0.38-0.41 mm, diameter of tibia I at base of d'' -spine 0.15-0.21 mm; on tibia IV 0.45-0.48 mm and 0.12-0.17 mm, respectively. Tm I 0.13. Position of d'' -spine on tibia I 0.11-0.13.

Abdomen. — Cylindriform, with conspicuously swollen genital area. Surface light beige-coloured, with white latero-dorsal bands. Posterior third of dorsal surface and posterior surface with some black transverse bars between latero-dorsal bands, narrowly separated from each other. Ventral surface with some small white blotches. Genital area and spinnerets beige-coloured, lightly suffused with grey.

Palp (fig. 303, 304). — Segments yellow-brown, cymbium lightly suffused with grey. Femur cylindriform, straight. Patella with a long dorsal spine, two times as long as segment. Tibia (fig. 294) slightly fusiform, distal margin with a ridge-like dorso-mesal projection above base of cymbium; segment one and a half times as long as patella, and nearly two times as long as high; 15-20 long spines on lateral and ventral surfaces. Cymbium (fig. 294) short and broad with blunt tip, distal half with a dorsal spine. Paracymbium with hairy basal part, distal arm flat with sinuous anterior margin,

tapering to a point distally and curved slightly forwards. Tegulum with transition of ventral into anterior surface rather angular, anterior surface excavated dorsally of this angular protrusion. Median apophysis (fig. 302) straight, rather broad, dorsal part with narrow hooked tip, ventral membranous part with large round apex much broader than dorsal part. Embolus (fig. 296, 300, *e*) with thick and heavily sclerotized base, apical half perpendicular to basal part and barely curved around terminal apophysis, dorsal side heavily sclerotized; spermduct-tooth blunt; a broad and blunt chitinous apical lobe distally of spermduct-tooth and rather far posteriorly. Embolic membrane broad and lightly sclerotized at base, turning over below apex, apical margin frayed. Terminal apophysis (fig. 296, *ta*) a simple, twisted element with about one and a half coil, small and barely visible at the unexpanded palp; apical coil as wide as basal one, ending abruptly with broadly rounded tip. Terminal sclerite (fig. 296, *tes*) large, barely shorter than terminal apophysis, situated between the latter and the embolus. Transversal sclerite (fig. 296, *ts*) small, of irregular shape, lying between terminal apophysis and lateral arm of lamella. Lamella (fig. 297) large, protruding beyond apex of cymbium; lateral arm long and slender and curved in dorsal direction; free lateral projection short and pointed, curved in anterior direction; apical mesal margin evenly curved towards lateral apex, which is bluntly hooked.

Female. — Measurements in mm. Total length 4.0-6.5; cephalothorax, length 1.75-2.25, width 1.25-1.65; abdomen, length 2.3-4.6, width 1.35-3.1, height 1.4-3.7; chelicerae, length 0.8-1.15, width 0.4-0.55.

Cephalothorax. — Colour as in male, with a faint median grey stripe from posterior margin to about PME. Posterior margin slightly excised. Eye-region shortly haired as margins of thorax, clypeus with longer hairs. Thorax with depression behind fovea. Diameter of PME 0.08-0.09 mm; PME separated from each other by 1.5 diams., from PLE by 2.2-2.4 diams., and from AME by 1.7 diams. of PME. Height of clypeus 0.14-0.18 of length of cephalothorax.

Chelicerae. — Light brown, without basal tubercles and stridulating files. Dorsal row with four equidistant teeth, second tooth slightly larger than basal and third teeth, apical tooth half as large as third tooth. Ventral row with three to four small teeth, all equidistant; basal tooth slightly larger than others, and situated opposite to gap between second and third teeth of dorsal row. Lateral margins of gnathocoxae parallel.

Legs. — Yellow-brown, metatarsi and tarsi brown. Length of femur I 1.4-1.6 times length of cephalothorax. Length of tibia I 12-14 diams. of segment. Measurements (of specimen from The Netherlands, Epen) in mm:

	I	II	III	IV
Fe	3.00	2.65	2.05	2.65
Pa	0.70	0.70	0.55	0.60
Ti	3.05	2.45	1.65	2.25
Mt	3.20	2.75	1.90	2.75
Ta	1.50	1.25	0.90	1.10

Chaetotaxy. — All femora with a pair of dorsal spines at base, and with a single dorsal spine on 0.2-0.3 of length; femur I with 1-3 l''-spines in addition. Spines on tibiae and metatarsi as in male, but tibia III with two pairs of v-spines, and with a second l'-spine near d'-spine; a second l'-spine may be present also on tibia IV.

Length of d''-spine on tibia I 0.38-0.45 mm, diameter of segment at base of d''-spine 0.21-0.27 mm; on tibia IV 0.46-0.56 mm and 0.17-0.22 mm, respectively. Tm I 0.13-0.16. Position of d''-spine on tibia I 0.11-0.13.

Abdomen. — Rather long oval in dorsal view; dorsal and ventral surface about parallel and without postero-dorsal tubercle. Dorsal surface with a narrow beige-coloured median stripe with grey or black suffusion on basal two-thirds, surrounded by white areas, followed by four black transverse bars on posterior third of dorsal surface and posterior surface; bars narrowly separated from each other by white areas, and occupying an area which is half as wide as the abdomen. Lateral surface with black oblique streaks on posterior half in postero-ventral direction, remaining surface white. Ventral surface beige-coloured with a large white lanceolate spot in front of spinnerets, and with many small white blotches between epigastric furrow and spinnerets; whole ventral surface suffused with black, strongly at sides and in front of spinnerets, but opercula beige-coloured. Spinnerets blackish.

Epigyne (fig. 299). — Opening large with anterior margin notched mesally. There are two deep lateral depressions, which are semi-covered at their mesal ends. Scape with narrowly prolonged tip.

Vulva (fig. 295, 298). — Atria with a large common opening. Spiral grooves with about two coils, turning-points situated at apices of atria and pointing outwards and forwards; receptacula small, curved inwards. In Japanese specimens spiral groove slightly longer, the turning-point pointing in mesal direction, the receptacula touching the mesal plane and curved in dorsal direction. Fertilization ducts running parallel with spiral grooves and ending laterally on dorsal side of scape. Scape with small depression at tip. Width of epigyneal aperture 0.34-0.42 mm.

Geographical variation. — The epigyneal apertures of the East Asiatic specimens studied are rather small (0.34-0.36 mm), but epigyne of this size are found in European specimens too. The material from Asia is too scanty

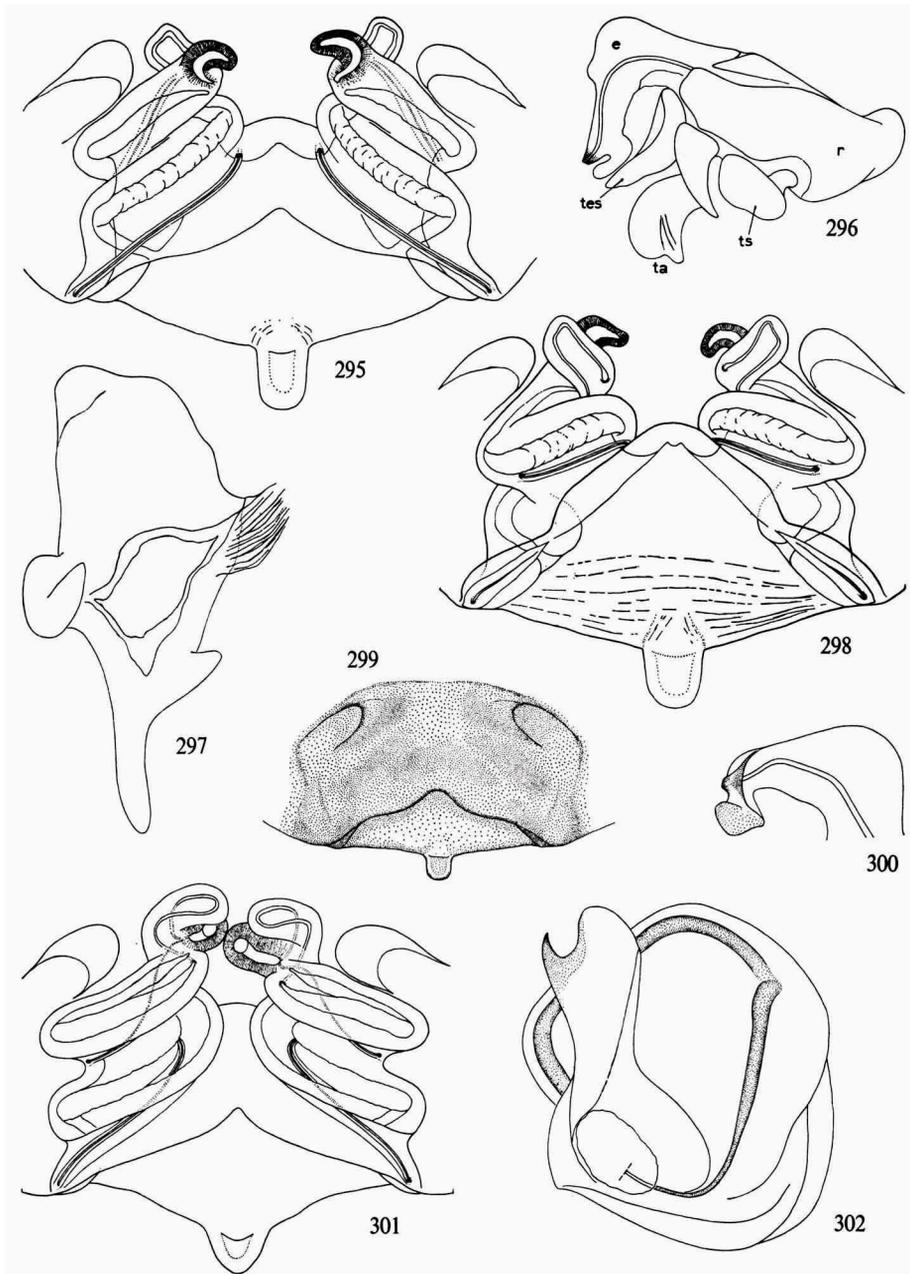


Fig. 295-302. *Neriene emphana*. 295, vulva, Europe, ventral aspect; 296, radix (*r*), with embolus (*e*), terminal sclerite (*tes*), terminal apophysis (*ta*), and transversal sclerite (*ts*); 297, lamella, dorsal aspect; 298, vulva, Europe, dorsal aspect; 299, epigyne; 300, embolus, dorsal aspect; 301, vulva, Japan, ventral aspect; 302, tegulum with median apophysis, mesal aspect. 295, 298, 301, $\times 123$; 296, 297, 300, 302, $\times 95$; 299, $\times 67$.

to attach any statistical value to these differences in range. The only distinct difference between European and Asiatic specimens seems to be the length of the spiral groove and consequently the positions of the receptacula and turning-points (fig. 301).

Distribution and habitat. — A Palearctic species. In Europe it reaches its northern limit in Denmark (Deichmann, 1920: 258) and Southern Finland (Lehtinen, 1964: 305). It has not been recorded from the British Isles, the Iberian Peninsula, and Scandinavia. In Asia it has been found in Siberia, China, Korea, the northern Japanese Islands (Hokkaido and the northern tip of Honshu), Sakhalin, and the Kuril Islands.

In my experience the species is restricted to forests, coniferous as well as deciduous, where the webs are found on shrubs and branches of trees. The webs are flat or lightly dome-shaped, but never so strongly as in *N. radiata*. The specimens become adult in June, and thus *N. emphana* can be called a summer-maturing species.

Material examined.

Netherlands. — 1 ♀, Gelderland, Hoog-Soeren, in dark spruce-fir forest, 25.vii.1958, P. J. van Helsdingen (ML); 8 ♀, do., 26.viii.1962 (ML); 3 ♀, do., 2.viii.1965 (ML). 1 ♀ 1 ♂, Wiessel near Apeldoorn, on low branches in beech-wood, 25.vii.1958, P. J. van Helsdingen (ML). 2 ♀ 1 ♂, Niersen, beech-wood, 8.viii.1959, P. J. van Helsdingen (ML); 1 ♀, do., 13.viii.1959 (ML). 1 ♂, Berg-en-Dal near Nijmegen, mixed forest, 10.viii.1968, P. J. van Helsdingen (ML). — 8 ♀ 16 ♂, Limburg, Epen, Bovenste Bos, 27.vi.1965, P. J. van Helsdingen (ML). — 1 ♀, Noord Brabant, Kampina near Boxtel, mixed forest, 14.vii.1965, P. J. van Helsdingen (ML).

Belgium. — 2 ♀, Brabant, Uccle, Petite Espinette, 31.vii.1911, G. Séverin (ISNB). 2 ♀, Forêt de Soignes, Rouge-Cloître, 15.viii.1879, L. Becker (det. Becker; ISNB). 1 ♀, Forêt de Soignes, Auderghem, 8.vii.1928, M. Thomas (ISNB). 1 ♂, Forêt de Soignes, 15.viii.1928, M. Thomas (ISNB). 1 ♀, Tervuren, 1-10.x.1940, R. Laurent (ISNB); 1 ♀ 1 ♂, do., Bois des Capucins, viii.1944, J. Verschuren (ISNB). — 1 ♀, Hainaut, Barbençon, 19-20.vii.1959, J. Schuyts (ISNB). — 1 ♀, Namur, Cerfontaine, 3.ix.1954, J. Kekenbosch (ISNB); 1 ♀, do., 3.ix.1955 (ISNB). — 1 ♀, Liège, Duzo-Moùpas, 10.viii.1950, J. Cooreman (ISNB). 5 ♀ 1 ♂, Eupen, 1-11.viii.1950, A. Doucet (ISNB). — 1 ♀, Luxembourg, Bouillon, 17.vi.1958, E. Derenne (ISNB). 1 ♂, Torgny, 16.vii.1958, E. Derenne (ISNB). 2 ♀, La Roche, vii.1959, G. Hoevenaghel (ISNB). 3 ♀ 2 ♂, Chiny, 25.vi.-8.vii.1945, R. Laurent (ISNB).

Germany. — 5 ♀, ex collection Ohlert sub *L. triangularis* (SMF). — 1 ♀ 2 ♂, Niedersachsen, Braunwald in Weserbergland, 14.vii.1960 (SMF). 1 ♂, Bodenfelle, 7.vi.1961 (SMF). — 1 ♀ 1 ♂, Hessen, Vogels Berg, near Niedermooser Teich, 13.viii.1961, O. Kraus (SMF). 1 ♂, Vogels Berg, 1950, K. Schnellbacher (SMF). 7 ♀ 1 ♂, Taunus, Niedernhausen, 1901, A. Knoblauch (SMF).

France. — 1 ♀ 1 ♂, "Gallia" (MNP; collection of Walckenaer?). — 1 ♂, Hautes-Pyrénées, Bagnères-de-Bigorre (MNP). — 2 ♀, Hautes-Savoie, St. Gervais, vi.1917 (MNP).

Switzerland. — 2 ♀, Schwyz, in small valley near Schwyz, on branches of trees,

23.viii.1958, P. J. van Helsdingen (ML). 1 ♀, Ibergeregg, 22.viii.1958, P. J. van Helsdingen (ML). — 2 ♂, Glarus, Klöntaler See, Vorauen, 850 m, 19.vi.1968 as subadults, last moult 27.vi.1968, P. J. van Helsdingen (ML).

Yugoslavia. — 2 ♀, Servia, Vazganica on Vidlič planina E. of Pirot, beech-wood, 6.viii.1967, C. L. Decleman (ML).

China. — 3 ♀, N. Peking (MNP).

Japan. — 1 ♀, Hokkaido, Teshikaga, 24.viii.1958, R. Oi (Oi, 1960; ML).

Neriene litigiosa (Keyserling) comb. nov.

(fig. 305-314)

Linyphia litigiosa Keyserling, 1886, Spinnen Amerikas, 2(2): 62, pl. 12 fig. 166 (description ♀ ♂, Washington State). — Blauvelt, 1936, Festschr. Strand, 2: 107, pl. 3 fig. 21-23, pl. 4 fig. 24-25 (genitalia). — Schenkel, 1950, Verh. naturf. Ges. Basel, 61: 62 (California). — Levi & Levi, 1951, Zoologica, New York, 36: 222, fig. 2, 5 (Wyoming). — Lowrie & Gertsch, 1955, Amer. Mus. Novit., 1736: 5 (Wyoming).

For complete list of references up to 1939, see Bonnet (1957: 2511).

Types. — ♂ lectotype, by present designation, from Washington State; 3 ♀ paralectotypes from same locality (BM).

The type was selected from the syntype-series, which came in the possession of the British Museum (Natural History) by purchase in 1890. Keyserling stated to have received the specimens from Simon, who probably did send him all available material of the species in this case (cf. *N. digna*). I have not come across any specimens that might have been part of the series in the collection of the Muséum National d'Histoire naturelle at Paris.

Male. — Measurements in mm. Total length 5.1-6.8; cephalothorax, length 2.1-3.0, width 1.6-2.1; abdomen, length 2.9-3.9, width 1.45-1.8, height 1.2-1.95; chelicerae, length 1.1-1.6, width 0.46-0.72.

Cephalothorax. — Light brown to brown, with marginal bands of grey suffusion from posterior excision to constriction above palpal femora, and with a narrow median stripe from posterior margin to posterior part of head, diffused in front. Posterior margin very lightly indented mesally, sides evenly rounded and constricted at border of head and thorax; width 0.7-0.75 of length, width of head 0.55 of width of thorax. Fovea lying deep between the inflated lateral parts of thorax; border of head and thorax with deep furrows. From side, dorsal line level at sides of fovea, head lightly convex, cephalothorax as a whole flat; clypeus straight. Margins of thoracic part with hairs on the grey bands; head with long hairs on clypeus, at eye-region, and on three rows on dorsal side from fovea to PME and PLE.

Eyes. — Eye-region slightly narrower than head. Posterior row lightly recurved, anterior row nearly straight. PME small, 0.10-0.11 mm in dia-

meter, with small anterior and posterior black triangles. PLE of same size, ALE slightly larger, diameter of AME 0.8 of diameter of PME. Lateral eyes with common black base, AME on a common black spot. PME separated from each other by 1.0-1.2 diams., from PLE by 2.1 diams., and from AME by 1.2 diams. of PME. AME separated by 0.6 of their own diameter. Height of clypeus 0.16 of length cephalothorax.

Chelicerae. — Colour as cephalothorax or slightly darker. Short and broad, width about 0.45 of length. Lateral surface slightly convex on basal half, dorsal surface conspicuously bulging on basal three-fourths; posterior surface straight, without a basal elevation. Stridulating file not present. Basal tubercle very small on latero-dorsal corner. One heavy blunt dorsal tooth near mesal end of apical slant. In the ventral row two teeth proximally, one opposite to, and one distally of dorsal tooth; basal tooth half as long as dorsal tooth, second tooth as long as dorsal tooth but more slender, close to basal tooth, two other teeth slightly smaller than second tooth and widely spaced; basal pair probably belonging to dorsal row.

Gnathocoxae. — Brown, suffused with black; lateral margins converging towards front, apices truncated obliquely, ventral surfaces rather convex. Labium black-brown with raised anterior margin. Sternum black-brown, with long spinehairs; produced posteriorly between coxae IV, which are separated by less than their own diameter; ratio width to length 0.8.

Legs. — Uniformly light brown with faint grey suffusion, not annulated. Posterior coxae often with darkened posterior surface. Legs very long and slender, anterior metatarsi extremely thin. Length of femur I 2.2-2.4 times length cephalothorax. Length of tibia I 24-28 diams. of segment. Metatarsus I about 65 times as long as the diameter in the middle of the segment. Measurements in mm (of specimen from California):

	I	II	III	IV	palp
Fe	5.30	4.70	3.30	4.30	1.30
Pa	0.75	0.70	0.60	0.60	0.35
Ti	5.40	4.50	2.65	3.95	0.50
Mt	6.90	5.20	3.30	5.00	—
Ta	2.20	1.80	1.10	1.40	0.87

Chaetotaxy. — Fe I-II 0-1 d; III-IV 1-2 d. Pa I-IV d''d', basal spine weak.

Ti	I	d''	(v' v'')	(v' v'')	l' l''	(v' v'')	l' (v' v'')	l''	d'	$\left[\begin{matrix} l'_a l''_a v'_a v''_a \end{matrix} \right]$
	II	d''	(v' v'')	(v' v'')	l' l''	(v' v'')	l'	l''	d'	$\left[\begin{matrix} l'_a l''_a v'_a v''_a \end{matrix} \right]$
	III	d''	(v' v'')		l' l''	(v' v'')	l'		d'	$\left[\begin{matrix} l'_a l''_a v'_a v''_a \end{matrix} \right]$
	IV	d''	v'		l' l''	v'	l'		d'	$\left[\begin{matrix} l'_a l''_a v'_a v''_a \end{matrix} \right]$

Mt I - II dl' l'' vl' l''; III - IV dl' l'' vdl' v

Apical spines on tibiae very small. Length of d''-spine 0.60 mm, diameter of segment at base of d''-spine 0.21-0.26 mm; diameter of tibia IV 0.19-0.20 mm. Tm I 0.09. Position of d''-spine on tibia I 0.11-0.13.

Abdomen. — Long and rather cylindrical, highest and widest on anterior half. Dorsal surface with a narrow black median stripe on anterior three-fourths, followed by a broadly black posterior fourth on which a light chevron is free of pigmentation. Median stripe flanked by an irregular clear white band; latero-dorsal bands on whole length of abdomen yellowish white. Lateral surface with irregular white longitudinal streaks, the remainder blackish. Ventral surface with light brown opercula, creamy on mesal halves, followed by a narrow white streak in posterior direction on either side, reaching at least as far as half length of abdomen. There is a conspicuous white lanceolate spot in front of the spinnerets. Remainder of ventral surface including genital region and spinnerets blackish, but some small white blotches may be present.

Palp (fig. 309, 310). — All segments light brown as legs, cymbium slightly darkened. Femur straight in lateral view, without spines but with long ventral hairs. Patella short, dorsal spine near distal margin two times as long as segment. Tibia longer than patella, widening towards apex, slightly fusiform; latero-dorsal and ventral spinehairs as long as segment, dorsal spine barely stronger or longer; many dorsal and lateral trichobothria near base. Cymbium comparatively short and broad, without spines. Paracymbium U-shaped, base heavily sclerotized and shortly haired; distal arm flat with sinuous anterior margin, broad at base, becoming narrower and parallel-sided towards apex. Tegulum with a ventro-lateral excrescence. Median apophysis (fig. 134) with heavily chitinous and hook-shaped tip on distal part, membranous middle part broad and with sharp tip close to distal hook, ventral margin strongly curved. Embolus (fig. 308, 313, *e*) with heavily sclerotized basal part, which is very massive and much heavier than embolic arm of radix; distal half standing perpendicularly to base, lightly curved and following curvature of terminal apophysis, much less sclerotized, with broadly truncate tip beyond blunt spermduct-tooth. Embolic membrane (fig. 313, *em*) with chitinized rib along lateral side of base; element twisted near apex and turning around chitinized rib, apical margin frayed. Terminal apophysis (fig. 307, 313, *ta*) with two coils, second coil larger than basal one and crescent-shaped; second coil with gutter-like outer surface, posterior wall of gutter transversely grooved; element closely connected with the terminal sclerite, which lies between terminal apophysis and embolus. Transversal sclerite (fig. 313, *ts*) large, about diamond-shaped. Lamella (fig. 312, 313, *l*) large, rather squarish anteriorly; mesal margin on anterior part with a slen-

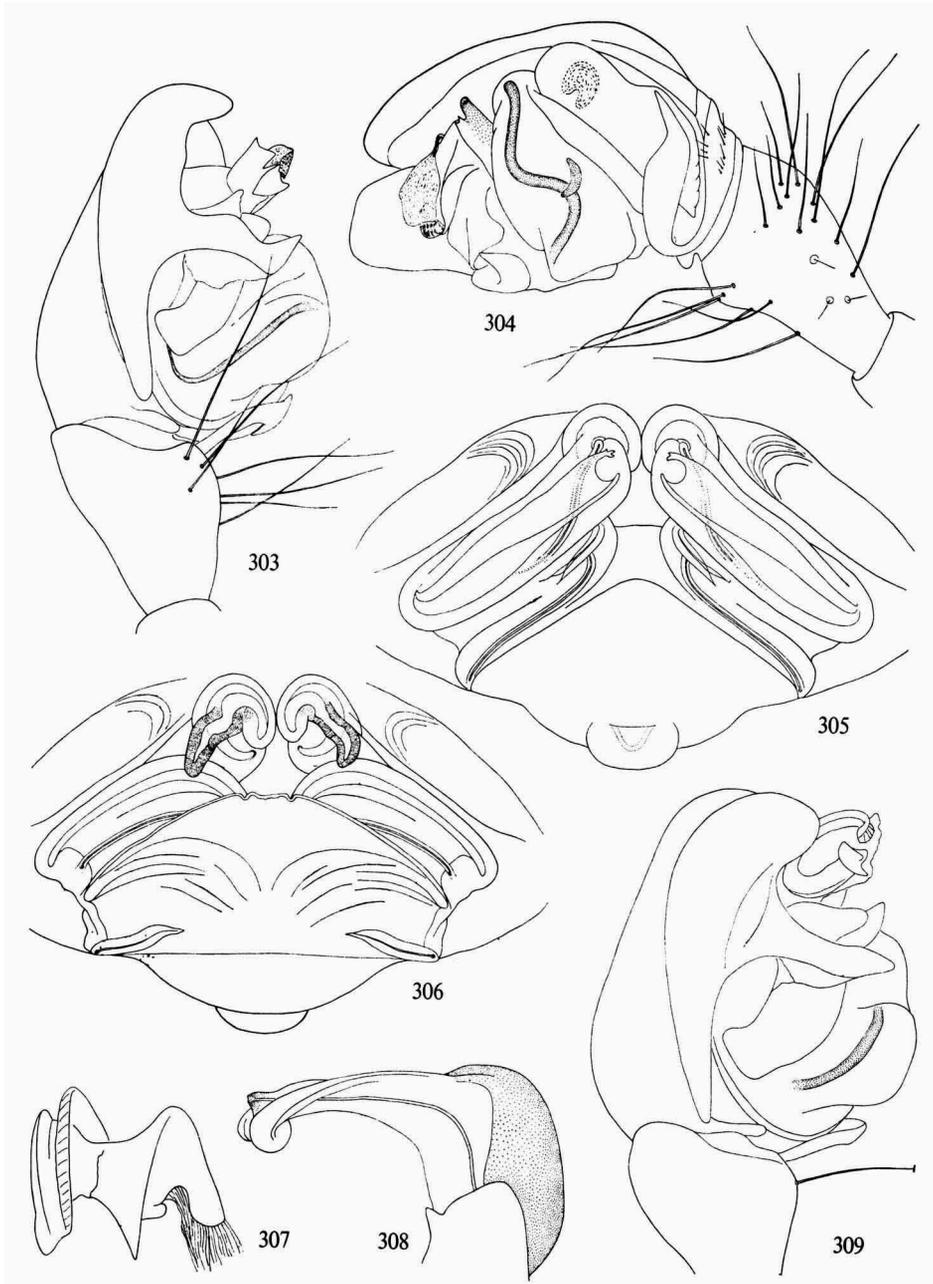


Fig. 303-304. *Neriene emphana*. 303, male palp, ventral aspect; 304, do., lateral aspect. Fig. 305-309. *N. litigiosa*. 305, vulva, ventral aspect; 306, do., dorsal aspect; 307, terminal apophysis; 308, embolus, dorsal aspect; 309, male palp, ventral aspect. 303, 304, $\times 67$; 305, 306, $\times 89$; 307, 308, $\times 95$; 309, $\times 49$.

der sharp tooth; posterior tip narrow and sharply pointed; mesal margin of proximal half with large tooth as usual; lateral free projection straight and rather obtuse, pointing in dorsal direction.

Female. — Measurements in mm. Total length 5.2-8.5; cephalothorax, length 2.15-3.0, width 1.5-2.2; abdomen, length 3.0-5.6, width 1.55-3.5, height 1.5-3.5; chelicerae, length 0.95-1.5, width 0.46-0.70.

Cephalothorax. — Light brown, with median blackish stripe and grey lateral margins often very faint. Shape as in male, but posterior margin more distinctly excised. Hairs on clypeus and at eye-region shorter. Anterior row of eyes very lightly recurved, posterior row recurved. Sizes of eyes and spacing as in males. Height of clypeus 0.10-0.12 of length of cephalothorax.

Chelicerae. — Slightly darker than cephalothorax, in dark specimens with grey suffusion. Dorsal surface only slightly bulging on basal half. Basal tubercle absent. Stridulating file absent. Dorsal row with four equidistant teeth, basal and apical teeth small, middle pair twice as long. Ventral row with three to four teeth, equidistant, basal tooth as small as basal dorsal tooth, others slightly smaller, fourth tooth, if present, very small and close to third tooth. Lateral margins of gnathocoxae parallel.

Legs. — Colour as cephalothorax, not annulated. Shorter and less slender than in male. Length of femur I 1.8-2.0 times length cephalothorax. Length of tibia I 15-17 diams. of segment. Length of metatarsus I 40-45 diams. of segment in the middle. Measurements in mm (of specimen from California):

	I	II	III	IV
Fe	4.35	4.00	3.00	3.90
Pa	0.80	0.80	0.65	0.70
Ti	4.40	3.75	2.45	3.40
Mt	4.95	4.20	2.95	4.15
Ta	2.00	1.70	1.20	1.45

Chaetotaxy. — As in male. Length of d''-spine 0.60-0.68 mm, diameter of segment at base of d''-spine 0.25-0.30 mm; diameter of tibia IV 0.20-0.25 mm. Tm I 0.11-0.15. Position of d''-spine on tibia I 0.12-0.14.

Abdomen. — Comparatively long and narrow, dorsal surface nearly parallel with ventral surface, posteriorly rounded without postero-dorsal tubercle. Pattern as in male but more distinct. Dorsal surface next to median black stripe chalk-white on anterior three-fourths; black median area on posterior fourth as wide as chalk-white area, with two pairs of white spots, often with a short black streak reaching forwards from the anterior corner. Broad latero-dorsal bands more yellow-white along whole length, reaching posterior

surface behind black dorsal area, narrowly separated there from band on other side. Lateral surface narrowly blackish ventrally; remainder white on anterior half with irregular blackish oblique streaks running in postero-ventral direction, black on posterior half with narrow white streaks in same direction. Ventral surface with two white parallel bands behind opercula, reaching to two-thirds of length of abdomen; a conspicuous white lanceolate spot present in front of spinnerets; remainder black with small white dots. Opercula cream-coloured, spinnerets black.

Epigyne (fig. 311). — Broad and darkly pigmented. Posterior margin excised mesally; ventral surface swollen near margin, with a deep depression on either side, depression not semi-covered as in *emphana*. Scape triangular with bluntly rounded tip and a small semi-covered depression.

Vulva (fig. 305, 306). — Wider than long. Atria with a large common triangular opening. Spiral grooves with slightly more than two coils; first coil broad, last coil narrow and ending in the strongly curved turning-point; entrances of grooves rather mesally on ventral wall. Receptacula slender, situated dorsally of apices of atria and pointing slightly in posterior direction. Fertilization ducts ending on dorsal surface on either side at base of scape. Width of epigyneal aperture 0.44-0.54 mm.

Distribution and habitat. — A West American species, ranging from British Columbia in the north to Mexico in the south (Worley, 1932: 31) along the coast, reaching inland as far as Montana, Wyoming, and Utah. It is said to occur in coniferous forests (Worley, 1932) and between shrubs and small trees (Comstock, 1913: 392). The latter author described the webs as large and slightly dome-shaped (Sierra Dome spider, fig. 406), 1-2 feet in diameter, much larger than the webs of *Linyphia marginata* [= *Neriene radiata* (Walckenaer)]. One sample from California (this paper) is said to come from webs in grass. The records date from June till the end of September, but from March onwards in California. According to Comstock it is a very common species in the mountains, though it occurs also in the coastal areas.

Material examined.

U.S.A. — 1 ♀ 1 ♂ 1 subadult ♀, "Amer. Sept." (MNP).
 U.S.A., Washington. — 3 ♀ 1 ♂, "Washington Terr." (♂ lectotype and ♀ paratypes of *Linyphia litigiosa*; BM). 1 ♀ 1 ♂, Olympia, N. Banks (MNP).
 U.S.A., California. — 1 ♀ 4 ♂, San Francisco, 14.vi.1936 (CAS); 2 ♀ 1 ♂, do., Golden Gate Park, 10.iii.1935 (CAS). 4 ♀ 1 ♂, Sonoma Co., Russian River, Vacation Beach, on webs in grass, 25.vi.1934 (CAS). 10 ♀ 2 ♂, Shasta Co., Burney Falls, 20.vii.1941, W. M. Pearce (ML). 1 ♂ 2 subadult ♀, Redwood State Park and Monterio, 1938-1939, H. Schenkel-Rudin (Schenkel, 1950; NMB).

The *Neriene radiata* group

Neriene radiata (Walckenaer) (*Linyphia marginata* C. L. Koch) comb. nov.

(fig. 315-324, table 1)

Abbot, 1792, Spiders of Georgia: 8, pl. 11 fig. 55 (manuscript, no name mentioned; U.S.A., Georgia).

Linyphia radiata Walckenaer, 1841, Hist. nat. Ins., Aptères, 2: 262 (naming and description of Abbot's fig. 55). — Simon, 1864, Hist. nat. Araign.: 223 (synopsis *Linyphia*). — Marx, 1890, Proc. U. S. Nat. Mus., 12: 529 (catalogue). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 254 (catalogue). — Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35(9): 82 (= *Linyphia marginata* C. L. Koch).

Linyphia marginata C. L. Koch, 1834, Faun. Ins. Germaniae init., 127: pl. 21-22 (description ♀ ♂, Germany).

Linyphia marginata Wider, 1834, Mus. Senckenb., 1: 247, pl. 17 fig. 5 (description ♀ and subadult ♂, Germany). Apparently described independently of Koch under the same name.

Linyphia marginata; Bösenberg & Strand, 1906, Abh. senckenb. naturf. Ges., 30: 173, fig. 192 (p.p.; Japan, Kyushu). — Simon, 1929, Arachn. France, 6(3): 630, 743, fig. 956-958 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 110, pl. 9 fig. 26-31 (genitalia; North America, Europe, and China). — Locket & Millidge, 1953, British Spid., 2: 403, fig. 239E, 241D (Scotland). — Paik & Kim, 1956, Korean Journ. Biol., 1: 55 (Korea). — Yaginuma, 1957, Acta Arachn., 14: 54 (Japan, Hokkaido); 1958, Misc. Rep. Res. Inst. Natur. Resources, 46/47: 70 (Japan, Honshu); 1960, Spid. Japan Colour: 41, pl. 12 fig. 72, textfig. 40-2 (Japan); 1962a, Spid. fauna Japan: 18 (catalogue). — Schenkel, 1963, Mém. Mus. nat. Hist. nat. Paris, A, 25: 10 (China).

Prolinyphia marginata; Wiehle, 1956, Tierw. Deutschl., 44: 298, fig. 486-492 (key, Germany). — Oi, 1960, Journ. Inst. Polyt., D, 11: 217, fig. 334-336 (Japan, Honshu). — Namkung, 1964, Atypus, 33/34: 36 (Korea). — Paik, 1965a, Educ. Journ., 3: 63, fig. 9-10 (Korea).

Araneus triangularis Clerck, (1757)1758, Aranei Svecici: pl. 3 tab. 2 fig. 2 (p.p.; ♀ depicted probably is *N. radiata*). — Thorell, 1856, Nov. Act. Reg. Soc. Sci. Upsaliensis, (3)2(1): 95 (= *Linyphia marginata* Wider).

Linyphia triangularis; Walckenaer, 1841, Hist. nat. Ins., Aptères, 2: 240 (description ♀ ♂; references listed are misleading).

Linyphia marmorata Hentz, 1850, Boston Journ. Nat. Hist., 6: 29, pl. 4 fig. 5 (diagnosis, U.S.A., Alabama). — Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 61 (= *Linyphia marginata* C. L. Koch).

Linyphia scripta Hentz, 1850, Boston Journ. Nat. Hist., 6: 29, pl. 4 fig. 6 (diagnosis, U.S.A., Alabama). — Emerton, 1875, Occ. Pap. Boston Soc. Nat. Hist., 2: 134 (note in reprint of Hentz (1850): = juvenile of *Linyphia marmorata*); 1882, Trans. Connecticut Acad. Arts Sci., 6: 61 (= *Linyphia marginata* C. L. Koch).

Linyphia pyrenaea Thorell, 1875b, Tijdschr. Ent., 18: 82 (diagnosis ♂, Pyrenees); 1875c, Kongl. Svenska Vet.-Akad. Handling., 13(5): 17 (description ♂, Pyrenees). — Simon, 1929, Arachn. France, 6(3): 743 (? = *Linyphia emphana*). — Denis, 1962b, Bull. Soc. Hist. nat. Toulouse, 97: 289 (? = *Linyphia emphana*). [new synonymy].

Lepthyphantes pyrenaicus; Galiano, 1910, Mem. R. Soc. española. Hist. nat., 6: 379, 397 (catalogue). — Bonnet, 1957, Bibliogr. Aran., 2(3): 2445 (catalogue).

For complete list of references up to 1939, see Bonnet (1957: 2512).

Types. — ♀ lectotype of *Linyphia marginata* Wider, by present designation; 4 paralectotypes (2 ♀ 2 subadult ♂) from same series (SMF). ♂ holo-

type of *Linyphia pyrenaea* Thorell from the Pyrenees (UZM). Figure 55 of Abbot's manuscript we may call the "iconotype" of *Linyphia radiata* Walckenaer, as the description by Walckenaer was based on this figure only. Abbot's specimens came from Georgia, Effingham Co., collected on May 15th in a pine wood.

Remarks. — This species is currently known as *Linyphia marginata*. In consequence of its transfer to *Neriene*, as proposed here, the species should bear the name *Neriene marginata* (C. L. Koch), a new combination. This combination, however, constitutes a junior homonym. *Neriene marginata* Blackwall was described in 1833, one year previous to the descriptions of *Linyphia marginata* by C. L. Koch and by Wider. It is, therefore, impossible to use the old name in the new combination, and the oldest available synonym must take its place, viz., *Linyphia radiata* Walckenaer. That *Neriene marginata* Blackwall is a junior subjective synonym of *Neriene clathrata* (Sundevall) unfortunately cannot alter the necessity of this change of name.

Linyphia radiata was recognized as a synonym of *Linyphia marginata* C. L. Koch by Chamberlin & Ivie (1944: 82). Realizing the importance of the manuscript of Abbot (1792) on the spiders of Georgia, and of the names of Walckenaer (1841) based on the illustrations of Abbot, Chamberlin & Ivie re-investigated the spider fauna of Georgia, and recognized most of the Walckenaer-Abbot species. I have not seen the manuscript myself, but Mr. D. J. Clark of the British Museum (Natural History), where the Abbot manuscript is preserved, has been so kind as to send me a colour slide of the figure concerned. Abbot's figures are very small (see Chamberlin & Ivie, 1944: fig. 4), but well done. A white margin on the cephalothorax is not visible on the illustration, on which *L. radiata* was based, but the abdominal pattern agrees very well with *L. marginata* C. L. Koch.

It is likely, but not certain, that Clerck (1758) has depicted the female (pl. 3 tab. 2 fig. 2) of *Neriene radiata* instead of *Araneus triangularis* [= *Linyphia triangularis*], to which the description and figure of the male refer. Walckenaer (1841: 240) linked the name *triangularis* with the figure of the female, though the description does not support his view. His *Linyphia triangularis* of 1841 (but not his earlier use of the name!) certainly is synonymous with *N. radiata*. The name *triangularis* is now commonly used for the species the male of which was depicted by Clerck (pl. 3 tab. 2 fig. 1). It is not Walckenaer's dissenting view in the first place, but rather his inconsistent and illogical reference to earlier publications by himself and other authors, which have caused so much confusion (see under *L. triangularis*).

Bonnet (1957) apparently has fallen victim again to Walckenaer's confusing references. For instance, his references to *Aranea triangularis* [non

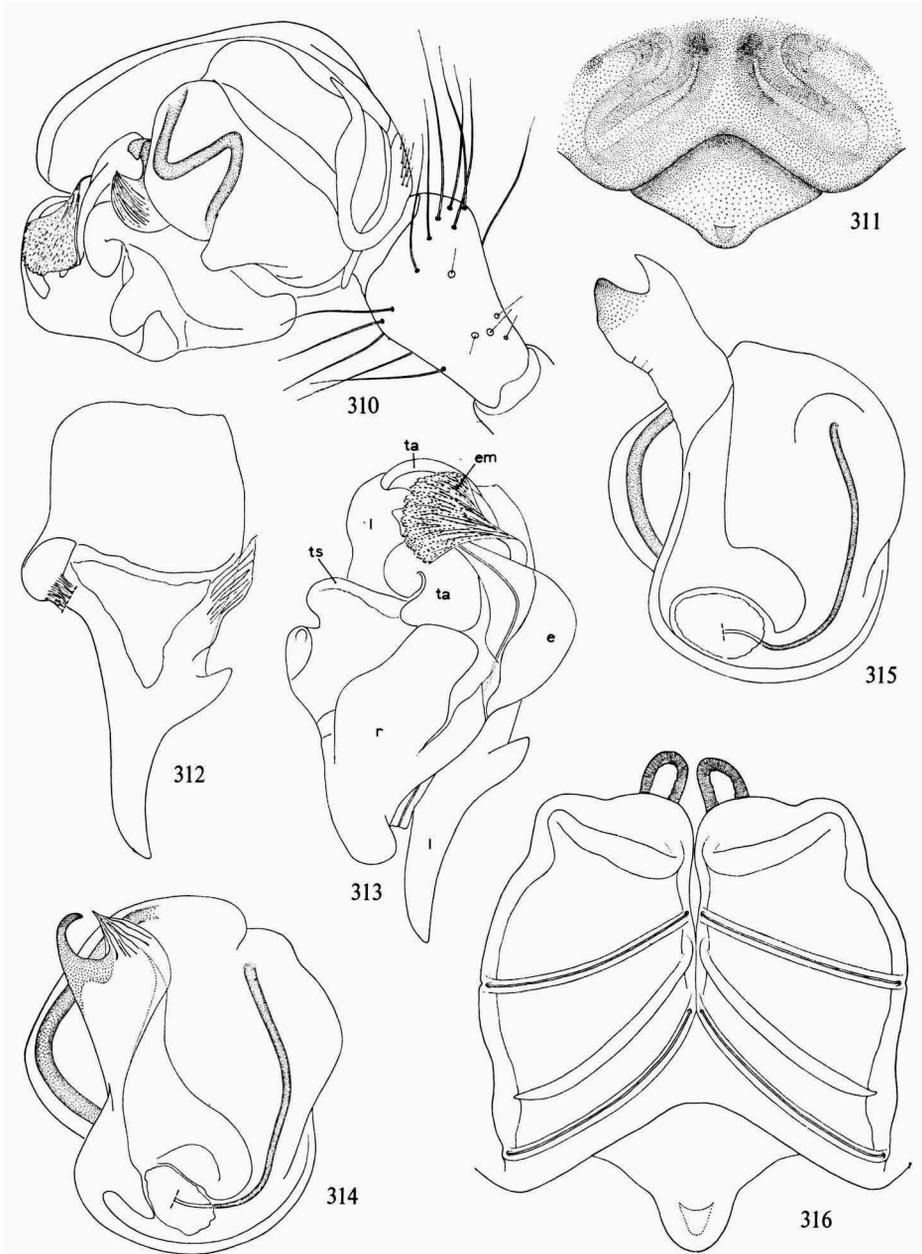


Fig. 310-314. *Neriene litigiosa*. 310, male palp, lateral aspect; 311, epigyne; 312, lamella, dorsal aspect; 313, embolic section, with radix(*r*), embolus(*e*), embolic membrane(*em*), terminal apophysis(*ta*), transversal sclerite(*ts*), and lamella(*l*); 314, tegulum with median apophysis, mesal aspect. Fig. 315-316. *N. radiata*. 315, tegulum with median apophysis, mesal aspect; 316, vulva, ventral aspect. 310, $\times 49$; 311, $\times 53$; 312-315, $\times 67$; 316, $\times 89$.

Cl.] from Olivier (1789: 208), Walckenaer (1802: 214), Latreille (1804a: 242), and Guérin (1818: pl. 258 fig. 7), should not be listed under *L. marginata* [= *Neriene radiata* (Walckenaer)], but under *L. triangularis* (Clerck) instead. Some of his references to *Linyphia triangularis* [non Cl.], viz., Walckenaer (1805: 70), Latreille (1806: 100; 1829: 245), Lucas (1840: 434), and possibly some of the other authors also, are equally out of place when listed under *marginata*. In all cases mentioned here the name *triangularis* is either followed by a diagnosis unmistakably pointing to *L. triangularis* (Clerck), or such a diagnosis is referred to. The addition "non Cl." is wrong in all cases mentioned here. Some of the authors refer to Walckenaer (1806: part 5 pl. 9), where a female of *triangularis* is correctly depicted. Bonnet (1957) does not mention this publication as far as *triangularis* is concerned. From his bibliography (1945: 624) we may conclude, that he has seen only the first four parts of this booklet of Walckenaer, and could not find the last part ("5e livraison"), wherein *Linyphia triangularis* is depicted.

Linyphia marmorata and *scripta* were both described from Alabama, U.S.A., by Hentz (1850), and though he explicitly mentioned the species to be clearly distinct from each other, both diagnoses seem to refer to the same species. A white margin of the cephalothorax is mentioned in either diagnosis, and the abdominal patterns are alike for both species. The typical shape of the web, an inverted bowl, is recorded for *scripta*, but the size of the specimen depicted is rather small (3 mm); the size of *marmorata* is in accordance with the European "*marginata*", but in this case Hentz indicates the webs to be "very large, with long threads to secure them". As only one species with white margins on the cephalothorax is recognized now in North America, both names of Hentz must refer to that species. I quite agree with Emerton's view (1875: 134), that *scripta* is in fact the juvenile form of *marmorata*.

The original description of *Linyphia marginata* from the hand of Wider (1834) is detailed and lengthy, and deals with the female and subadult male. This is in accordance with the presence of females and subadult males in the only tube with material of the species in the original collection of Wider at Frankfurt (SMF). A lectotype has been selected from this series, which bears no locality label, but should originate from Beerfelden south of Frankfurt, as mentioned by Wider himself.

Koch's (1834) description of *L. marginata* is very short, but there is no doubt about its identity. The figures are correct and both sexes are depicted.

Linyphia pyrenaea has had a long life as a separate species. Based on a single male specimen from the Pyrenees, its name has been cited in all cata-

logues and many faunal lists. It was transferred to the genus *Lephyphantes* by Galiano (1910: 379, 397) without reasons given, and it was listed in the same genus by Bonnet (1957: 2445). Denis (1962b: 289) had to contradict this for nomenclatural reasons, and he suggested *pyrenaea* to be synonymous with *emphana*, following the opinion of Simon (1929: 743). After examination of the description of Thorell, and of the holotype, I place it now as a synonym of the present species.

Bösenberg & Strand (1906: 173) were first in recording *marginata* [= *radiata*] from Japan, suggesting the name *longipedella* in case it might appear necessary to raise the long-legged Japanese form to subspecific rank. This form is now correctly considered to be a separate species by all recent Japanese authors. Schenkel's (1937: 78) record of *marginata* from Kansu, China, also belongs to *longipedella*. It is impossible to re-investigate all other records of *marginata* from the East Asiatic mainland and Japan, but some of them may refer to *longipedella* too.

From Prószyński's (1961: 129) illustrated account of the pairing of *L. marginata* it is clear that he observed *Neriene emphana* and not the present species.

Male. — Measurements in mm. Total length 3.4-5.3; cephalothorax, length 1.55-2.35, width 1.15-1.7; abdomen, length 1.7-3.0, width 0.9-1.5, height 0.8-1.4; chelicerae, length 0.7-1.0, width 0.35-0.50.

Cephalothorax. — Light brown to orange-brown, faintly suffused with black, with the exception of broad callous brims; head slightly darker, blackish-brown in dark specimens. Posterior margin superficially excised, sides evenly curved to front, not constricted at border of head and thorax. Callous brims only slightly raised with a superficial groove between brim and remainder of dorsal surface of thorax, running from posterior margin to border of head and thorax; accumulations of white pigment sometimes present below integument of brims; outer margin of brims with small warts, each with a short hair on top. Width 0.7 of length, width of head about 0.55 of width of thorax. From side, posterior end of callous brim vertical, dorsal line of thorax barely rising towards level fovea, cephalon slightly raised; grooves on border of head and thorax not very distinct; clypeus straight. Thorax and posterior part of head with very short hairs, eye-region and clypeus with long hairs and some spinehairs.

Eyes. — Eye-region slightly narrower than head. Anterior row of eyes straight, posterior row recurved. PME without black rings, only small triangles present in front and behind. Diameter of PME 0.08-0.11 mm, lateral eyes of same size, diameter of AME 0.7 of diameter of PME. PME

separated from each other by about 0.9 diam., from PLE by 2.0-2.1 diams., and from AME by 0.9-1.0 diam. of PME. AME separated by their own diameter or slightly less. Height of clypeus 0.19-0.23 of length of cephalothorax.

Chelicerae. — Brown to black, lighter at base and near cheliceral teeth. Basal tubercle blunt but rather large. Basal two-thirds of lateral surface with fine parallel grooves and ridges. Three teeth in dorsal row, basal pair at proximal side of apical slant, third tooth rather far from basal pair, near base of fang, more dorsal in position; second tooth large, basal and apical teeth half as large. Ventral row with three widely spaced, equidistant teeth, basal tooth opposite to second tooth of dorsal row and as large as basal tooth of dorsal row, the others very small, apical tooth opposite to apical tooth of dorsal row.

Gnathocoxae. — Brown to dark brown, heavily suffused with black, notably on lateral surfaces. Labium black-brown to black, with raised anterior half. Sternum brown, heavily suffused with black; width 0.80-0.85 of length, broadly produced between coxae IV.

Legs. — Light brown to yellow-brown, lightly suffused with black. Coxae IV often with blackened posterior surfaces. Legs very long and slender, length of femur I 1.5-1.7 times as long as cephalothorax, length of tibia I 19-22 diams. of segment. Measurements (of specimen from Belgium, Eprave) in mm:

	I	II	III	IV	palp
Fe	3.55	3.15	2.20	3.05	1.05
Pa	0.60	0.57	0.47	0.52	0.25
Ti	3.50	3.20	1.90	2.75	0.35
Mt	3.50	3.35	2.10	3.20	—
Ta	1.55	1.50	1.00	1.20	0.94

Chaetotaxy. — All femora spineless. Pa I-IV d''d', on I and II apical spine very small, on III and IV of same length as basal one.

Ti I d'' l' l'' d', 4-6 v'', 3-6 v'
 II d'' l' l'' d', 4-5 v'', 4-5 v'
 III-IV d'' l' d', 1 v'', 1-3 v'
 Mt I-IV dl'l''v

All tibiae without apical spines. Length of d''-spine on tibia I 0.15-0.31 mm, diameter of tibia I at base of d''-spine 0.15-0.20 mm; on tibia IV 0.28-0.44 mm and 0.13-0.16 mm, respectively. Tm I 0.10-0.11. Position of d''-spine on tibia I 0.08-0.10.

Abdomen. — Cylindriform, with obscure pattern, resembling female. Median dorsal band broad, beige-coloured, heavily suffused with black, especially at margins, uniformly black posteriorly above spinnerets; interrupted by a narrow white or beige cross-band at three-fourths of length. Dorsal median band bordered by white, dorsal half of lateral surface white, ventral half mainly black. Ventral surface black, bordered by white latero-ventral stripes or series of three spots from opercula to about spinnerets. Opercula light brown, spinnerets and genital area black. Latero-ventral stripes and lateral stripe behind white dorsal cross-band yellow in live specimens. I have seen a very dark specimen from Japan, which has the abdomen black with a white spot at base of second half of lateral surface, a pair of white spots on the posterior surface, and a small white spot as a remainder of the latero-ventral stripe; the opercula are beige-coloured.

Palp (fig. 322, 324). — All segments light brown to yellow-brown, femur often darkened at base, cymbium usually completely blackish. Femur spineless, slightly fusiform. Patella with a long dorsal spine near distal margin, two and a half times as long as segment, accompanied by a long spinehair, two-thirds of length of spine. Tibia with a long dorsal spine near distal margin, two times as long as segment, and with 15-20 slightly shorter spinehairs on dorsal and lateral surfaces. Cymbium with a dorsal spine on distal half, and with long spinehairs. Paracymbium with flat and narrow distal arm tapering to a point. Anterior and ventral surfaces of tegulum meeting in a rounded protrusion, anterior surface not excavated dorsally of this protrusion but straight, whole element rather squarish in lateral view. Median apophysis (fig. 315) long, curved slightly in dorsal direction on distal half; distally bifurcate, dorsal tip hook-shaped, ventral tip straight and membranous, dorsal arm broader than ventral arm. Embolus (fig. 323, *e*) broad at base, bent perpendicularly in the middle; outer margin heavily chitinous; spermduct ending at blunt tip, which is devoid of appendages or lobes. Embolic membrane with heavily sclerotized ventral margin. Terminal apophysis (fig. 318, 319, 323, *ta*) a conspicuously grooved and heavily chitinous element; basal part a convex shield, the remainder of the element appearing from the inside (mesal side) of the shield; tip indented where the grooves meet the anterior margin. There is a large terminal sclerite, rather blade-like and pointed; the element lies between the terminal apophysis and the embolic membrane. Lamella (fig. 320) large, with evenly curved mesal and anterior margins; anterior tip blunt, lateral margin straight between tip and very short lateral arm, the latter without free projection; dorsal surface of anterior half with conspicuous ridges perpendicular to lateral margin; proximal tip sharply pointed; element not projecting in front of cymbium and terminal

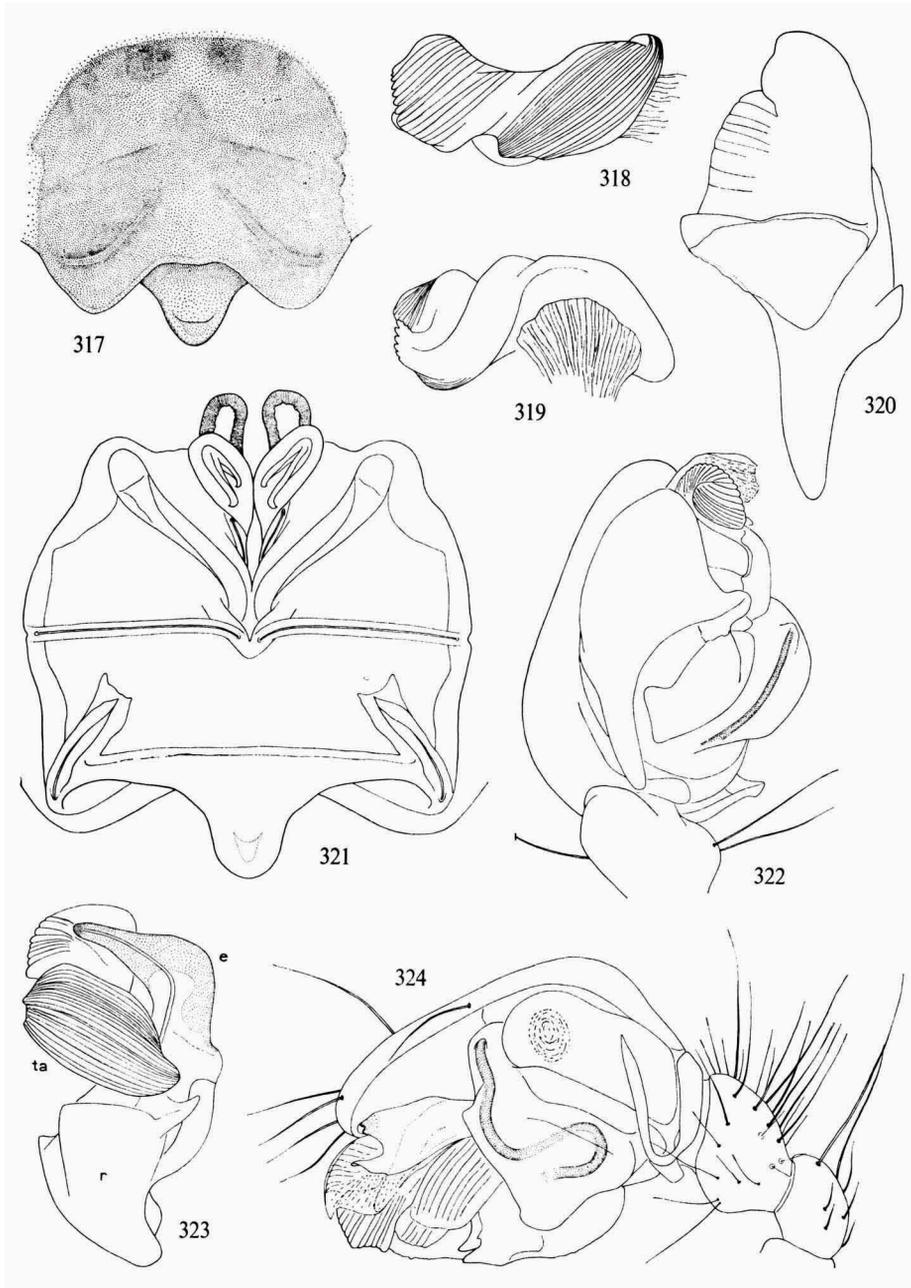


Fig. 317-324. *Neriene radiata*. 317, epigyne; 318, terminal apophysis, lateral aspect; 319, do., mesal aspect; 320, lamella, dorsal aspect; 321, vulva, dorsal aspect; 322, male palp, ventral aspect; 323, radix (*r*) with embolus (*e*) and terminal apophysis (*ta*); 324, male palp, lateral aspect. 317, 322, 324, $\times 49$; 318-320, 323, $\times 67$; 321, $\times 89$.

apophysis in the unexpanded palp (cf. *longipedella*). Transversal sclerite absent.

Female. — Measurements in mm. Total length 3.3-6.5; cephalothorax, length 1.3-2.2, width 1.0-1.6; abdomen, length 1.9-4.6, width 1.1-3.1, height 1.0-2.9; chelicerae, length 0.62-0.90, width 0.30-0.45.

Cephalothorax. — Coloured as male, but head less dark. Callous brims occupying about one-seventh of width of thorax, brims conspicuously raised; a nearly continuous band of white pigment always present below integument at border of callous brim and thorax proper; warts and hairs as in male. Grooves at border of head and thorax distinct. Eye-region and clypeus hairy, shorter than in male. Diameter of PME 0.07-0.10 mm, laterals of same size, diameter of AME about 0.7 of PME. PME separated from each other by 0.9-1.0 diam., from PLE by 1.4 diams., and from AME by 1.0 diam. of PME. Height of clypeus 0.12-0.15 of length cephalothorax.

Chelicerae. — Basal tubercle absent. Stridulating file as in male. Dorsal row with three strong equidistant teeth, second tooth largest, others slightly smaller. Ventral row with three equidistant teeth, basal tooth opposite to second or third dorsal tooth and as large as basal dorsal tooth, apical tooth slightly smaller.

Legs. — Light yellow-brown to light brown, coxae IV often with blackened posterior surfaces. Legs long and slender, length of femur I 1.6-1.9 times length of cephalothorax, length of tibia I 14-18 diams. of segment. Measurements (of specimen from France, Montpellier) in mm:

	I	II	III	IV
Fe	3.40	2.90	2.10	2.85
Pa	0.65	0.62	0.55	0.55
Ti	3.55	2.85	1.75	2.45
Mt	3.50	2.85	1.95	2.60
Ta	1.75	1.35	0.70	1.15

Chaetotaxy. — Femora spineless. Patellae as in male. Spines on tibiae as in male, but with less v-spines, e.g., tibia I with 4-5 v'-spines, tibia II with 3-4 v'-spines. Length of d''-spine on tibia I 0.37-0.44 mm, diameter of tibia I at base of d''-spine 0.20-0.25 mm; on tibia IV 0.46-0.50 mm and 0.17-0.20 mm, respectively. Tm I 0.10-0.15. Position of d''-spine on tibia I 0.09-0.13.

Abdomen. — Broad dorsal median band with sinuate margins, beige-coloured with black suffusion at margins, black on posterior half; some small white blotches present near median line, band interrupted by a narrow white

transverse band on three-fourths of length of abdomen. Remainder of dorsal surface and dorsal half of lateral surface white from base to about spinnerets. Ventral surface and ventral half of lateral surface black, with conspicuous latero-ventral stripes from opercula to about spinnerets; stripes white in preserved specimens, yellow in the live animal; stripes often broken up into series of three spots. Black areas of ventral and lateral surfaces connected with black posterior part of dorsal band near spinnerets. Opercula beige-coloured or light brown. Spinnerets black.

Epigyne (fig. 317). — Large and conspicuous, black-brown, rather protruding from ventral surface. Posterior margin excised in the middle, lateral corners protruding posteriorly.

Vulva (fig. 316, 321). — Nearly two coils of spiral groove. Opening of groove laterally on ventral wall. Turning-point meso-dorsally of apex of atrium, pointing in antero-lateral direction. Receptacula situated meso-ventrally and pointing in anterior direction. Ventral wall excised at posterior margin, dorsal wall with short scape, a semi-covered depression on its ventral surface. Epigyneal aperture 0.33-0.56 mm; in European specimens 0.45-0.56 mm, in Chinese specimens 0.37-0.48 mm (3 ♀ only), and in Japanese specimens 0.33-0.40 mm. Many females from the Eastern United States have been examined and measured, and their epigyneal apertures range between 0.39 and 0.49 mm; only few specimens were available from more Western parts (4 ♀ and 1 ♂ from New Mexico), and these show a considerable increase in the size of the genitalia in comparison with the East, with an epigyneal aperture of 0.51-0.56 mm.

Geographical variation. — In table 1 some measurements have been arranged in relation to the geographical origin of the specimens, on a very rough scale. A comparison of the size of the specimens (total length, length of cephalothorax, length of femur I) reveals small but consistent differences. Males and females from North America and Europe, respectively, reach the same upper limits of the numerical range, but North American specimens (eastern part only) can be smaller; specimens from Japan show the same lower limits as the American specimens, but their upper limits are much lower; European and Japanese specimens are nearly without overlap as far as cephalothorax and femur I are concerned, but their total lengths considerably overlap. Too few specimens were available from China to get a clear impression of their size limits, but they seem to be intermediate between the European and Japanese populations, as they are geographically.

The sizes of the genitalia (only the width of the epigyneal aperture and the length of the cymbium have been considered) likewise show a geographical variation, the differences being more clear-cut and showing less

TABLE I
Neriene radiata and *N. longipedella*
 Sizes (mm) of specimens and genitalia in relation to distribution

	<i>N. radiata</i>				<i>N. longipedella</i>	
	Nearctic		Europe	Palearctic	Asia	Japan
	West	East		Asia		
♀						
total length	4.8-6.0	3.3-6.5	4.3-6.5	4.8 (Paik: 4.5)	4.2	4.4-5.6
cephalothorax length	2.0-2.2	1.3-2.2	1.6-2.2	1.5-1.85	1.6	1.85-2.3
femur I length	3.45-3.75	2.5-3.5	2.9-3.6	2.6-3.3	3.35	4.2-5.1
width epigyneal aperture	0.51-0.56	0.39-0.49	0.45-0.56	0.37-0.48	0.42	0.50-0.55
♂						
total length	5.3	3.4-5.3	4.2-5.3	(Paik: 4.5)		4.6-5.4
cephalothorax length	2.35	1.55-2.35	1.85-2.3			2.1-2.5
femur I length	4.15	2.85-3.5	3.0-3.8			4.8-5.7
cymbium length	1.00	0.79-0.86	0.84-1.02			1.00-1.12

overlap. Eastern North American specimens have smaller genitalia than the European ones, while more to the West (New Mexico) they equal those from Europe. Specimens from China (no males available) are smaller again than the European, again without overlap, while the Japanese specimens are even smaller in this respect, much smaller than specimens from Europe. I have not seen any specimens from Western North America, west of the Rocky Mountains, and thus I have not been able to investigate the geographical variation across the New World. The nature of this variation might be very interesting from a zoogeographical point of view.

Distribution and habitat. — *Neriene radiata* is the only species of the genus with a Holarctic distribution. It has been recorded from most countries in Europe, including the British Isles, the Iberian Peninsula, Italy, Scandinavia, and Finland. It was recorded once from The Netherlands (Becker, 1896: 22, from Maastricht), but it has never been found there again. In Asia it occurs on the mainland, and on the Japanese and Kuril Islands. In the Nearctic region it is known from many parts of the United States and Canada, but the records are more numerous from the east than from the west.

The peculiar web of the species has been described and depicted many times (Emerton, 1902: fig. 318; Comstock, 1913: 390, fig. 405; Nielsen, 1932: 206, fig. 7; Kaston, 1948: 123, pl. 114). It is distinctly dome-shaped, and constructed between shrubs and high vegetation, between branches of trees and the ground, and in similar situations. Adult specimens have been recorded from May onwards.

Material examined.

- Belgium. — 1 ♂, Namur, Eprave, 10.vi.1959, J. M. Vrydagh (ISNB).
 France. — 1 ♀, Hautes-Alpes, Aspremont, M. Thomas (ISNB). — 1 ♀, Alpes-Maritimes, La Trinité-Victor, ix.1954, M. Thomas (ISNB). — 1 ♀, Lot, Forêt de Vayrac (MNP). — 5 ♀ 7 ♂, Hérault, Juvignac near Montpellier, 20.v.1967, J. C. Ledoux (ML).
 Pyrenees. — 1 ♂, Pyrenees, J. Lange (holotype *Linyphia pyrenaea* Thorell; UZM).
 Spain. — 1 ♀, Monte Tibidabo near Barcelona, 12.ix.1953 (SMF).
 Germany. — 3 ♀ 2 subadult ♂, Hessen, Odenwald, leg. Wider (♀ lectotype and paralectotypes of *Linyphia marginata* Wider; SMF). — 17 ♀ 2 ♂, Baden-Württemberg, Neuhütten, 19.vi.1949, A. Zilch (SMF). 1 ♀, Hornberg, 5.viii.1958, W. Tobias (SMF).
 Switzerland. — 9 ♀ 3 ♂, St. Gallen, Walenstadt, 12.vi.1968, P. J. van Helsdingen (ML). — 1 ♀ 1 ♂, Glarus, Tierfehd near Linthal, 800-1000 m, between low shrubs and below branches of trees, 10.vi.1968, P. J. van Helsdingen (ML). 3 ♀ 2 ♂, Klöntaler See, 850 m, low shrubs, 9.vi.1968, P. J. van Helsdingen (ML); 3 ♀ 2 ♂, Klöntaler See, Vorauen, 850 m, 19.vi.1968 (ML).
 Austria. — 3 ♀ 1 ♂, Vorarlberg, between Lochau and Eichenberg, 18.vi.1960, H. Janetschek (SMF). 2 ♀, above Valduna near Feldkirch, 20.vi.1960, H. Janetschek

(SMF). 1 ♂, Latenser Tal, 20.vi.1960, H. Janetschek (SMF). — 18 ♀ 17 ♂, Tirol, Lanser Kopf near Innsbruck, on young spruce-firs, 900 m, 7.v.1967, K. Thaler (ML). 1 ♀ 1 ♂, Mayerhofen, vi.1958, A. Müller (SMF).

Italy. — 1 ♀, Campania, Castellammare di Stabia, 25.v.1962, H. & L. Levi (MCZ).

Yugoslavia. — 1 ♀, Istria, Galezana near Pula, 27.vi.1962, H. Levi (MCZ). 1 ♀ 1 ♂, Rovinj, on shrubs, 2.vi.1962 (ML). 3 ♀ 1 ♂, Ročko polje, forest, 23.v.1968, C. L. Deeleman (ML). — 3 ♀, Croatia, Gračac, 24.vii.1964, C. L. Deeleman (ML). — 1 ♂, Slovenia, Severin, near Kupa river, 5.vii.1966, C. L. Deeleman (ML). 5 ♀ 2 ♂, Julian Alps, Bled, 500-700 m, 6-8.vii.1962, H. & L. Levi (MCZ).

Turkey. — 1 ♀, Amasya (MNP).

China. — 3 ♀, N. Peking (MNP).

Japan. — 9 ♀ 3 ♂, Kyushu, Nagasaki and Kompira (among specimens of *L. marginata longipedella* Bösenberg & Strand, 1906; SMF). — 1 ♀ 1 ♂, Honshu, Hiroshima Pref., Tadanoumi, 15.viii.1948, R. Oi (Oi, 1960; ML).

Canada. — 1 ♀, Prince Albert, 18.viii.1914, J. H. Emerton (MCZ).

U.S.A. — 4 ♀ 2 ♂, Massachusetts, Beverley, 4.vi.1870, J. H. Emerton (MCZ). — 26 ♀ 5 ♂, New Jersey, Lambertville, viii.1953, W. Ivie (ML). — 6 ♀ 5 ♂, Maryland, Meyersville, South Mts., 2.ix.1915, Hyslop & Parker (Blauvelt, 1936; MCZ). — 2 ♀, Georgia (MNP). — 2 ♀, Minnesota, Roseau, 18.vi.1966, B. Cutler (ML). — 2 ♀ 1 ♂, New Mexico, Bandelier National Monument, 21.vi.1947, D. C. Lowrie (CSC). 2 ♀, El Porvenir, 28.vi.1947, D. C. Lowrie (CSC).

Nerienne longipedella (Bösenberg & Strand) comb. nov.

(fig. 325-333)

Linyphia marginata longipedella Bösenberg & Strand, 1906, Abh. senckenb. naturf. Ges., 30: 173, fig. 192 (diagnosis of subspecies, Japan).

Linyphia longipedella; Yaginuma, 1957, Acta Arachn., 14: 54 (Japan, Hokkaido); 1958, Misc. Rep. Res. Inst. Natur. Resources, 46/47: 70 (Japan, Honshu); 1960, Spid. Japan Colour: 41, pl. 12 fig. 71, fig. 40-1 (Japan).

Prolinyphia longipedella; Oi, 1960, Journ. Inst. Polyt., D, 11: 218, fig. 337-339 (Japan, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue). — Namkung, 1964, Atypus, 33/34: 36, fig. 16 (Korea). — Paik, 1965a, Educ. Journ., 3: 64, fig. 11-13 (Korea).

Linyphia marginata; Schenkel, 1937, Ark. Zool., 29A(1): 78 (China, Kansu).

Linyphia yunohamensis; Bösenberg & Strand, 1906, Abh. senckenb. naturf. Ges., 30: fig. 43A-C, 54A-C (p.p.; Japan). — Strand, 1918, Arch. Naturg., 82A(11): 76 (description ♀ ♂, pairing, Japan).

Types. — ♂ lectotype, by present designation, from Japan, Kyushu, Nagasaki and Kompira, 1882, W. Dönitz; the long syntype-series further contains 23 specimens (15 ♀ 8 ♂) of *longipedella*, mixed up with 12 specimens (9 ♀ 3 ♂) of *N. radiata*, divided among two tubes, both bearing a label "Japan, Nagasaki, Kompira, W. Dönitz leg. 1882" (SMF).

Remarks. — Bösenberg & Strand (1906), when recording *Linyphia marginata* [= *N. radiata* (Walckenaer)] for the first time from Japan, mentioned the conspicuous long legs of their specimens. As a precautionary measure, in case a later student would think it necessary to raise the Japanese form to subspecific rank, they provided the name *longipedella*. Recent

Japanese authors correctly have considered it to be a distinct species, differing from the sympatric *Nerienne radiata* by the long legs and the genitalia. It now appears that both species were present in the material Bösenberg & Strand had before them. Some drawings of this species from the hand of Dönitz (in Bösenberg & Strand, 1906: pl. 5 fig. 43, 54) were erroneously assigned by them to *Linyphia yunohamensis*, a new species described in the same paper. Dönitz collected the material of *marginata longipedella* and *yunohamensis*, adding the above mentioned figures and field-notes. Dönitz's account on the courtship of one species was published by Strand (1918: 76), again in relation with *Linyphia yunohamensis*. From Dönitz's description, however, it is quite clear he had specimens of *longipedella* before him, and not of *yunohamensis*.

Schenkel's record (1937: 78) of *Linyphia marginata* from Kansu in China appears to be based on a misidentification. It is a small specimen of *N. longipedella*, and it forms the westernmost find of the species up till now.

Nerienne longipedella is slightly larger than the Japanese specimens of *N. radiata*, with much longer legs, and with conspicuously larger genitalia. As to the latter it is comparable with the European specimens of *radiata*.

Male. — Measurements in mm. Total length 4.6-5.4; cephalothorax, length 2.1-2.5, width 1.7-1.9; abdomen, length 2.5-3.0, width 1.3-1.6, height 1.5-1.8; chelicerae, length 1.0-1.2, width 0.45-0.55.

Cephalothorax. — Light brown to yellow-brown, very faintly suffused with black; slightly darker on grooves between head and thorax; callous brims of one-eighth of width of thorax, from posterior margin to border of head and thorax; brims barely raised, with very small warts and hairs at lateral margins; accumulations of white pigment below integument never present. Posterior margin not excised, cut off straight, sides barely constricted at border of head and thorax. Width 0.75-0.8 of length, width of head 0.6 of width of thorax. From side, dorsal line moderately rising towards level fovea, line of head rising steeper and slightly convex towards eye-region; clypeus straight. Long hairs on head in three rows from fovea to PME and PLE, at eye-region and on clypeus.

Eyes. — Eye-region occupying whole width of head. Anterior row of eyes straight, posterior row slightly recurved. PME not on black tubercles, but with small black triangles only in front and behind. Diameter of PME 0.10-0.12 mm, laterals of approximately same size, diameter of AME 0.7 of diameter of PME. PME separated from each other by 0.7-0.9 diam., from PLE by 1.7-2.0 diams., and from AME by about 1.0 diam. of PME. AME

separated by less than their own diameter. Height of clypeus 0.21-0.23 of length of cephalothorax.

Chelicerae. — Light brown. Basal tubercle small. Basal three-fourths of lateral surface with fine stridulating ridges. Dorsal row of cheliceral teeth numbering four or five, basal pair nearly in line with ventral row, apical two or three situated more dorsally; second tooth largest, basal and third teeth half as large, apical(s) very small and close together. Ventral row with four or five teeth, equidistant, basal tooth as large as basal tooth of dorsal row, gradually diminishing in size towards very small apical tooth; basal tooth close to second tooth of dorsal row.

Gnathocoxae. — Brown, suffused with black, apices lighter. Labium brown, heavily suffused with black; anterior raised border narrow, lighter. Sternum brown, heavily suffused with black; width 0.8 of length.

Legs. — Light brown to yellow-brown, without annulations. Legs long and slender, length of femur I 1.9-2.5 times length of cephalothorax, length of tibia I 22-24 diams. of segment. Measurements (of lectotype) in mm:

	I	II	III	IV	palp
Fe	5.60	4.80	3.20	4.30	1.19
Pa	0.70	0.70	0.55	0.55	0.31
Ti	6.40	5.10	2.85	4.00	0.40
Mt	6.80	5.20	3.05	4.70	—
Ta	2.50	2.10	1.25	1.60	1.10

Chaetotaxy. — All femora spineless. Pa I-IV $d''d'$, apicals very small, notably on legs I and II.

Ti I $d'' l' l'' d'$, 5-6 v' , 5-6 v''
 II $d'' l' l'' d'$, 4-6 v' , 4-6 v''
 III $d'' l' d'$, 2-3 v' , 2-3 v''
 IV $d'' l' d'$, 0-1 v' , 0-1 v''

Mt I-II $d'l''v$; III-IV $d'l'$

Length of d'' -spine on tibia I 0.34 mm, diameter of segment at base of d'' -spine 0.18-0.23 mm; on tibia IV 0.48 mm and 0.17-0.20 mm, respectively. Tm I 0.09-0.17. Position of d'' -spine on tibia I 0.08-0.13. In the larger part of the available material spines broken off or legs missing.

Abdomen. — Cylindric. Dorsal median band light brown, margins straight with the exception of one indentation on half length of abdomen; interrupted by a narrow clear white cross-band on three-fourths of length; suffused with black on sides in front of indentation, heavily suffused from indentation to spinnerets. A dorso-lateral white band from anterior side to

half length of abdomen, connected there with white indentation of dorsal band, which continues on the lateral surface as a white vertical stripe, curving gradually more in posterior direction and reaching the latero-ventral white stripe not far from spinnerets; dorsal white cross-band reaching lateral surface and continuing there parallel with above mentioned white vertical stripe, but not reaching the latero-ventral stripe; a short horizontal white streak from dorsal margin of operculum to one-third of length of abdomen; posterior surface with two pairs of small white spots in one line with the dorso-lateral stripes; remainder of lateral surface mottled with white and black, mainly black on ventral half. Ventral surface uniformly black, bordered by two pairs of white spots; first pair round and clear white, separated from opercula by their own length, second pair oblong, connected with lateral vertical white stripe, not far from spinnerets. Opercula light brown, genital area and spinnerets brown, suffused with black.

Palp (fig. 325, 332). — All segments yellow-brown, cymbium brown. Femur slightly fusiform. Patella short, dorsal spine about two times as long as segment. Tibia slightly longer than patella, dorsal spine and dorsal and lateral spinehairs about twice as long as segment. Cymbium with one or two spines on distal half of dorsal surface, and with some spinehairs along margins. Flat and narrow distal arm of paracymbium with blunt tip. Tegulum with anterior surface excavated above the rounded antero-ventral protrusion; not squarish as in *radiata*. Median apophysis (fig. 329) long, distal half curved slightly in dorsal direction as in *radiata*, but distal half broader, the ventral margin distinctly curved towards blunt ventral tip, dorsal tip hook-shaped; ventral arm broader than dorsal arm (cf. *radiata*). Embolus perpendicularly curved at half length, tip (fig. 327) with small rounded spermduct-tooth next to an equally small excrescence. Embolic membrane (fig. 328, *em*) straight, ventral margin heavily sclerotized, apical margin frayed. Terminal apophysis (fig. 331) long and narrow and conspicuously grooved as in *radiata*; basal part shield-shaped; apical half as a continuation of internal part of shield, slightly narrower than in *radiata*, grooved as basal shield. Terminal sclerite (fig. 328, *tes*) large, blade-like, with sharp free distal edge, situated between terminal apophysis and embolic membrane. Lamella (fig. 328, *l*) very long, conspicuously protruding from tip of palp, and much longer than cymbium; proximal tip very slender, mesal margin straight; anterior margin evenly rounded, lateral arm very short, without free projection; dorsal surface rugose near lateral margin in front of connecting membranes, roughened by small papillae on apical part; this apical part not present in *radiata*. Transversal sclerite absent.

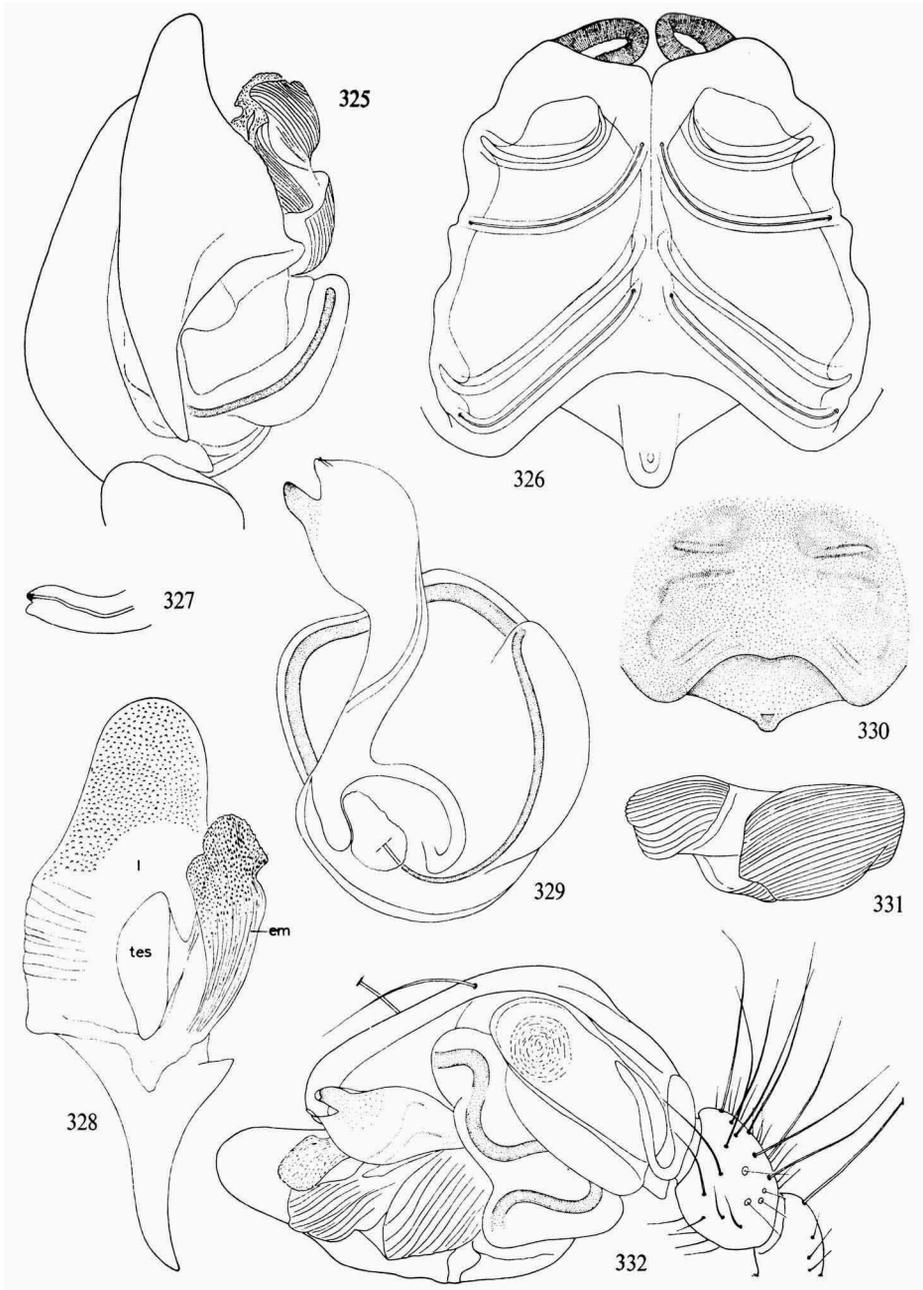


Fig. 325-332. *Neriene longipedella*. 325, male palp, ventral aspect; 326, vulva, ventral aspect; 327, tip of embolus; 328, lamella (*l*), with terminal sclerite (*tes*) and embolic membrane (*em*); 329, tegulum with median apophysis, mesal aspect; 330, epigyne; 331, terminal apophysis; 332, male palp, lateral aspect. 325, 330, 332, $\times 49$; 326, $\times 89$; 327-329, 331, $\times 67$.

Female. — Measurements in mm. Total length 4.2-5.6; cephalothorax, length 1.6-2.3, width 1.25-1.7; abdomen, length 2.6-3.4, width 1.5-2.15, height 1.45-1.9; chelicerae, length 0.75-1.1, width 0.35-0.50.

Cephalothorax. — Colour as in male. Callous brims without accumulations of white pigment below integument; lower margin of head at sides and on clypeus light. Posterior margin broadly excised, sides slightly constricted at border of head and thorax. Clypeus, when looked at from side, with slightly protruding lower margin. Hairs as in male. Diameter of PME 0.11-0.13 mm, laterals of same size, diameter of AME about 0.7 of PME. PME separated from each other by 0.6-0.7 diam., from PLE by 1.3-1.4 diams., and from AME by 1.0 diam. of PME. AME separated by less than their own diameter. Height of clypeus 0.16-0.18 of length of cephalothorax.

Chelicerae. — Basal tubercle absent. Stridulating files as in male. Dorsal row usually with five equidistant teeth, rarely four or six; second tooth largest, basal and third teeth half as long, diminishing in size towards very small apical tooth. Ventral row with five teeth, all equidistant; basal tooth as large as and opposite to third tooth of dorsal row, gradually diminishing in size in apical direction.

Legs. — Long and slender as in male. Length of femur I 2.1-2.4 times length cephalothorax, length of tibia I 19-20 diams. of segment. Measurements in mm (of specimen from Japan, Honshu):

	I	II	III	IV
Fe	5.20	4.60	3.20	4.40
Pa	0.80	0.70	0.60	0.65
Ti	5.90	4.70	2.90	4.10
Mt	5.90	4.80	3.10	4.50
Ta	2.60	2.00	1.30	1.80

Chaetotaxy. — Femora and patellae as in male. Tibiae I and IV with more v-spines, viz., 6-7 v'- and 6-7 v''-spines on tibia I, 3-4 v'- and 3-4 v''-spines on tibia IV; tibiae III and IV with a l''-spine and a second l'-spine. Metatarsi with spines as in male.

Length of d''-spine on tibia I 0.65 mm (one specimen only), diameter of segment at base of d''-spine 0.24-0.29 mm; diameter of tibia IV at base of d''-spine 0.19-0.24 mm, spine broken off in all available specimens. Tm I 0.09. Position of d''-spine on tibia I 0.06-0.10.

Abdomen. — Cylindric as in male. Dorsal surface light; median band much lighter than in *radiata*, indicated by two or three pairs of black spots on anterior half, followed by a transverse black bar at base of second half of abdomen, separated from black posterior surface by a narrow white transverse stripe. Pattern on lateral surface as in male. Posterior surface with

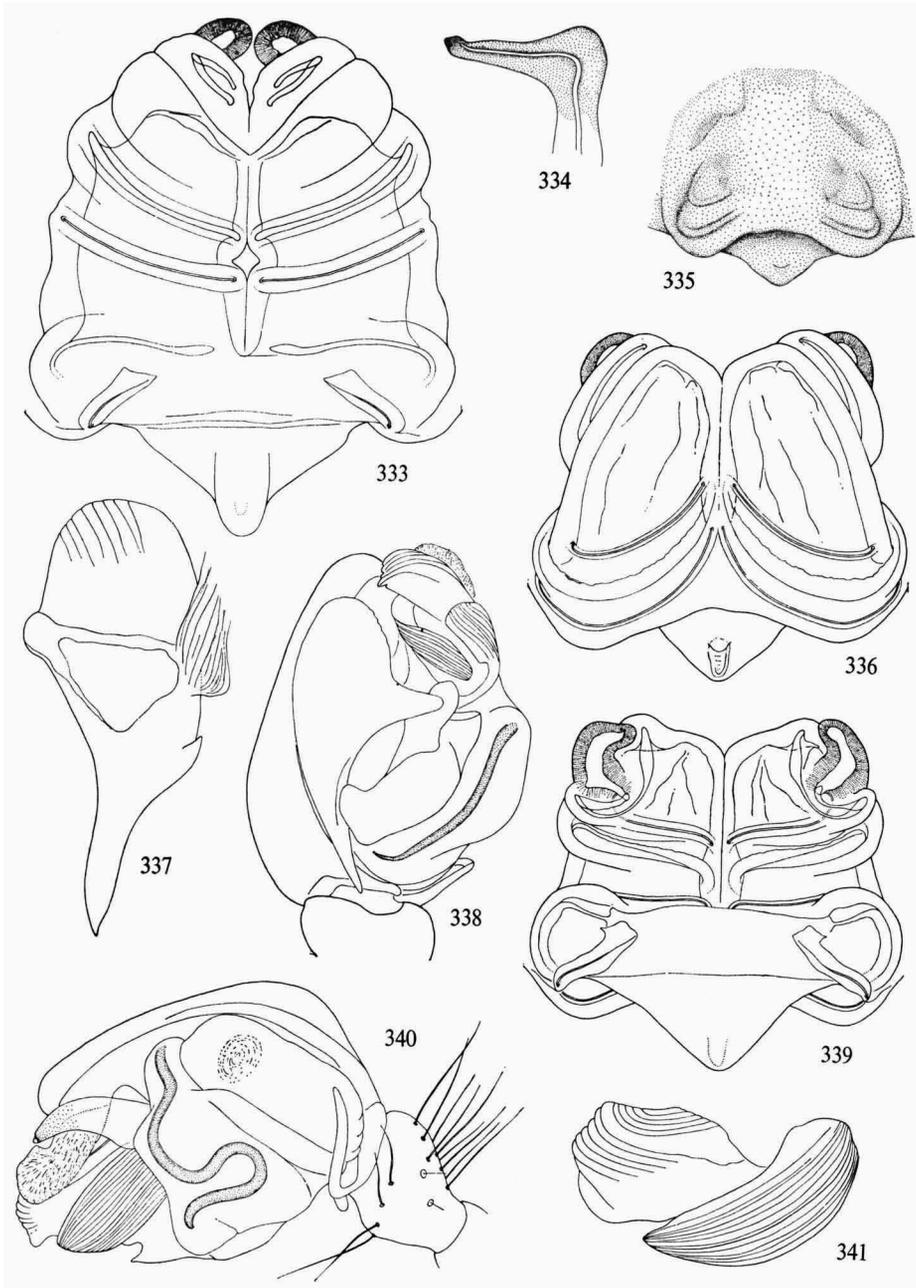


Fig. 333. *Neriene longipedella*, vulva, dorsal aspect. Fig. 334-341. *N. marginella*. 334, embolus, dorsal aspect; 335, epigyne; 336, vulva, ventral aspect; 337, lamella, dorsal aspect; 338, male palp, ventral aspect; 339, vulva, dorsal aspect; 340, male palp, lateral aspect; 341, terminal apophysis. 333, 336, 339, $\times 89$; 334, 337, 341, $\times 95$; 335, $\times 49$; 338, 340, $\times 67$.

two pairs of white spots, the dorsal pair as widely separated as the dorso-lateral bands, the ventral pair closer together and not far from spinnerets; a small white transverse mesal spot usually present. Ventral surface black, with two pairs of latero-ventral spots as in male.

Epigyne (fig. 330). — Of same appearance as in *radiata*, but scape more triangular, the rounded tip smaller and rather narrow. Posterior margin with excision more rounded.

Vulva (fig. 326, 333). — General appearance again as in *radiata*. Atria completely separated, mesal septum reaching as far as posterior margin of ventral wall. Entrances of spiral grooves mesally in dorsal wall; two and one-fourth coils of spiral groove from entrances to turning-points, which are directed sideways. Receptacula pointing in mesal direction. Width of epigyneal aperture 0.42-0.55 mm; in the only specimen I have seen from China the aperture measures 0.42 mm, in the Japanese specimens the width varies between 0.50 and 0.55 mm.

Geographical variation. — Judging from the sole available ♀ from continental Asia, there is a geographical variation in total length, length of cephalothorax, length of legs, and width of epigyneal aperture (no male available). The Japanese specimens are larger than the specimen from China in all characters mentioned (table 1, p. 233). In *N. radiata* the contrary has been found (table 1), the Chinese specimens being distinctly larger than the specimens from Japan, though the ranges clearly overlap. As a result the Japanese specimens of *longipedella* are comparable in size and width of epigyneal aperture with *radiata* from Europe, differences in lengths of legs left out of consideration. The cymbium of *longipedella* is longer than in most specimens of *radiata* from Europe. In Japan very small specimens of *radiata* occur sympatrically with the large *longipedella*, and this makes it very easy to distinguish the two species in this region.

Distribution and habitat. — An East Asiatic species, recorded from China, Kansu (present paper), Korea, and Japan. According to Oi (1960: 218) the species is more common than *radiata*. The web is dome-shaped as in *radiata*, and adult specimens are recorded by him from July onwards. It thus appears that *radiata* (occurring from May onwards) is the earlier.

Material examined.

China. — 1 ♀, South Kansu, Kina, 1930, D. Hummel (*Linyphia marginata*; Schenkel, 1937; MS).

Japan. — 15 ♀ 9 ♂, Kyushu, Nagasaki and Kompira, 1882, W. Dönitz (♂ lectotype and paralectotypes of *Linyphia marginata longipedella* Bösenberg & Strand; SMF). — 1 ♀ 1 ♂, Honshu, Toyama Pref., Hakusan, 26.vii.1954, R. Oi (ML).

Neriene marginella (Oi) comb. nov.

(fig. 334-342)

Prolinyphia marginella Oi, 1960, Journ. Inst. Polyt., D, 11: 219, fig. 344-346, 356-357 (description ♀ ♂, Japan). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue).

Types. — ♂ lectotype, from Japan, Honshu, Shizuoka Pref., Fuji-Omiya (CO); paralectotypes from several localities on Honshu (CO and ML).

In his original paper Oi (1960) listed specimens from several localities, but omitted to select a holotype. However, on my request he now has selected a lectotype, the designation of which is published here. All other specimens of the first description are paralectotypes.

Male. — Measurements in mm. Total length 3.5-4.3; cephalothorax, length 1.6-2.05, width 1.2-1.45; abdomen, length 2.0-2.35, width 1.15-1.3, height 1.0-1.3; chelicerae, length 0.70-0.94, width 0.32-0.44.

Cephalothorax. — Brown to dark brown, head slightly darker. Callous margin only vestigially developed, barely raised and not lighter than rest of cephalothorax, short hairs on lateral margins present. Posterior margin cut off straight, sides evenly rounded, not constricted at border of head and thorax. Width 0.7-0.75 of length, width of head 0.55 of width of thorax. From side, dorsal line rising from posterior margin to fovea, level from fovea to eye-region; clypeus straight. Eye-region and clypeus with long hairs, a spinehair behind PLE at either side.

Eyes. — Eye-region occupying whole width of head. Posterior row of eyes slightly recurved, anterior row slightly procurved. PME with small black triangles in front and behind, not on black tubercles. Diameter of PME 0.09-0.10 mm, lateral eyes of same size, AME smaller, their diameter 0.65 of diameter of PME. PME separated from each other by 0.9-1.0 diam., from PLE by 1.3-1.5 diams., and from AME by 1.3 diams. of PME. AME separated by their own diameter. Height of clypeus 0.19-0.21 of length of cephalothorax.

Chelicerae. — Same colour as head. Basal tubercle small, at latero-frontal corner. Lateral surface with fine parallel ridges on basal two-thirds. Dorsal row with three teeth, basal pair close together, second tooth largest, third tooth rather plump and as large as second tooth, situated much more dorsally, as far from base of fang as from second tooth. Ventral row with three or four teeth, basal tooth small, not far from second tooth but more ventrally, other teeth very small, all close together.

Gnathocoxae. — Brown, lightly suffused with black, apices lighter. Labium

and sternum brown, heavily suffused with black; width of sternum 0.95 of length.

Legs. — Uniformly light brown. Length of femur I 1.6-1.8 times length cephalothorax, length tibia I 19-23 diams. of segment. Measurements in mm (of a paralectotype):

	I	II	III	IV	palp
Fe	2.80	2.35	1.70	2.30	0.82
Pa	0.40	0.40	0.35	0.37	0.19
Ti	2.90	2.35	1.40	2.00	0.29
Mt	2.85	2.35	1.50	2.15	—
Ta	1.45	1.15	0.75	0.95	0.74

Chaetotaxy. — All femora spineless. Pa I-IV $d''d'$, all short, apicals on legs I and II very short.

Ti I	d''	l''	d' , 3-5	v' , 3-4	v''
II	d''	l''	d' , 3	v' , 3	v''
III	d''		d' , 2	v' , 1	v''
IV	d''		d' , 1	v'	

Mt I-II $dl''v$; III-IV $dl'v$

Length of d'' -spine on tibia I 0.14-0.16 mm, diameter of segment at base of d'' -spine 0.14-0.16 mm; on tibia IV 0.26-0.32 mm and 0.10-0.15 mm, respectively. Tm I 0.11-0.13. Position of d'' -spine on tibia I 0.08-0.10.

Abdomen. — Cylindriciform. Black-brown, with only faint traces of the female pattern recognizable. A pair of white spots above the spinnerets usually present, ventro-lateral spots behind the opercula and near spinnerets sometimes present. Lateral white band developed, or reduced to a small light area on half length of abdomen, bearing a white spot. Opercula light brown, genital area dark brown, spinnerets black.

Palp (fig. 338, 340). — Femur and patella dark brown, tibia and cymbium brown with heavy black suffusion. Femur slightly fusiform with concave dorsal surface. Patella with dorsal spine near apical margin one and a half times as long as segment, and with many shorter spinehairs on dorsal and lateral surfaces. Cymbium with one dorsal spine and long hairs. Paracymbium with narrow flat distal arm tapering to a point. Tegulum about squarish as in *radiata*, but with the antero-ventral corner more rounded; anterior surface very lightly concave. Median apophysis (fig. 342) slender and lightly curved in dorsal direction on distal half; not bifurcate, dorsal tip hook-shaped and slightly chitinous, no ventral membranous part present. Embolus curved perpendicularly on half length, spermduct ending at truncate tip (fig. 334).

Terminal apophysis (fig. 341) distinctly grooved on basal shield and on apical half; general shape as in *radiata*, but shorter. Terminal sclerite between terminal apophysis and embolic membrane rather pointed mesally, anterior edge sharp. Lamella (fig. 337) not protruding in front of terminal apophysis or cymbium at the unexpanded palp; proximal tip slender; mesal, anterior, and lateral margins evenly rounded towards very small lateral protrusion where connecting membranes are attached to element; no lateral arm visible; dorsal surface corrugated, ridges running obliquely in anterolateral direction. No transversal sclerite present.

Female. — Measurements in mm. Total length 3.7-4.0; cephalothorax, length 1.35-1.45, width 1.05-1.1; abdomen, length 2.2-2.6, width 1.5-1.09, height 1.9-2.2; chelicerae, length 0.58-0.62, width 0.30-0.31.

Cephalothorax. — Yellow-brown, with grey suffusion at posterior margin, on striae, on border of head and thorax, and at eye-region. Callous margin narrow, from posterior side to head, occupying about one-twelfth of width of thorax, without white pigment below integument; small hairs along margins. Posterior margin superficially excised. Hairs on head shorter than in male. Diameter of PME 0.08-0.10 mm, laterals and AME as in male. PME separated from each other by 0.65 diam., from PLE by 1.1 diams., and from AME by 0.9 diam. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.15-0.17 of length of cephalothorax.

Chelicerae. — Yellow-brown, faintly suffused with black on dorsal and lateral surface. Stridulating file as in male. Dorsal row with three equidistant teeth, second tooth largest, basal and apical teeth of same size, slightly smaller. Ventral row with three small teeth, gradually diminishing in size towards apex, basal tooth opposite to second and third teeth of dorsal row.

Legs. — Yellow-brown, metatarsi and tarsi brown. Length of femur I 1.7-1.8 times length cephalothorax, length tibia I 17-19 diams. of segment. Measurements in mm (of paralectotype):

	I	II	III	IV
Fe	2.35	2.00	1.50	2.00
Pa	0.45	0.45	0.35	0.40
Ti	2.45	2.00	1.25	1.70
Mt	2.40	1.90	1.30	1.80
Ta	1.30	1.05	0.75	0.85

Chaetotaxy. — Differing from male only in the presence of a *l'*-spine on tibiae III and IV, and in the number of *v*-spines on tibiae; tibiae I and II with 3 *v'*- and 3 *v''*-spines, tibia III with 2 *v'*- and 1-2 *v''*-spines, tibia IV with 0-1 *v'*- and *v''*-spines.

Length of d''-spine on tibia I 0.27 mm, diameter of tibia I at base of d''-spine 0.15-0.17 mm; on tibia IV 0.34 mm and 0.13-0.15 mm, respectively. Tm I 0.10-0.12. Position of d''-spine on tibia I 0.08-0.10.

Abdomen. — Median dorsal band leaf-shaped with sinuous margins from anterior side to spinnerets, interrupted on posterior half of abdomen by a narrow white cross-band; cross-band continuous with white latero-dorsal band, which flanks the median dorsal band from base to spinnerets; dorsal band beige-coloured with black suffusion near margins at broadest point and in front of cross-band, uniformly black from cross-band to spinnerets. Lateral surface with a short white horizontal stripe from dorsal margin of operculum to half length of abdomen; a white vertical band on half length running from latero-dorsal band in ventral direction, curving in posterior direction on ventral half of lateral surface, connected there with the white latero-ventral spot near spinnerets; dorsal cross-band continuing on dorsal half of lateral surface as a white vertical stripe; remainder of lateral surface black. Ventral surface uniformly black, flanked by a pair of white oblong spots immediately behind opercula, and by a second pair of spots near spinnerets, the latter pair connected with lateral white markings. Opercula light brown, spinnerets black.

Epigyne (fig. 335). — Large, black-brown, bulging ventrally. Posterior margin excised. Scape triangular. Opening large and wide.

Vulva (fig. 336, 339). — Atria parallel, mesal septum not reaching posterior margin of ventral wall. Tips of atria curving slightly in dorsal direction. Entrances of spiral grooves laterally in dorsal wall, close to the points where the fertilization ducts end on the dorsal side of the dorsal wall. Spiral groove with slightly more than two coils, last coil curving backwards from tip of atrium to turning-point, which is situated dorso-laterally and points outwards. Receptacula near turning-points, slightly dorsally and laterally of tips of atria and pointing in anterior direction. Scape triangular, short, with a semi-covered depression on ventral surface. Width of epigyneal aperture 0.45-0.48 mm.

Distribution and habitat. — Known from Japan (Honshu) only. Data about habitat not available. Adult specimens from May to August (a single ♀ in March (Oi, 1960: 220) might be a survivor of previous year's generation).

Material examined.

Japan, Honshu. — 1 ♀ 1 ♂, Shizuoka Pref., Fuji-Omiya, 1.viii.1958, T. Katayama (♂ lectotype and ♀ paralectotype; Oi, 1960; CO). 1 ♀, Shiraito Falls, 2.viii.1955,

R. Oi (paralectotypes; Oi, 1960; ML). — 1 ♂, Ashifu Experimental Forest, Kyoto Pref., 31.v.1958, R. Oi (CO); 1 ♀ 1 ♂, do., 25.v.1961, R. Oi (ML).

Neriene strandia (Blauvelt) comb. nov.

(fig. 343-346)

Linyphia strandia Blauvelt, 1936, Festschr. Strand, 2: 116, fig. 32-35, 37-38 (description ♂ ♀, Borneo, Sarawak).

Types. — ♂ lectotype, by present designation, and ♀ paralectotype, from Borneo, Sarawak (CU).

There are no other records, nor has this small species ever been collected again.

Male. — Measurements in mm. Total length 3.0; cephalothorax, length 1.45, width 1.1; abdomen, length 1.75, width 0.95, height 0.9; chelicerae, length 0.61, width 0.31.

Cephalothorax. — Light brown, faintly suffused with black on striae. Callous brims from posterior margin to border of head and thorax, lower margin of head and clypeus also whitish; brims barely raised, occupying one-sixth of width of thorax; posterior margin not excised, sides slightly constricted at border of head and thorax. Width 0.75 of length, width of head 0.6 of width of thorax. From side, barely rising from posterior margin to fovea, level at fovea, rising more steeply to eye-region; clypeus straight; grooves on border of head and thorax distinct. Eye-region with a few hairs.

Eyes. — Eye-region occupying nearly whole width of head. Posterior row of eyes slightly recurved, anterior row straight. PME with small black triangles in front and behind. Diameter of PME 0.12 mm, laterals of about same size, diameter of AME 0.75 mm. PME separated from each other by 0.75 diam., from PLE by 0.9 diam., and from AME by 0.75 diam. of PME. AME separated by 0.65 of their own diameter. Height of clypeus 0.16 of length of cephalothorax.

Chelicerae. — Light yellow-brown, lightly suffused with black at base. Basal tubercle small, situated on latero-dorsal corner. Very fine parallel ridges on basal two-thirds of lateral surface. Dorsal row with four teeth; basal pair at proximal side of apical slant, second tooth twice as large as basal tooth, rather close together; apical pair near base of fang and more dorsal in position, small and close together. Ventral row with four small teeth, basal pair slightly more apical than basal pair of dorsal row, apical pair very small and opposite to apical pair of dorsal row, all very small.

Gnathocoxae. — Brown, suffused with black, apices lighter. Labium brown, heavily suffused with black, apical margin lighter. Sternum brown, heavily suffused with black.

Legs. — Light yellow-brown, without annulations. Legs long and slender, length of femur I 2.1 times as long as cephalothorax, length of tibia I 25 diams. of segment. Measurements (of lectotype) in mm:

	I	II	III	IV	palp
Fe	2.95	2.45	1.55	2.15	0.68
Pa	0.42	0.40	0.30	0.33	0.17
Ti	3.30	2.45	1.40	2.00	0.26
Mt	3.50	2.65	1.60	2.35	—
Ta	1.65	1.25	0.85	1.05	0.64

Chaetotaxy. — All femora spineless. Patellae with d''d'.

Ti I-II d'' v'' v' d' v'' v'
 III d'' v' d' v'
 IV d'' d'

Mt I-IV with one d-spine only. All spines broken off. Diameter of tibia I at base of d''-spine 0.13 mm, on tibia IV 0.11 mm.

Abdomen. — Rather cylindrical, highest point on posterior half. Median dorsal band beige-coloured, with sinuate margins, blackish there and with a faint black median stripe; band uniformly blackish on posterior surface of abdomen, interrupted by a narrow white cross-band. Median band bordered by white latero-dorsal bands from anterior side to about spinnerets. Ventral surface uniformly blackish, bordered by white latero-ventral stripes from light brown opercula to near spinnerets. Lateral surface with a white stripe from dorsal margin of operculum to half length of abdomen, followed by two white vertical stripes, which are connected with the latero-dorsal band, and with a white, oblique, narrow, and isolated postero-lateral stripe; remainder of lateral surface blackish. Genital area black-brown. Spinnerets black.

Palp (fig. 345). — Palps of the only available specimen not dissected. All segments yellow-brown, cymbium suffused with black. Dorsal spine of patella nearly three times as long as segment. Tibia with two spines on dorsal and latero-dorsal surfaces, both about as long as segment. Cymbium with a long dorsal spine. Paracymbium small with flat and narrow distal arm. Tegulum with a small projection on lateral surface; anterior surface flat and perpendicular to ventral surface. Median apophysis with long and hook-shaped dorsal tip; ventral margin serrate at some distance of tip, ventral-most tooth larger than others. Embolus with truncate tip, spermduct ending there. Terminal apophysis with conspicuously grooved basal shield as in the other species of the group, distal part slightly twisted and equally grooved. Lamella with proximal tip bent to mesal side and curved again in proximal

direction shortly before sharp tip; anterior margin rather angular in comparison with other species of the group; lateral arm only vestigial, without free projection; dorsal surface of anterior half rugose. Transversal sclerite absent.

Female. — Measurements in mm. Total length 3.7; cephalothorax, length 1.45, width 1.1; abdomen, length 2.25, width 2.0, height 2.0; chelicerae, length 0.61, width 0.31.

Cephalothorax. — Colour as in male. Callous brims conspicuous, occupying one-sixth of width of thorax from posterior margin to border of head and thorax, lower margin of head and clypeus also whitish but not swollen. Posterior margin lightly excised. Eye-region and clypeus with short hairs. Both rows of eyes practically straight. Diameter of PME 0.11 mm, PME separated from each other by 0.7 diam., from PLE by 0.9 diam., and from AME by 0.9 diam. of PME. AME separated by less than their own diameter. Height of clypeus 0.12 of length of cephalothorax.

Chelicerae. — Light brown. Basal two-thirds with fine parallel ridges. Dorsal row with four teeth, equidistant, second tooth largest, others slightly smaller. Ventral row with three teeth, basal tooth opposite to third tooth of dorsal row, apical pair close together.

Legs. — Uniformly light yellow-brown. Legs long and slender. Length of femur I 2.1 times length cephalothorax, length of tibia I 20 diams. of segment. Measurements in mm (of paralectotype):

	I	II	III	IV
Fe	3.05	2.50	1.80	2.35
Pa	0.50	0.45	0.35	0.40
Ti	3.25	2.45	1.50	2.10
Mt	3.35	2.60	1.70	2.40
Ta	1.75	1.30	0.90	1.10

Chaetotaxy. — All spines as in male. Length of d'' -spine on tibia I 0.39 mm, diameter of tibia I at base of d'' -spine 0.16 mm; d'' -spine on tibia IV broken off, diameter 0.14 mm.

Abdomen. — Widest and highest point on posterior half of abdomen. Dorsal surface white, with four pairs of blackish spots, the last pair connected with each other mesally; a narrow light brown mesal stripe running from about first pair of spots to posterior surface, becoming black where spots of fourth pair meet. Remainder of dorsal field white. Lateral surface with white stripes as in male, and with narrow white latero-ventral bands. Ventral surface uniformly black. Opercula light brown, spinnerets black-brown.

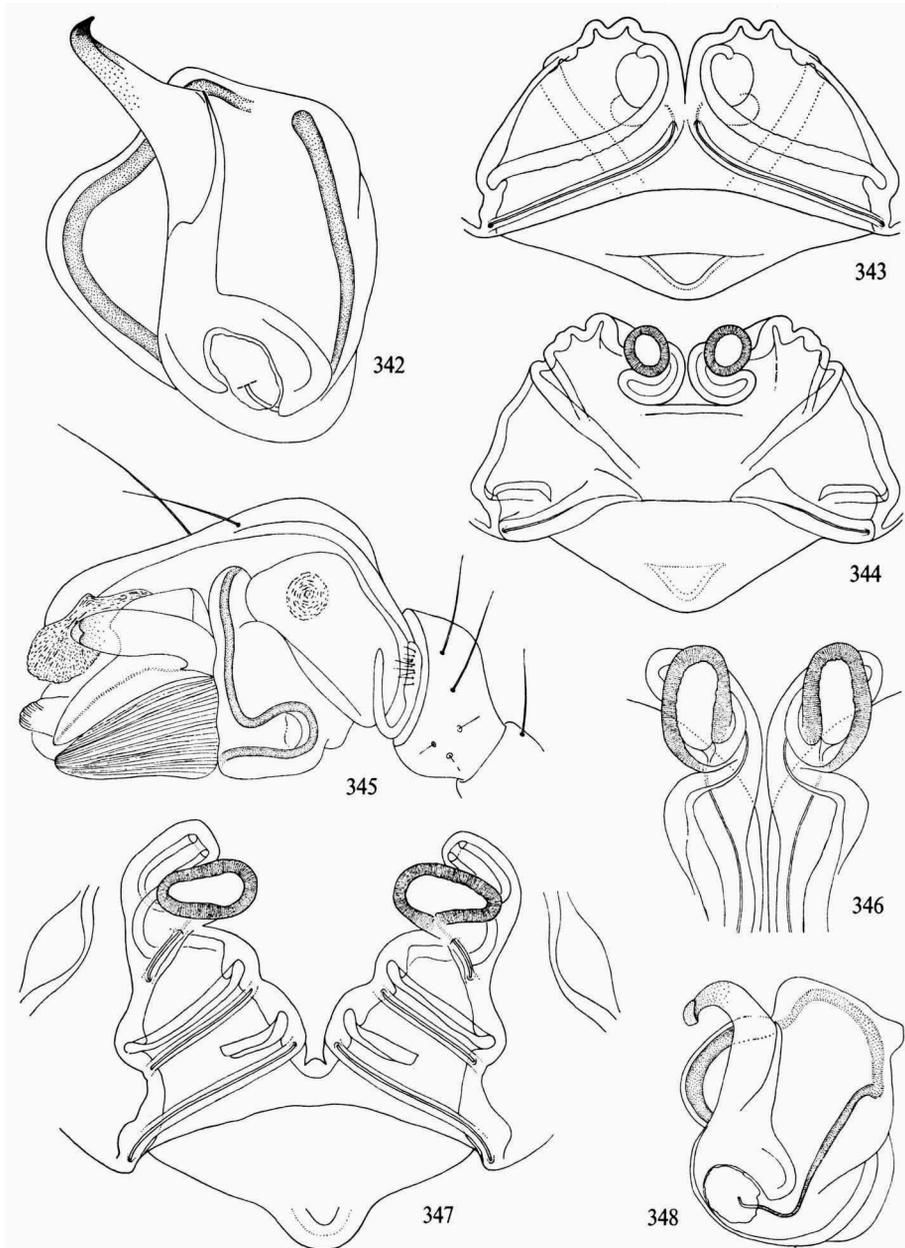


Fig. 342. *Neriene marginella*, tegulum with median apophysis, mesal aspect. Fig. 343-346. *N. strandia*. 343, vulva, ventral aspect; 344, do., dorsal aspect; 345, male palp, lateral aspect; 346, receptacula seminis and turning-points. Fig. 347-348. *N. peltata*. 347, vulva, ventral aspect; 348, tegulum with median apophysis, mesal aspect. 342, $\times 95$; 343, 344, $\times 105$; 345, $\times 72$; 346, $\times 177$; 347, $\times 213$; 348, $\times 100$.

Epigyne. — Protruding ventrally. Posterior margin slightly emarginate; scape triangular with blunt tip.

Vulva (fig. 343, 344). — Much wider than long, semi-spherical in outline. Spiral grooves with less than one coil, entrances situated laterally in dorsal wall; turning-points and receptacula situated close together dorso-mesally (fig. 346), the former touching in the mesal plane and pointing in lateral direction, the latter pointing in dorsal direction. Triangular scape with a small semi-covered depression on ventral side of tip. Width of epigyneal aperture 0.47 mm.

Distribution. — Borneo, Sarawak. No data about habitat available.

Material examined.

Borneo. — 1 ♂ 1 ♀, Sarawak, Mt. Poi, 1630 m (lectotype and paralectotype; CU).

The *Neriene peltata* group

Neriene peltata (Wider) comb. nov.

(fig. 347-355, pl. 2 fig. 5, 7)

Linyphia peltata Wider, 1834, Mus. Senckenb., 1: 250, fig. 7a-c (description subadult ♀ and ♂, Germany). — Simon, 1929, Arachn. France, 6(3): 631, 744, fig. 965-967 (key, France). — Blauvelt, 1936, Festschr. Strand, 2: 119, pl. 6 fig. 43-46, pl. 7 fig. 47, 50 (genitalia). — Locket & Millidge, 1953, British Spid., 2: 399, fig. 237E, 239B, 241A-B (British Isles).

Prolinyphia peltata; Wiehle, 1956, Tierw. Deutschl., 44: 305, fig. 500-505 (key, Germany).

Linyphia peltata marpurgensis Strand, 1907a, Zool. Anz., 32: 229 (dark ♂ variety, Germany).

Linyphia rubea Blackwall, 1841, Trans. Linn. Soc. London, 18: 661 (description ♀ ♂, England). — Thorell, 1870, Rem. syn. Europ. spid.: 51 (= *Linyphia peltata* Wider).

Linyphia hortensis; Di Caporiacco, 1953, Mem. Biogeogr. Adriatica, 2: 77 (p.p.; Italy).

Linyphia emertonii; Sørensen, 1898, Vid. Meddel. naturh. Foren. Kjöbenhavn, 1898: 194 (Greenland). — Holm, 1967, Meddel. Grönland, 184(1): 68, 96 (= *Linyphia peltata* Wider).

Lepthyphantes nigrescens O. Pickard-Cambridge, 1912, Proc. Dorset Nat. Hist. Antiquar. Fld. Cl., 33: 75, 90, fig. 11-13 (description ♂, England); 1913, Proc. Dorset Nat. Hist. Antiquar. Fld. Cl., 34: 114 (= *Linyphia peltata* Wider).

For a complete list of references up to 1939, see Bonnet (1957: 2521).

Types. — Lectotype of *Linyphia peltata* Wider, a subadult ♀, by present designation, from Germany, Odenwald (SMF); 15 paralectotypes (7 subadult ♀, 8 subadult ♂) from same locality (SMF). The presence of only subadult specimens in the original series is in accordance with Wider's

description. The types of *Linyphia rubea* Blackwall and *Lepthyphantes nigrescens* O. Pickard-Cambridge have not been recovered.

Remarks. — *N. peltata* has been recorded from continental Asia and Japan by several authors, but it does not seem to occur there. Schenkel's (1937: 78) specimens of *peltata* from Kansu belong to *Nerience limbatinella* (Bösenberg & Strand) as far as the adult specimens are concerned; the juvenile specimens I have listed under *Nerience angulifera* (Schenkel), as is discussed there. All records from Japan (Saito, 1934: 309; 1939: 54; Oi, 1960: 225; Yaginuma, 1957: 54; 1960: 42; 1962a: 19; Yaginuma & Ohno, 1967: 20, 27) are also listed under *angulifera*, be it tentatively. *N. angulifera* differs from *peltata* in the abdominal pattern and the genitalia.

Holm (1967: 68) has re-examined the record of *Linyphia emertonii* from Greenland by Sörensen (1898), which appeared to belong to *N. peltata*. It is the westernmost find of the present species. The type-material of *L. emertonii* Thorell (1875a: 494) has not been recovered, but the description in my opinion points to *Estrandia nearctica* (Banks).

A dark male specimen from Marburg, Germany, has been described as a distinct variety *peltata marburgensis* by Strand (1907a). Males are sometimes very strongly pigmented with only faint traces of the abdominal pattern left, or none at all. These specimens fall within the normal variability of the species, and the maintenance of a separate name is superfluous.

Male. — Measurements in mm. Total length 3.0-3.5; cephalothorax, length 1.3-1.55, width 1.0-1.15; abdomen, length 1.75-2.0, width 0.95-1.1, height 0.75-0.85; chelicerae, length 0.69-0.74, width 0.35.

Cephalothorax. — Orange-brown to brown, head usually slightly darker, lightly suffused with black at margin, at foveal depression, and on posterior part of head. Posterior margin excised mesally, sides evenly rounded to front, slightly constricted at border of head and thorax; width 0.7-0.8 of length, width of head 0.6 of width of thorax. From side, dorsal line lightly curved from posterior margin to eye-region, reaching highest point above coxae I and II; clypeus concave below AME, lower part slightly convex. Shortly haired along margins, hairs on clypeus and at eye-region few and slightly longer.

Eyes. — Eye-region barely narrower than head. Posterior row slightly recurved, anterior row straight. Small black triangles in front and behind PME. Diameter of PME 0.07-0.08 mm, laterals not much larger, diameter of AME 0.75 of PME. PME separated from each other by 1.0 diam., from PLE by 1.6 diams., and from AME by 0.8-0.9 diam. of PME. AME separated by their own diameter. Height of clypeus 0.13-0.16 of length of cephalothorax.

Chelicerae. — Orange-brown to brown, not darker than cephalothorax. Basal tubercle not present. Fine parallel ridges faintly visible on basal two-thirds of lateral surface. Dorsal row with three cheliceral teeth; basal tooth small, situated at mesal side of apical slant, second tooth twice as large and not far from basal tooth, apical tooth intermediate in size between basal and second tooth, situated halfway between second tooth and base of fang, distance from second tooth consequently being three times the distance between second and basal teeth. Ventral row with one or two small teeth near base of fang.

Gnathocoxae. — Orange-brown to brown, lightly suffused with black, apices lighter; lateral margins slightly concave, apices truncated perpendicularly. Labium black-brown, anterior raised margin lighter. Sternum brown, heavily suffused with black, becoming black-brown at margins; width 0.9 of length.

Legs. — Light brown with narrow dark grey apical rings on femora and tibiae; metatarsi and tarsi slightly darker. Length of femur I 1.4-1.6 times length of cephalothorax; length of tibia I 15-17 diams. of segment. Measurements in mm (of specimen from Luxemburg, Ettelbruck):

	I	II	III	IV	palp
Fe	2.15	1.85	1.25	1.65	0.50
Pa	0.45	0.45	0.35	0.40	0.17
Ti	2.20	1.75	1.00	1.40	0.25
Mt	2.50	2.05	1.15	1.75	—
Ta	1.10	0.90	0.60	0.75	0.45

Chaetotaxy. — Fe I dl'; II dl'; III-IV d. Pa I-IV d''d', basal spine weak and small.

Ti	I - II	v _b ''	d''	v'	v''	l'	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III		d''	v'		l'		d'	[l' _a l'' _a v' _a v'' _a]
	IV		d''	v'		l'	l''	d'	[l' _a l'' _a v' _a v'' _a]

Mt I-II dv; III dl'v

Length of d''-spine on tibia I 0.22-0.30 mm, diameter of tibia I at base of d''-spine 0.12-0.14 mm; on tibia IV 0.27-0.34 mm and 0.10-0.12 mm, respectively. Tm I 0.19-0.20. Position of d''-spine on tibia I 0.17-0.20.

Abdomen. — Cylindriform. White dorso-lateral bands with white blotches on beige-coloured background, separated in front and behind from band on other side, and separating black-brown dorsal band from black ventral half of abdomen; dorsal band with sinuate margins and a rather deep incision on two-thirds of length of abdomen, usually darker behind incision. In dark

specimens whole abdomen black-brown. Genital area brown. Opercula and spinnerets black-brown as ventral surface.

Palp (fig. 349, 353). — Segments light brown to dark brown, cymbium suffused with black. Patella short, the long dorsal spine near apical margin two times as long as segment. Tibia with dorsal spine near apical margin one and a half times as long as segment; few long hairs on lateral and ventral surfaces. Cymbium without spines. Paracymbium with short and narrow distal arm of lanceolate shape. Tegulum with small but distinct excavation on antero-ventral surface; lateral surface with small excrescence dorsally of excavation, within loop of spermduct, which is visible through the integument. Median apophysis (fig. 348) with narrow hook-shaped dorsal tip curved in ventral direction. Embolus (fig. 351) curved as usual, narrow subapically, widening again at apex, which bears two rounded lateral lobes below the cone-shaped spermduct-tooth. Terminal apophysis (fig. 352) small, with about two and a half coils, apical coil with transverse grooves and serrate apical margin, basal coil plate-like. Lamella (fig. 355) with proximal tip lightly curved to mesal side and sharply pointed; mesal margin straight; anterior margin perpendicular to mesal surface, antero-lateral blunt tip very lightly curved to dorsal side; lateral arm short, but with a long and slender free projection with sharp tip, more than three times as long as wide at base. Transversal sclerite absent.

Female. — Measurements in mm. Total length 2.9-4.6; cephalothorax, length 1.2-1.45, width 0.9-1.1; abdomen, length 1.7-3.4, width 1.5-2.3, height 1.3-2.5; chelicerae, length 0.52-0.71, width 0.25-0.32.

Cephalothorax. — Colour as in male, but without suffusion. Sizes and spacing of eyes as in male. Height of clypeus lower, 0.12-0.13 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Stridulating files with fine parallel ridges. Dorsal row with three teeth as in male. Ventral row with three slightly smaller teeth, basal tooth opposite to gap between second and third teeth of dorsal row. Gnathocoxae with parallel lateral margins.

Legs. — Length of femur I 1.3 times length cephalothorax; length of tibia I 12-13 diams. of segment. Measurements (of specimen from Luxemburg, Ettelbruck) in mm:

	I	II	III	IV
Fe	1.90	1.70	1.25	1.65
Pa	0.50	0.45	0.40	0.45
Ti	1.85	1.55	0.95	1.35
Mt	1.95	1.65	1.10	1.50
Ta	1.00	0.90	0.60	0.75

Chaetotaxy. — Fe I d'l'; II-III d; IV spineless. Spines on patellae and tibiae as in male, but anterior tibiae without v_b'' -spines. Length of d''-spine on tibia I 0.25-0.27 mm, diameter of segment at base of d''-spine 0.14-0.16 mm; on tibia IV 0.32-0.35 mm and 0.12-0.14 mm, respectively. Tm I 0.20. Position of d''-spine on tibia I 0.19-0.21.

Abdomen (pl. 2 fig. 5, 7). — Oval in dorsal view, dorsal surface evenly curved from base of abdomen to spinnerets, when seen from side. Median dorsal band very distinct from anterior surface to well above spinnerets, surrounded on all sides by white areas; occupying on anterior half about half width of abdomen, its margins irregularly sinuate, constricted at base of posterior half, then widening again; light brown on anterior half with some white blotches, and lightly suffused with black near margins, becoming more black-brown on posterior half with two pairs of ill-defined small light areas with white blotches. Lateral surface with a white dorso-lateral band from base to spinnerets, and with a white ventro-lateral band or a series of four white spots from dorsal margin of operculum to dorso-lateral band at some distance from spinnerets, separated from spinnerets by a black-brown extension of the ventral surface; middle part of lateral surface usually slightly darker, the white blotches more widely spaced. Ventral surface black-brown with white markings, consisting of a white crossbar behind epigastric furrow, and of a white spot in front of spinnerets, this spot connected with the extreme ends of the cross-bar by two slightly outwardly curved light streaks; whole area between cross-bar, lateral streaks and white spot in front of spinnerets usually rather light with white blotches, but dark black-brown in dark specimens. Area above spinnerets white, below and at sides bordered by black-brown with two lateral white spots on either side. Opercula and spinnerets brown, heavily suffused with black.

Epigyne (fig. 354). — Small and barely protruding. Common opening of atria small, with evenly curved anterior margin. Two oblique depressed areas on either side.

Vulva (fig. 347, 350). — Atria conical, diverging. Spiral grooves with about two coils from entrances in the middle of the ventral wall of either atrium to the turning-points, which lie in front of the receptacula and point in mesal direction. Receptacula at mesal sides of apices, pointing in ventral direction and outwards. Scape broadly triangular, with slightly protruding and rounded tip, provided with a semi-covered depression on its ventral surface. Width of epigyneal aperture 0.20-0.22 mm.

Distribution and habitat. — *N. peltata* is a European species. The earlier records from China and Japan are now assigned to two other species, viz.,

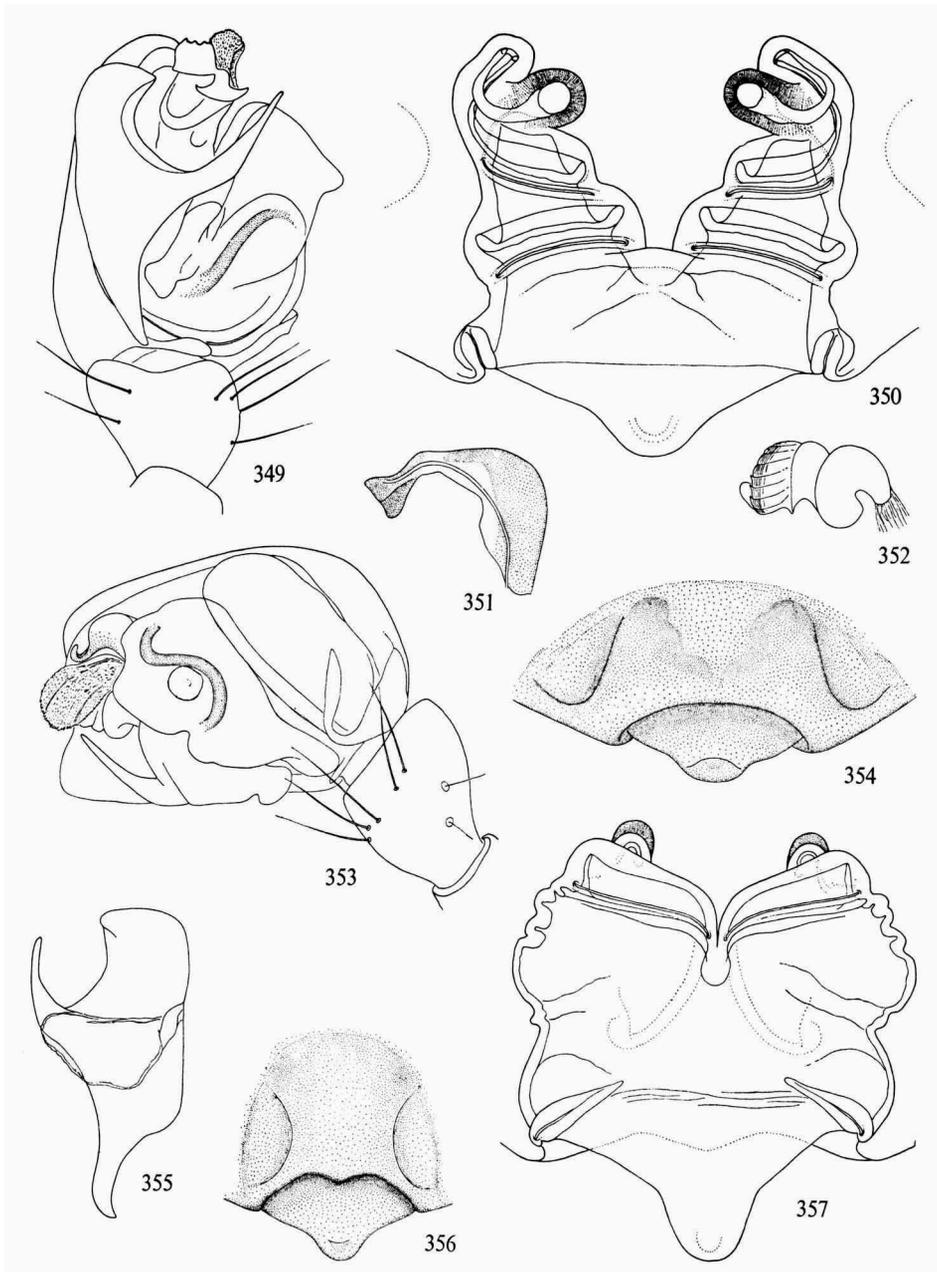


Fig. 349-355. *Neriene peltata*. 349, male palp, ventral aspect; 350, vulva, dorsal aspect; 351, embolus, dorsal aspect; 352, terminal apophysis; 353, male palp, lateral aspect; 354, epigyne; 355, lamella, dorsal aspect. Fig. 356-357. *N. angulifera*. 356, epigyne; 357, vulva, dorsal aspect. 349, 353, $\times 95$; 350, $\times 213$; 351, 352, 357, $\times 123$; 354, 355, $\times 100$; 356, $\times 67$.

N. limbatinella and *angulifera* (see under remarks on the latter species). Within Europe it has been found in most countries, including Scandinavia and Finland, the British Isles, Italy, and the Balkans, but not in Portugal and Spain. There is a probable record from Algeria (Denis, 1937), and it has been found once on West Greenland (vide Holm, 1967). In the East it reaches as far as Russia.

N. peltata clearly prefers trees and shrubs for a habitat. The small webs are built at the base of branches against the trunk, or between the smaller twigs. The period of sexual activity falls early in the year, from April onwards, the females are still found throughout the summer.

Material examined.

Netherlands. — 6 ♀, Gelderland, Hoog-Soeren, in trees, 26.viii.1962, P. J. van Helsdingen (ML); 3 ♀, do., 2.viii.1965, P. J. van Helsdingen (ML). 2 ♀, Wiessel near Apeldoorn, in trees, 24.vi.1962, P. J. van Helsdingen (ML). — 7 ♀ 1 ♂, Limburg, Mheer, 3-4.vi.1962, P. J. van Helsdingen (ML); 12 ♀, do., 8.vi.1962 (ML). 40 ♀, Epen, Bovenste Bos, 4.vi.1962, P. J. van Helsdingen (ML). 4 ♀, Gerendal near Schin op Geul, 5.vi.1962, P. J. van Helsdingen (ML); 24 ♀, do., 29.v.1963 (ML). 1 ♀, Maastricht, 28.v.1963, P. J. van Helsdingen (ML).

Belgium. — 1 ♀ 1 ♂, Brabant, Forêt de Soignes, Rouge-Cloître, 26.iv.1956, V. Hendrickx (ISNB). 1 ♀, Boitsfort, Etang des Enfants Noyés, 5.vi.1951, P. Gravez (ISNB). — 1 ♀, Hainaut, Montigny-le-Tilleul, 8.iv.1961, A. & J. Doucet (ISNB); 2 ♀ 2 ♂, do., 22.iv.1961 (ISNB); 1 ♀, do., 2.v.1961 (ISNB). 24 ♀ 1 ♂, Barbençon, 23.iv.1961, A. & J. Doucet (ISNB); 52 ♀ 7 ♂, do. (ISNB). 1 ♀ 1 ♂, Vergnies, 23.iv.1961, A. & J. Doucet (ISNB); 12 ♀, do., 29.iv.1961, J. Doucet (ISNB). 1 ♀, Virelles, 4.v.1958, A. Devigne (ISNB). 2 ♂, Howardries, 14.v.1957, J. Kekenbosch (ISNB). 8 ♀, Boussu-lez-Walcourt, 6.v.1961, A. & J. Doucet (ISNB). — 1 ♀, Namur, Clermont-lez-Walcourt, on spruce-fir, 20.v.1960, A. & J. Doucet (ISNB); 52 ♀ 11 ♂, do., 15.iv.1961, J. Doucet (ISNB). 2 ♀, Ciergnon, 3.vi.1962, C. Segers (ISNB). 2 ♀, Crupet, 10.v.1959, G. Hoevenaghel (ISNB). 2 ♀, Rivière, 7.v.1959, G. Hoevenaghel (ISNB). 2 ♀, Malonné, 26.v.1963, R. Damoiseau (ISNB). — 1 ♀ 1 ♂, Liège, Ben-Ahin, ravin de Solières, 16.v.1962, C. Segers (ISNB). — 3 ♀, Luxembourg, Ethe, Vallée du Chou, 21-22.v.1958, R. Tollet (ISNB); 1 ♀, do., 12-13.vi.1958, J. M. Vrydagh (ISNB). 2 ♀, Florenville, 10.vi.1956, A. Collart (ISNB). 2 ♀, Torgny, 1-15.vi.1961, E. Derenne (ISNB). 2 ♀, Chiny, 25.vi-8.vii.1945, R. Laurent (ISNB). 1 ♂, Orval, 9-14.vi.1958, E. Derenne (ISNB). 2 ♀, La Roche, vii.1959, G. Hoevenaghel (ISNB). 2 ♀, Mirwart, Bois Smuid, 6.vii.1943, R. Tollet (ISNB).

Luxemburg. — 3 ♀ 3 ♂, Diekirch, in hedge, 3-5.vi.1960, P. J. van Helsdingen (ML).

Germany. — 1 ♂, Westfalen, Versmold, v.1960, H. Felten (SMF). — 2 ♂, Hessen, Odenwald, Otzberg, 18.iv.1949, A. Zilch (SMF). 3 ♀ 1 ♂, Vogels Berg, Gederner See, 14.v.1961, O. Kraus (SMF). 2 ♀, Niedermoos near Lauterbach, 24.iv.1949, H. Felten (SMF).

Switzerland. — 15 ♀ 1 ♂, Glarus, Klöntaler See, 9.vi.1968, P. J. van Helsdingen (ML). 3 ♀, Tierfehd, 800 m, 10.vi.1968, P. J. van Helsdingen (ML). 3 ♀ 1 ♂, Linthal, 660 m, 15.vi.1968, P. J. van Helsdingen (ML). 1 ♀, above Linthal, 1200 m, 23.vi.1968, P. J. van Helsdingen (ML). 19 ♀, Durnachtal, E. of Linthal, 750-1500 m, 21.vi.1968, P. J. van Helsdingen (ML). 1 ♀, Chis (Kies), 900 m, 22.vi.1968, P. J. van Helsdingen (ML). — 1 ♀, St. Gallen, Walenstadt, 12.vi.1968, P. J. van Helsdingen (ML).

Italy. — 1 ♀ 1 ♂, Trentino, Lago di Tenna N. of Riva, 600 m, 21.v.1959, P. J. van

Helsdingen (ML). — 2 ♀, Puglia, Gargano, Foresta Umbra, v.1950, S. Ruffo (*L. hortensis*; Di Caporiacco, 1953; MV). — 4 ♀, Calabria, La Sila, Serra Stella, 21.vi.1960, S. Ruffo (MV). 1 ♀, La Sila, Bosco Gariglione, 28.vi.1960, S. Ruffo (MV).

Yugoslavia. — 6 ♀, Croatia, Plitvice, 20-22.vi.1962, H. & L. Levi (MCZ). — 5 ♀ 1 ♂, Slovenia, Julian Alps, Bled, 500-700 m, 6-8.vii.1962, H. & L. Levi (MCZ). — 1 ♀, Montenegro, Bare, 800 m, 18.vii.1958, C. L. Deeleman (ML). 1 ♀, Jelenica between Ivangrad and Kolasin, 31.vii.1967, C. L. Deeleman (ML). — 1 ♀, Serbia, Pirot, Vazganica on Vidlič planina, beech-forest, 6.viii.1967, C. L. Deeleman (ML).

Turkey. — 3 ♀, Hamsiköy near Trabzon, 21.viii.1958, G. P. Lampel (HDO).

***Neriene angulifera* (Schenkel) comb. nov.**

(fig. 356-358, pl. 2 fig. 6, 8)

Linyphia angulifera Schenkel, 1953, Bol. Mus. Nac., Zool., 119: 24, fig. 13 (description ♂, China, Kansu).

Linyphia peltata; Saito, 1934, Journ. Fac. Agric. Hokkaido Imp. Univ., 33: 309, pl. 15 fig. 59 (Japan, Hokkaido); 1939, Saito Ho-on Kai Mus. Res. Bull., 18: 54 (Japan, Hokkaido). — Schenkel, 1937, Ark. Zool., 29A(1): 78 (p.p.; juveniles only, adults belong to *N. limbatinella*). — Yaginuma, 1957, Acta Arachn., 14: 54 (Japan, Hokkaido); 1960, Spid. Japan Colour: 42, fig. 40-4, pl. 13 fig. 76 (Japan).

Neolinyphia peltata; Oi, 1960, Journ. Inst. Polyt., D, 11: 225, fig. 328-329 (description ♀, Japan, Hokkaido, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 19 (catalogue). — Yaginuma & Ohno, 1967, Journ. Toyo Univ., Gener. Educ. (Nat. Sci.), 8: 20, 27 (Rishiri).

Linyphia frutetorum; Schenkel, 1937, Ark. Zool., 29A(1): 79 (juveniles, China, Kansu).

Types. — I have not been able to trace the original material (1 ♂, 1 juvenile) of *L. angulifera*, which are said to belong to the Hoangho-Peiho Museum at Tientsin, China. The specimens were collected at Kansu in China.

Remarks. — Through kindness of Prof. Dr. R. Oi from Osaka, Japan, I had the opportunity to examine a female specimen of what always has been taken for *Linyphia peltata* [= *Neriene peltata* (Wider)] by Japanese authors. The specimen shows great affinities with *peltata* indeed, but it clearly belongs to a separate species. It is easily distinguished by the shape of the vulva, the atria of which are touching instead of divergent, and by the distinct abdominal pattern. The abdomen (pl. 2 fig. 6) has the latero-dorsal white bands truncated on three-fourths of its length by the black posterior quarter, while in *N. peltata* these bands continue as far as the spinnerets. This agrees quite well with the available illustrations of the species (Oi, 1960: fig. 328; Yaginuma, 1960: pl. 13 fig. 76). Thus we may conclude that this is the known representative of the species-group in Japan, which, however, is different from the European *peltata*.

A closely related species is known from Kansu in China, viz., *Neriene angulifera* (Schenkel), described from one male and one juvenile specimen from the East Asiatic temperate region. According to Schenkel's figure and description this species has a similar abdominal pattern. The other characters

of the Japanese *peltata*-like species are not contradicted by Schenkel's description of *angulifera*, but a profound comparison of the descriptions is not favoured by their dealing with different sexes. Awaiting more material from East Asia, I have therefore tentatively assigned the Japanese "*peltata*" to *Neriene angulifera*.

Schenkel's (1937: 79) record of *Linyphia frutetorum* [= *Frontinellina frutetorum* (C. L. Koch)] is listed here, as the specimens concerned are juveniles of the *peltata*-group. They were collected at the same locality as the juvenile specimens of *peltata* [= *angulifera*], mentioned by him in the same paper, and they resemble these in every detail. They cannot belong to *Frontinellina frutetorum*, because of the presence of spines on the femora and white ventral spots on the abdomen. The dorsal abdominal pattern shows a brown median band, and thus *N. limbatinella* (Bösenberg & Strand) is excluded as a possibility. I have consequently listed both records mentioned under the present species.

The palp depicted by Saito (1934: fig. 59c) clearly is that of an abnormally regenerated or developed specimen. The cymbium is much too short, median apophysis and lamella apparently are too long.

Female. — Measurements in mm. Total length 3.65; cephalothorax, length 1.25, width 0.95; abdomen, length 2.6, width 1.7, height 1.85; chelicerae, length 0.55, width 0.29.

Cephalothorax. — Brown, darker on striae and border of head and thorax, striae not reaching lateral margins, the latter with narrow black lines. Posterior margin cut off straight, sides evenly rounded towards front, barely constricted at border of head and thorax. Width 0.75 of length, width of head 0.65 of width of thorax. From side, rising rather steeply from posterior margin, level at fovea, dorsal line of head slightly convex; clypeus concave below AME, straight at lower part. Very short hairs along lateral margins, eye-region and clypeus with short and normal hairs.

Eyes. — Eye-region narrower than head, about 0.5 of width of thorax. Anterior row straight, posterior row slightly recurved. Small black triangles in front of and behind PME. Diameter of PME 0.075 mm, laterals slightly larger, diameter of AME 0.06 mm. PME separated from each other by 0.85 diam., from PLE by 1.1 diams., and from AME by 1.1 diams. of PME. AME separated by slightly less than their own diameter. Height of clypeus 0.11 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax. Basal tubercle not present, basal three-fourths of lateral surface with fine parallel ridges, rather widely spaced on basal half, closer together on base of apical half. Dorsal row with three

to four teeth, equidistant, middle tooth or teeth slightly larger than basal and apical teeth. Ventral row with three teeth, smaller than teeth of dorsal row, equidistant, apical tooth largest, basal tooth opposite to interstice basally of apical tooth of dorsal row.

Gnathocoxae. — Brown, suffused with black at bases; lateral margins parallel, apices rounded, mesal margins strongly converging in front of labium, then diverging again to internal apices. Labium black-brown, raised anterior half lighter. Sternum dark brown, black-brown at margins; width 0.85 of length.

Legs. — Brown, lightly suffused with black on tibiae, metatarsi and tarsi. Length of femur I 1.2 times length cephalothorax; length tibia I 11.5 diams. of segment. Measurements in mm (of specimen from Japan, Honshu):

	I	II	III	IV
Fe	1.50	1.40	1.00	1.30
Pa	0.45	0.42	0.35	0.35
Ti	1.45	1.30	0.75	1.05
Mt	1.45	1.30	0.85	1.25
Ta	0.90	0.80	0.55	0.70

Chaetotaxy. — Fe I l'; II-IV d. Pa I-IV d''d', basal spine weak and short.

Ti	I	d''	l'	l''	d'
	II	d''		l''	d'
	III	d''			d'
	IV	d''	l'		d'

Mt I-II spineless; III-IV d.

Length of d''-spine on tibia I 0.29 mm, diameter of tibia I at base of d''-spine 0.17 mm; on tibia IV 0.39 mm and 0.13 mm, respectively. Tm I 0.22-0.25. Position of d''-spine on tibia I 0.16.

Abdomen (pl. 2 fig. 6, 8). — Dorsal surface evenly rounded to spinnerets. Median dorsal band with rather straight margins on anterior half, constricted at half length, widening again with angular margin, with an even stronger constriction at three-fourths of length, then widening very strongly and occupying whole posterior surface; band beige-coloured, with some white blotches, and suffused with black at margins, blackish behind last constriction, with a few pairs of white spots, of which one pair of large ones lies laterally above spinnerets, situated in one line with white band on ventral half of lateral surface. White latero-dorsal bands from anterior surface to posterior deep constriction of dorsal band, not reaching to ventro-lateral band (cf. *peltata*). Lateral surface with a ventro-lateral series of large white spots, which are nearly confluent, this series running from dorsal margin of operculum to

large white spots on posterior surface; remainder of lateral surface light brown, with some white blotches. Ventral surface light brown, suffused with black, and with a clear white spot in front of spinnerets, many small white blotches present between this spot and epigastric furrow. Opercula light brown, spinnerets brown, both suffused with black.

Epigyne (fig. 356). — Dark brown, with a lateral depressed area at either side not far in front of posterior margin. Posterior margin excised, lightly curved backwards again mesally. Scape longer than in *peltata*, with rounded tip.

Vulva (fig. 357, 358). — Rather broad. Atria with large common cavity, only separated on anterior fourth. Spiral grooves with not much more than one coil; entrances of grooves in the middle of the ventral wall of either atrium, turning-points at apices. Receptacula at ventral sides of turning-points, widely separated from each other, pointing in anterior direction. Scape with small semi-covered depression on ventral surface. Width of epigyneal aperture 0.29 mm.

Distribution and habitat. — No data about habitat are available. The species, as I understand it here, occurs in China (Kansu) and Japan (Hokkaido, Honshu).

Material examined.

Japan, Honshu. — 1 ♀, Kyoto Pref., Ashifu, 25.v.1961, R. Oi (ML).

China. — 3 juveniles, South Kansu, D. Hummel (*Linyphia peltata*; Schenkel, 1937; MS); 2 juveniles, South Kansu, Tan-chang, 1900 m, 5.x.1930, D. Hummel (*Linyphia frutetorum*; Schenkel, 1937; MS); 25 juveniles, South Kansu, D. Hummel (*Linyphia frutetorum*; Schenkel, 1937; MS).

Neriene kashmirica (Di Caporiacco) comb. nov.

(fig. 359-360)

Bathyphantes kashmiricus Di Caporiacco, 1935, Mem. Soc. Ent. Ital., 13: 167 (description ♂, Kashmir).

?*Linyphia consanguinea* O. Pickard-Cambridge, 1885, Scient. Res. Sec. Yarkand Miss., Aran.: 40 (diagnosis ♀ ♂, Kashmir).

Types. — ♂ holotype of *Bathyphantes kashmiricus* from Garhi near Jhelum in Kashmir, West Pakistan (MSNM).

Remarks. — *Bathyphantes kashmiricus* was collected during the Italian Karakoram Expedition, and originates from Garhi near Jhelum in Kashmir. An examination of the only specimen ever recorded, the ♂ holotype, revealed that Di Caporiacco was wrong in placing the specimen in *Bathyphantes*.

Chaetotaxy, cheliceral teeth, abdominal pattern, and the shape of the palpal elements leave no doubt about its belonging in the *peltata*-group of *Neriene*.

Both sexes of *Linyphia consanguinea* were collected near Murree and the Sind Valley, both in Kashmir, when the participants of the Second Yarkand Mission were still on their way from Calcutta to Yarkand, advancing towards Shrinagar. Pickard-Cambridge thought the species to resemble the European *N. peltata*, and from this I infer that it belongs to that species-group. If this is the case indeed, *L. consanguinea* well might be a synonym of *N. kashmiricus*, as the type-localities of the two species are rather close to each other on the same side of the Himalaya range (Murree lies 110 km NNW of Jhelum, as the crow flies). For the time being there only is this geographical evidence. Additional material from Kashmir would be very helpful to confirm the synonymy proposed here, as would, of course, the original material of *Linyphia consanguinea*, which has been searched for in vain at London, Oxford, Calcutta, and Vienna.

Male (holotype of *Bathyphantes kashmiricus* Di Caporiacco). — Measurements in mm. Total length 2.3; cephalothorax, length 1.05, width 0.8; abdomen, length 1.35, width 0.8, height 0.9; chelicerae, length 0.46; width 0.24.

Cephalothorax. — Brown, suffused with black on striae and border of head and thorax; posterior mesal part of head and lateral margins of thorax without black suffusion, lighter than remainder of thorax. Posterior margin superficially excised, blackish; sides evenly rounded towards head, barely constricted at border of head and thorax; width 0.75 of length, width of head 0.65 of width of thorax. From side, rather evenly rising and lightly curved from posterior margin to eye-region, barely level at fovea; clypeus concave below eyes, lower margin slightly convex. Clypeus and eye-region shortly haired.

Eyes. — Eye-region slightly narrower than width of head. Posterior row of eyes recurved, anterior row slightly procurved. PME with small black triangles in front and behind. Diameter of PME 0.085 mm, laterals slightly larger, diameter of AME 0.7 of diameter of PME. PME separated from each other by 0.65 diam., from PLE by 1.0 diam., and from AME by 0.7 diam. of PME. AME separated by 0.65 of their own diameter. Height of clypeus 0.13 of length of cephalothorax.

Chelicerae. — Brown as cephalothorax. Without basal tubercle and without stridulating file. Dorsal row with three cheliceral teeth, basal and apical teeth small, middle tooth twice as large, equidistant, close together at mesal end of apical slant. Ventral row with two small teeth, basal tooth opposite to apical tooth of dorsal row.

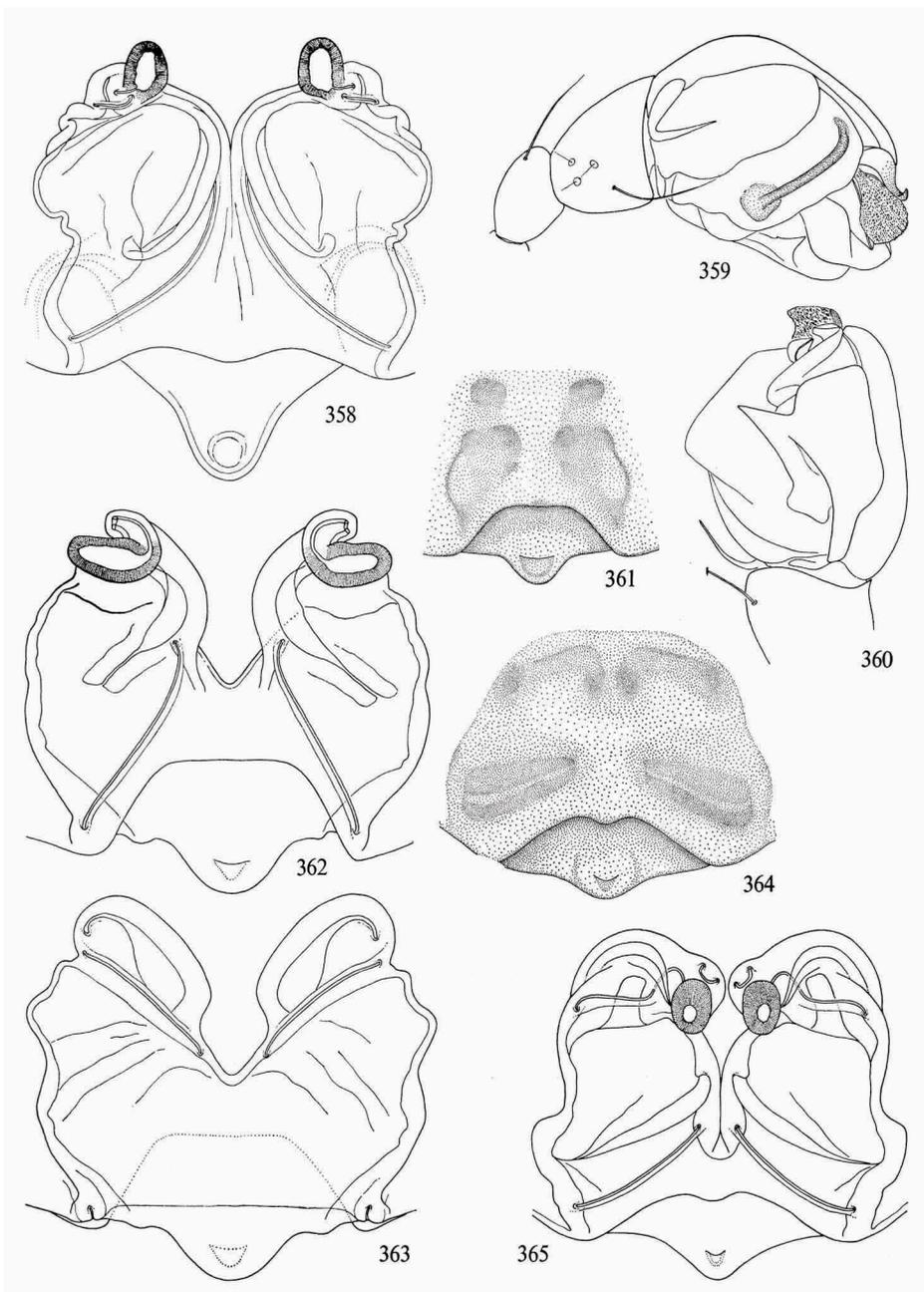


Fig. 358. *Neriene angulifera*, vulva, ventral aspect. Fig. 359-360. *N. kashmirica*. 359, male palp, lateral aspect; 360, do., ventral aspect. Fig. 361-363. *N. birmanica*. 361, epigyne; 362, vulva, ventral aspect; 363, do., dorsal aspect. Fig. 364-365. *N. katyae*. 364, epigyne; 365, vulva, ventral aspect. 358, 365, $\times 123$; 359, 360, $\times 100$; 361, $\times 117$; 362, 363, $\times 177$; 364, $\times 95$.

Gnathocoxae. — Brown as cephalothorax, lightly suffused with black, apices lighter. Labium black-brown, raised apical border lighter. Sternum brown, suffused with black at margins; width 0.85 of length.

Legs. — Yellow-brown, with narrow apical rings on femora, tibiae and metatarsi. Length of femur I 0.9 times length cephalothorax; length of tibia I 11.5 diams. of segment. Measurements in mm:

	I	II	III	IV	palp
Fe	0.95	1.15	0.75	1.00	0.37
Pa	0.30	0.30	0.24	0.26	0.11
Ti	1.15	1.00	0.55	0.80	0.17
Mt	1.15	1.05	0.65	1.00	—
Ta	0.60	0.60	0.40	0.55	0.38

Chaetotaxy. — Fe I 1'; II-IV d. Pa I-IV d''d', basal spine weak.

Ti	I	d''	1'	1''	d'
	II	d''		1''	d'
	III	d''	v'		d'
	IV	d''	1'		d'

Mt I d; II-IV -

Length of d''-spine on tibia I 0.24 mm, diameter of segment at base of d''-spine 0.10 mm; on tibia IV 0.31 mm and 0.09 mm, respectively. Tm I 0.22. Position of d''-spine on tibia I 0.18.

Abdomen. — Rather cylindrical, dorsal surface straight on anterior half, evenly but strongly curved on posterior half from dorsally to spinnerets. Dorsal median band broad, light brown with black suffusion against sinuate margins, bordered by white latero-dorsal region; transition of dorsal into posterior surface with a narrow white cross-band, narrowly interrupted in the middle; a white curved cross-band above spinnerets in one line with the longitudinal white stripe on ventral half of lateral surface; remainder of dorsal and lateral surfaces light brown with some white blotches, posterior surface suffused with black. Ventral surface brown with black suffusion; a clear white spot in front of spinnerets forms the posterior tip of an area of white blotches between epigastric furrow and spinnerets, occupying whole width of ventral surface behind furrow, borders of area converging posteriorly. Opercula light brown. Genital area blackish. Spinnerets brown, suffused with black.

Palp (fig. 359, 360). — The only palp still present not dissected. — All segments yellow-brown, cymbium dark brown. Patella short, dorsal spine one and a half times as long as segment. Tibia slightly longer than high, with a lateral spine as long as segment. Cymbium spineless. Paracymbium small,

distal arm tapering to a sharp point. Tegulum with transition of anterior into ventral surface rounded. Tip of median apophysis hook-shaped and bent in anterior direction, tip of hook directed to dorsal side. Embolus with sharp and rather broad tip, spermduct ending at tip. Terminal apophysis with about one coil. Lamella relatively short, with short truncate proximal tip and a straight anterior margin; mesal margin straight on anterior half; lateral arm very short, bearing a sharply pointed free projection, which is shorter and broader than in *peltata*, about one and a half times as long as broad at base.

Distribution. — West-Pakistan, Kashmir.

Material examined.

West-Pakistan. — 1 ♂, Kashmir, Garhi near Jhelum, 1200 m, 25.iii.1929 (holotype *Bathypantes kashmiricus* Di Caporiacco; MSNM).

***Neriene birmanica* (Thorell) comb. nov.**

(fig. 361-363)

Linyphia birmanica Thorell, 1887, Ann. Mus. civ. Stor. nat. Genova, 25: 99 (description ♀, Burma). — Simon, 1894, Hist. nat. Araign., 1: 693 (synopsis of *Linyphia* species).

Type. — ♀ holotype from Burma, Moulmein (MG).

Additional ♀ specimens of this small *peltata*-like species have been found in the O. Pickard-Cambridge collection at Oxford. The male is still unknown.

Female. — Measurements in mm. Total length 2.35-3.6; cephalothorax, length 1.0-1.25, width 0.75-0.95; abdomen, length 1.45-2.55, width 1.05-1.85, height 1.0-2.0; chelicerae, length 0.62-0.92, width 0.30-0.45.

Cephalothorax. — Light brown to dark brown, lightly suffused with black on striae and border of head and thorax; lateral margins narrowly lighter from leg I to leg IV, white pigment below integument usually present. Posterior margin excised, sides strongly curved behind, rather straight on anterior half, not constricted at border of head and thorax; width 0.7-0.75 of length, width of head 0.55 of width of thorax. From side, dorsal line rising steeply from posterior margin to fovea, level at fovea, dorsal line of head slightly convex; clypeus concave. Short hairs at eye-region and on clypeus.

Eyes. — Eye-region occupying whole width of head. Anterior row straight, posterior row slightly recurved. PME with narrow black rings. Diameter of PME 0.075-0.085 mm, laterals of about same size, diameter of AME

0.75 of diameter of PME. PME separated from each other by 0.8 diam., from PLE by 1.0 diam., and from AME by 1.0-1.1 diams. of PME. AME separated by about their own diameter. Height of clypeus 0.11-0.13 of length of cephalothorax.

Chelicerae. — Light brown to dark brown, as cephalothorax. Fine parallel ridges on lateral surface faintly visible. Basal tubercle absent. Dorsal row with three cheliceral teeth, equidistant, middle tooth slightly larger than others. Ventral row with two or three smaller teeth, equidistant, basal tooth largest but smaller than dorsal teeth and situated opposite to apical tooth of dorsal row.

Gnathocoxae. — Light brown to brown, lightly suffused with black on basal half; lateral margins parallel, rounded apically, internal apices converging in front of labium. Labium brown, suffused with black, raised anterior part lighter. Sternum light brown to brown, suffused with black, notably at margins; width 0.8 of length.

Legs. — Light yellow-brown to brown, without annulations. Length of femur I 1.3-1.5 times length cephalothorax. Length of tibia I 9-10 diams. of segment. Measurements (of holotype) in mm:

	I	II	III	IV
Fe	1.45	1.35	0.95	1.30
Pa	0.40	0.40	0.30	0.35
Ti	1.40	1.25	0.70	1.10
Mt	1.45	1.30	0.85	1.30
Ta	0.80	0.70	0.50	0.65

Chaetotaxy. — Fe I dl'; II-IV d, not always present on leg IV. Pa I-IV d''d', basal spine weak.

Ti	I - II	d''	v'	l'	l''	d'
	III	d''	v'			d'
	IV	d''		l'		d'

Mt I-IV no spines present.

Length of d''-spine on tibia I 0.22-0.24 mm, diameter of segment at base of d''-spine 0.14-0.15 mm; diameter of tibia IV 0.11-0.13 mm. Tm I 0.18-0.20. Position of d''-spine on tibia I 0.18-0.21.

Abdomen. — Rather globular, with strongly curved dorsal surface. Median dorsal band broad with sinuate margins, from anterior surface to about three-fourths of length, where the dorsal surface starts its strong decline to the spinnerets; dorsal band connected on anterior surface with dark area on anterior half of lateral surface, bordered at sides by white latero-dorsal bands, and bordered at posterior margin by a narrow white cross-band, which

is often narrowly interrupted mesally. Posterior surface black with few small white spots, intersected by a curved white cross-band slightly above spinnerets. Lateral surface bordered by white latero-dorsal band and white ventro-lateral band from dorsal margin of operculum to half length, followed by two white vertical bars in one line with the white curved transverse bar on posterior surface above spinnerets; white vertical bars connecting latero-dorsal band with ventro-lateral region; remainder of lateral surface of same colour as dorsal band, with some small white blotches. Ventral surface dark brown to black-brown, with a number of clear white spots, of which the posterior-most in front of the spinnerets is large and conspicuous; white spots arranged into a triangular area from epigastric furrow to tip in front of spinnerets. Opercula light brown; spinnerets brown to black-brown.

Epigyne (fig. 361). — Brown, with a dark brown translucent spot at either side in front of oblique lateral margins of the trapezoid opening. A superficially depressed area at either side next to lateral translucent spots. Scape forming a rounded mesal projection.

Vulva (fig. 362, 363). — Atria rather spherical, diverging in apical direction. Spiral grooves with about two coils from entrances in the middle of the ventral wall of either atrium to the apical turning-points. Receptacula situated postero-ventrally of turning-points and pointing outwards. Scape with a semi-covered depression near tip. Width of epigyneal aperture 0.15-0.17 mm.

Distribution. — India and Burma. No data about habitat available.

Material examined.

Burma. — 1 ♀, Moulmein, 1877, O. Beccari and E. d'Albertis (holotype; MG).
India. — 5 ♀, Bombay (HDO).

***Neriene katyae* spec. nov.**

(fig. 364-366)

Type. — ♀ holotype from Ceylon, Kandy, 1913, D. R. P. Beresford (HDO).

An unidentified specimen, found in the O. Pickard-Cambridge collection in the Hope Department at Oxford, appeared to belong to an undescribed species. It is a pleasure to name this species after my wife.

Description of holotype. — Measurements in mm. Total length 2.9; cephalothorax, length 1.1, width 0.75; abdomen, length 1.85, width 1.35, height 1.4; chelicerae, length 0.58, width 0.28.

Cephalothorax. — Dark brown. Posterior margin deeply excised, sides evenly rounded towards head, not constricted at border of head and thorax; width 0.7 of length, width of head 0.65 of width of thorax. From side, rising steeply towards fovea, level there, dorsal line of head lightly curved towards eye-region; clypeus concave below AME. Eye-region and clypeus with short hairs.

Eyes. — Eye-region occupying whole width of head. Both rows nearly straight. Diameter of PME 0.09 mm, laterals slightly larger, diameter of AME 0.7 of diam. of PME. PME separated from each other by 0.9 diam., from PLE by 1.0 diam., and from AME by 0.9 diam. of PME. AME separated by their own diameter. Height of clypeus 0.14 of length of cephalothorax. PME with narrow black rings and triangles.

Chelicerae. — Dark brown, without basal tubercle. Fine parallel ridges visible on basal two-thirds of lateral surface. Dorsal row with three cheliceral teeth, equidistant, middle tooth larger than others. Ventral row with three small teeth, equidistant, all of same size, smaller than apical tooth of dorsal row; basal tooth opposite to interstice between second and third dorsal teeth.

Gnathocoxae. — Brown with blackish base; lateral margins slightly diverging to front, apices rounded. Labium blackish-brown, raised anterior half lighter. Sternum blackish-brown; width 0.8 of length.

Legs. — Brown, tips of tibiae and metatarsi darkened. Length of femur I 1.3 times length cephalothorax; length tibia I 13 diams. of segment. Measurements in mm:

	I	II	III	IV
Fe	1.40	1.30	0.85	1.20
Pa	0.41	0.37	0.30	—
Ti	1.25	1.15	0.65	—
Mt	1.35	1.25	0.80	—
Ta	0.75	0.65	0.50	—

Chaetotaxy. — Fe I d'; II-III d; IV spineless. Pa I-IV d''d', basal spine weak.

Ti	I	d''	l'	l''	d'
	II	d''		l''	d'
	III	d''	v'		d'

Tibia IV missing. Mt I-III spineless. Diameter of tibia I at base of d''-spine 0.16 mm. All spines broken off. Tm I 0.26. Position of d''-spine on tibia I 0.15.

Abdomen. — Dorsal surface moderately curved on anterior half, strongly curved behind towards spinnerets. Whole abdomen rather white. Dorsal

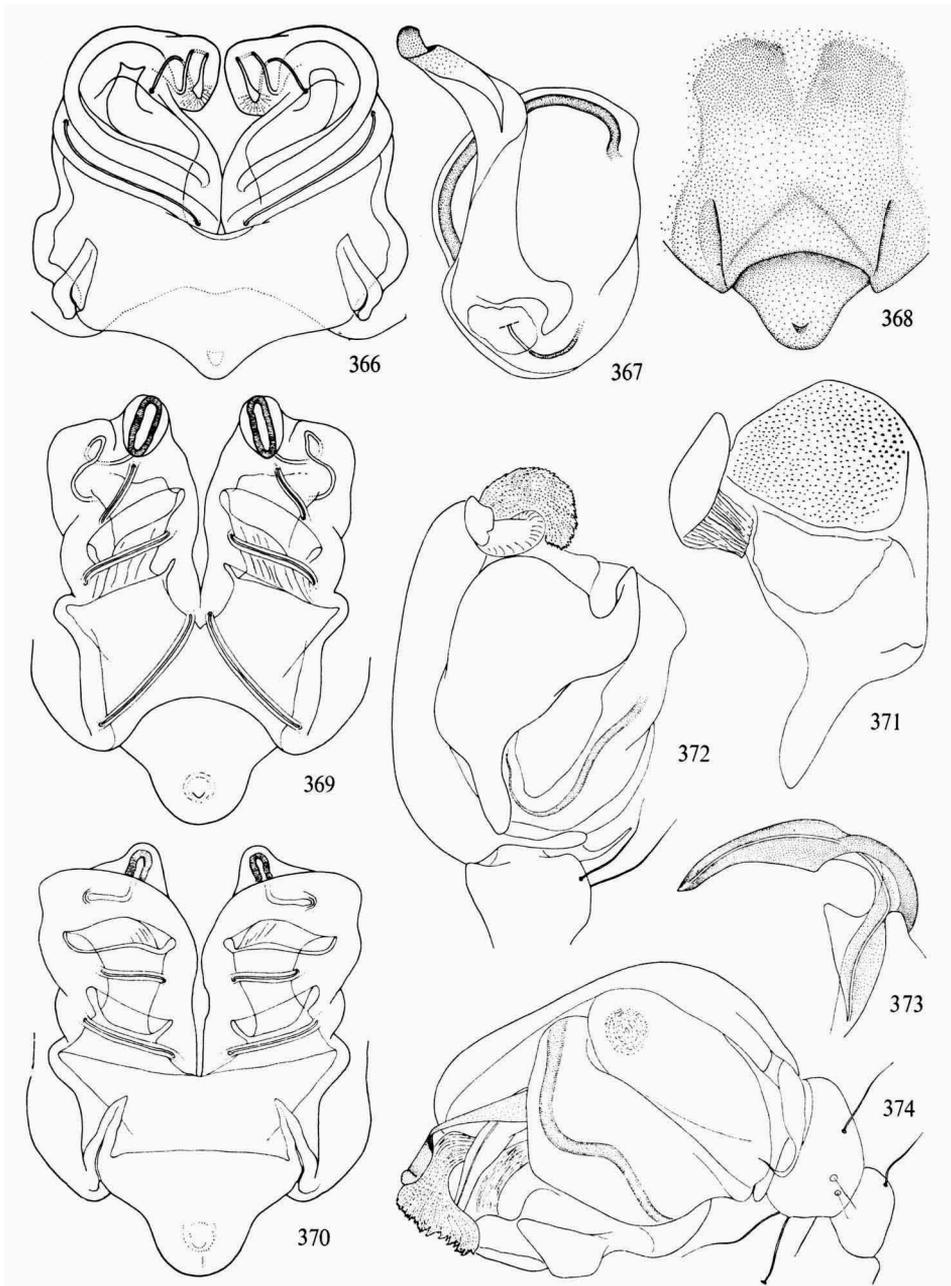


Fig. 366. *Neriene katyae*, vulva, dorsal aspect. Fig. 367-374. *N. japonica*. 367, tegulum with median apophysis, mesal aspect; 368, epigyne; 369, vulva, ventral aspect; 370, do., dorsal aspect; 371, lamella, dorsal aspect; 372, male palp, ventral aspect; 373, embolus, dorsal aspect; 374, male palp, lateral aspect. 366, $\times 123$; 367, 368, 372, 374, $\times 67$; 369, 370, $\times 89$; 371, 373, $\times 95$.

surface with broad white latero-dorsal bands, which are broadly connected at three-fourths of length, enclosing a mesal area, where the white blotches are less dense, leaving two pairs of black-brown spots and a narrow black-brown median line; posterior surface mainly white, with irregular black markings; area above spinnerets narrowly blackish with few white blotches. Lateral surface mainly white, with a faint brown spot on anterior half, and with three faint vertical streaks on posterior half. Ventral surface brown, with a clear white spot in front of spinnerets, and with a triangular area between this spot and epigastric furrow, pointing backwards, densely covered with white blotches. Opercula brown. Spinnerets brown, suffused with black.

Epigyne (fig. 364). — Dark brown, without lateral depressed areas. Spiral grooves and receptacula visible as dark streaks and spots. Posterior margin strongly emarginate, with a short blunt projection in the middle.

Vulva (fig. 365, 366). — Atria parallel, separate from slightly in front of posterior margin of ventral wall. Spiral grooves with two coils; entrances of spiral grooves laterally on ventral wall, second coil of grooves strongly curved at apices of atria from laterally to mesally; receptacula mesally, pointing in ventral direction, not touching. Scape very short, with slightly rounded tip, and with small semi-covered depression on ventral surface. Width of epigyneal aperture 0.28 mm.

Distribution. — Ceylon. Only known from the type-locality Kandy, which lies in the mountainous central part of Ceylon, at least 200 m above sea level.

***Neriene japonica* (Oi) comb. nov.**

(fig. 367-375)

Neolinyphia japonica Oi, 1960, Journ. Inst. Polyt., D, 11: 224, fig. 322-324 (description ♀ ♂, Japan, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 19 (catalogue). — Paik, 1965a, Educ. Journ., 3: 67, fig. 20-21 (Korea).

Types. — ♀ holotype and ♂ "allotype" from Japan, Honshu, Nara (CO). This is the type-species of *Neolinyphia* Oi.

Male. — Measurements in mm. Total length 3.1; cephalothorax, length 1.55-1.6, width 1.3; abdomen, length 1.6-1.7, width 1.0-1.1, height 0.85-1.0; chelicerae, length 0.65, width 0.35.

Cephalothorax. — Light yellow-brown with darker fovea, and with border of head and thorax slightly darker. Width 0.8 of length, width of head 0.5 of width of thorax. Posterior margin with rounded corners, cut off straight; sides evenly rounded to head, without constriction at border of head and

thorax; a longitudinal furrow present from posterior margin to posterior point of head. From side, rounded posteriorly becoming level at fovea, dorsal line of head slightly raised; clypeus concave below eyes, lower part straight. Rather long curved hairs, some of which are spine-like, on clypeus, at eye-region, and on dorsal surface of head in three rows, behind PLE on both sides and on median line, respectively. Very short hairs along posterior part of lateral margins.

Eyes. — Eye-region occupying whole width of head. Anterior row straight, posterior row slightly recurved. Diameter of PME 0.09 mm, laterals of same size, diameter of AME 0.75 of diameter of PME. PME with narrow black rings, not on tubercles. PME separated from each other by 1.3 diams., from PLE by 1.7 diams., and from AME by 1.1 diams. of PME. AME separated from each other by slightly less than their own diameter. Height of clypeus 0.20 of length of cephalothorax.

Chelicerae. — Light brown, slightly darker at apices. Without basal tubercle. Very fine but faint ridges on lateral surface. Dorsal row with three teeth near mesal corner of apical slant, basal and apical teeth half as large as second one, equidistant and rather close together. Ventral row with two teeth, as large as basal tooth of dorsal row, close together and opposite to dorsal teeth at mesal corner of apical slant.

Gnathocoxae. — Brown, lightly suffused with black, apices lighter; lateral margins rounded, converging in anterior direction. Labium black-brown, raised anterior border brown. Sternum brown suffused with black; width 0.9 of length.

Legs. — Light yellow-brown, with tibiae, metatarsi and tarsi slightly darker at apices. Femur I 1.1 times as long as cephalothorax, length of tibia I 10-11 diams. of segment. Measurements (of "allotype") in mm:

	I	II	III	IV	palp
Fe	1.75	1.60	1.05	1.45	0.62
Pa	0.45	0.45	0.35	0.40	0.20
Ti	1.70	1.50	0.85	1.20	0.28
Mt	1.75	1.55	1.00	1.45	—
Ta	0.90	0.85	0.60	0.75	0.69

Chaetotaxy. — Fe I 1'; II-IV d. Pa I-IV d''d', basal spine shorter than apical one.

Ti	I - II	d''	1'	1''	d'
	III	d''	v'		d' [1'_a l''_a v'_a v''_a]
	IV	d''	v	1'	d' [1'_a l''_a v'_a v''_a]

Mt I-II -; III-IV d.

Length of d''-spine on tibia I 0.24-0.29 mm, diameter of segment at base of d''-spine 0.16 mm; on tibia IV 0.41-0.44 mm and 0.12-0.13 mm, respectively. Tm I 0.23-0.24. Position of d''-spine on tibia I 0.18-0.20.

Abdomen. — Comparatively small, barely exceeding cephalothorax in length. Beige-coloured background with faint dorsal pattern, composed of small and widely spaced white blotches and obscure black pigmented median line, chevrons, and dorso-lateral band. Ventral surface rather heavily suffused with black, with a large triangular area behind the epigastric furrow, this area light with many white blotches, ending on posterior half not far from spinnerets. Opercula and spinnerets brown, suffused with black. Genital area brown.

Palp (fig. 372, 374). — All segments yellow-brown, cymbium brown with black suffusion. Patella with long dorsal spine near apical margin, two times as long as segment. Tibia with long dorsal spine, 1.3 times as long as segment, situated near apical margin; a row of five shorter spines parallel with apical margin on lateral surface. Cymbium without spines. Paracymbium with very short and thread-like distal arm. Tegulum angular on middle of anterior surface in lateral view. Median apophysis (fig. 367) long, curving away from antero-mesal surface of tegulum with distal half, dorsal tip hook-shaped and slender in lateral view; element very long and protruding in front of cymbium at the unexpanded palp. Embolus (fig. 373) strongly curved at base, apical part rather straight with sharp tip, where the spermduct opens. Terminal apophysis (fig. 375) long and slender with knob-shaped tip; about two and a half coils, transversely grooved on distal halves. Lamella (fig. 371) with comparatively broad proximal tip not curved; mesal margin straight and gradually passing into rounded anterior margin; free lateral projection at end of short lateral arm conical, pointing forwards and in dorsal direction; dorsal surface rather rough in front of connecting membranes. Transversal sclerite not present.

Female. — Measurements in mm. Total length 2.9-3.4; cephalothorax, length 1.15-1.4, width 0.9-1.1; abdomen, length 2.0-2.25, width 1.35-1.55, height 1.45-1.6; chelicerae, length 0.52, width 0.26.

Cephalothorax. — Posterior margin broadly but shallowly excised, sides slightly constricted at border of head and thorax. Clypeus with short hairs. Eye-region slightly narrower than head. PME separated from each other by 0.7 diam., from PLE and from AME by 1.1 diams. of PME. AME separated by their own diameter. Sizes of eyes as in male. Height of clypeus 0.13-0.14 of length cephalothorax.

Chelicerae. — Stridulating file with fine parallel ridges. Dorsal row with

three teeth as in male, but the interstices are larger. Ventral row with two small teeth, opposite to apical pair of dorsal row. Lateral margins of gnathocoxae parallel. Labium and sternum blackish brown as in male.

Legs. — Colour as in male. Length of femur I 1.1-1.2 times length cephalothorax; length of tibia I 7.5-8.5 diams. of segment. Measurements in mm (of holotype):

	I	II	III	IV
Fe	1.55	1.45	1.05	1.45
Pa	0.45	0.40	0.35	0.40
Ti	1.50	1.40	0.80	1.20
Mt	1.45	1.35	0.95	1.45
Ta	0.85	0.80	0.55	0.75

Chaetotaxy. — Differing from male in the presence of a d-spine on femur I, and a pair of v-spines on tibia I; on tibia II a v''-spine. Length of d''-spine on tibia I 0.25-0.28 mm, diameter of segment at base of d''-spine 0.17-0.20 mm; on tibia IV 0.35-0.42 mm and 0.12-0.15 mm, respectively. Tm I 0.26-0.27. Position of d''-spine on tibia I 0.18-0.20.

Abdomen. — In profile dorsal surface rounded in front, rather parallel with ventral surface in the middle, strongly curved to spinnerets behind. Dorsal surface composed of white blotches on light background and some faint blackish stripes, running obliquely in postero-lateral direction; this area surrounded by light latero-dorsal bands from anterior side to three-fourths of length; latero-dorsal bands with four pairs of oblique white stripes, touching or separated by blackish streaks; posterior pair of white stripes less oblique than others, prolonged on dorsal surface and forming a white transverse bar or blunt chevron. Lateral surface with a clear white and rather broad band on ventral half, from anterior side above petiolus in direction of spinnerets, its ventral border curving in dorsal direction before reaching spinnerets, bands of either side nearly touching on median line above spinnerets; remainder of lateral surface beige-coloured with white spots, blackish against latero-dorsal white band. Ventral surface and area around spinnerets black with a light triangular area from epigastric furrow pointing backwards to a white spot in front of spinnerets; light area with white blotches concentrated at the three tips, behind opercula and in front of spinnerets, respectively. Opercula and spinnerets brown, suffused with black.

Epigyne (fig. 368). — Common opening of atria trapezoid, with a dark brown sclerotized and depressed area at either side. Scape triangular, blunt, broadly exposed to view.

Vulva (fig. 369, 370). — Much longer than wide. Atria fused on posterior part, slightly diverging anteriorly. Spiral grooves with openings in lateral

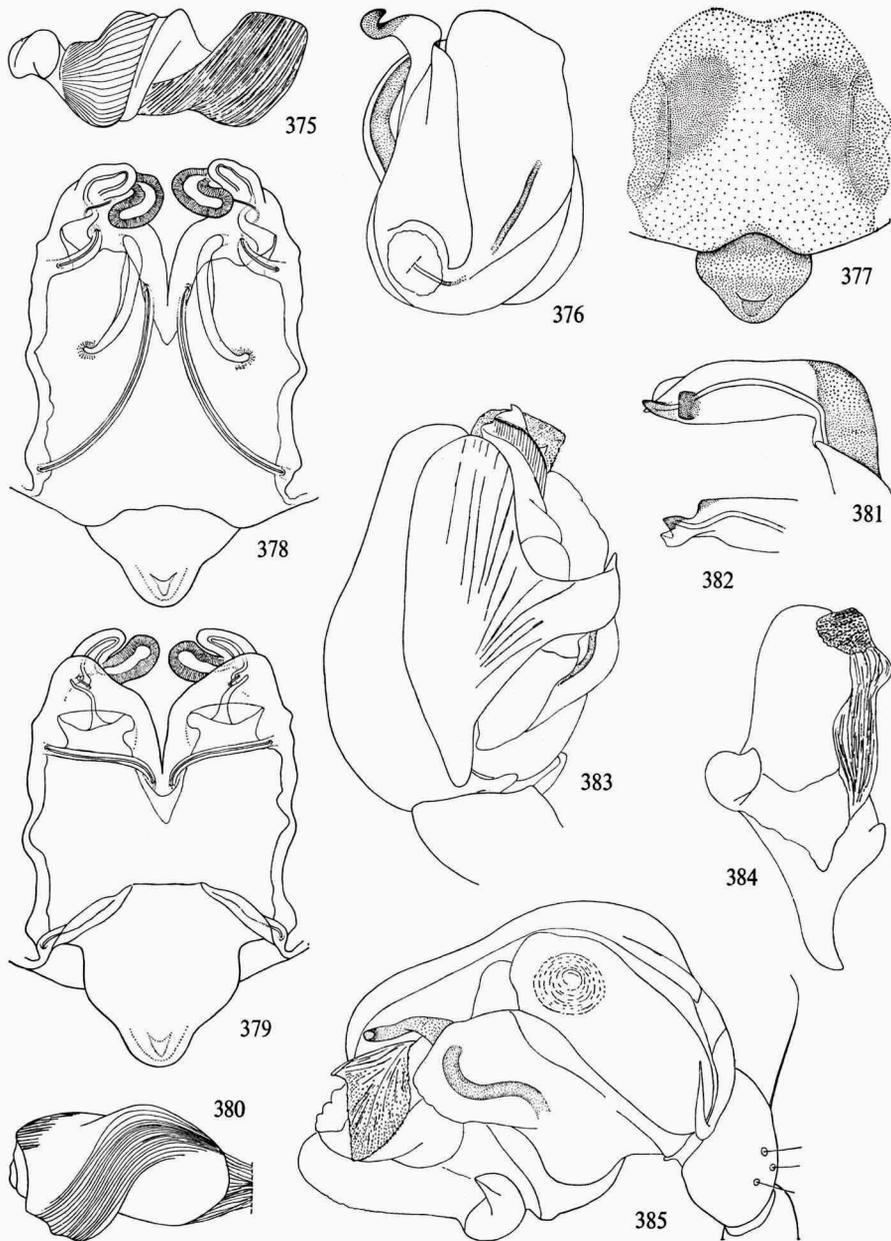


Fig. 375. *Neriene japonica*, terminal apophysis. Fig. 376-385. *N. fusca*. 376, tegulum with median apophysis, mesal aspect; 377, epigyne; 378, vulva, ventral aspect; 379, do., dorsal aspect; 380, terminal apophysis; 381, embolus, dorsal aspect; 382, do., posterior aspect; 383, male palp, ventral aspect; 384, lamella, dorsal aspect; 385, male palp, lateral aspect. 375, 380-382, $\times 95$; 376, 377, 383-385, $\times 67$; 378, 379, $\times 89$.

wall, and with approximately two and a half coils to turning-points, which lie laterally of receptacula. Receptacula at mesal side of apices of atria, fertilization ducts running backwards through thick walls of atria, parallel with spiral grooves. Scape broad, triangular, slightly constricted before broadly rounded tip; ventral surface with small semi-covered depression mesally. Width of epigyneal aperture 0.25-0.29 mm.

Distribution. — Recorded from Japan (Honshu) and Korea.

Material examined.

Japan, Honshu. — 1 ♀ 1 ♂, Nara Pref., Nara, 11.v.1952 (♀ holotype and ♂ "allotype"; CO). — 1 ♀ 1 ♂, Mie Pref., "Y. Yamakawa", Sakakibara, 2.vii.1958, R. Oi (ML). 1 ♀, Mie Pref., Hisari, 2.vi.1958, R. Oi (ML).

Nerienne fusca (Oi) comb. nov.

Neolinyphia fusca Oi, 1960, Journ. Inst. Polyt., D, 11: 226, fig. 325-327 (description ♀ ♂, Japan, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 19 (catalogue).

Types. — ♀ holotype and ♂ "allotype" from Japan, Honshu, Nara (CO).

Male. — Measurements in mm. Total length 3.3; cephalothorax, length 1.6-2.0, width 1.25-1.65; abdomen, length 1.9, width 1.15, height 1.0; chelicerae, length 0.75-0.90, width 0.35-0.45.

Cephalothorax. — Yellow-brown to light brown, suffused with black on striae, fovea, and posterior part of head, striae not reaching lateral margins of cephalothorax, but leaving a broad marginal border without suffusion. Posterior margin cut off straight, sides evenly rounded towards front, not constricted at border of head and thorax. Width about 0.8 of length, width of head 0.6 of width of thorax. From side, dorsal line of thorax rising rather steeply to level fovea, dorsal line of head rising steeply for a short stretch near posterior margin, then continuing evenly to eye-region; clypeus slightly concave below AME, lower part straight. Very short hairs along posterior and lateral margins of thorax, eye-region and clypeus with longer hairs.

Eyes. — Eye-region slightly narrower than width of head. Anterior row straight, posterior row slightly recurved. Diameter of PME 0.09-0.11 mm, lateral eyes of approximately same size, AME smaller, their diameter measuring 0.85 of diameter of PME. PME with narrow black rings. PME separated from each other by 1.0 diam., from PLE by 1.7 diams., and from AME by 1.3 diams. of PME. AME separated by 0.6 of their own diameter. Height of clypeus 0.19-0.20 of length of cephalothorax.

Chelicerae. — Brown, darker than cephalothorax. Basal tubercle not pres-

ent. Fine parallel ridges faintly visible on basal half of lateral surface. Dorsal row with three small teeth, second one largest, equidistant, close together near mesal side of apical slant. Ventral row with one small wart-like tooth opposite to apical tooth of dorsal row.

Gnathocoxae. — Brown, suffused with black; lateral margins slightly converging, apices truncated perpendicularly. Labium brown, heavily suffused with black, anterior border raised and as dark as base. Sternum brown, suffused with black, lightly in the middle, more heavily at margins; width 0.85 of length.

Legs. — Light yellow-brown, lightly suffused with black; apical margins of coxae and basal margins of femora with dirty grey rings; tips of femora, tibiae, and metatarsi slightly darker. Length of femur I 1.2-1.4 times length of cephalothorax; length of tibia I 10-11 diams. of segment. Measurements (of "allotype") in mm:

	I	II	III	IV	palp
Fe	2.75	2.40	1.45	1.95	0.77
Pa	0.65	0.63	0.45	0.50	0.25
Ti	2.55	2.10	1.10	1.60	0.34
Mt	3.00	2.55	1.40	2.20	—
Ta	1.45	1.20	0.70	1.00	0.80

Chaetotaxy. — Fe I d'; II-IV d; dorsal spines not always present on all legs. Pa I-IV d''d', basal spine weak and small.

Ti I - II d'' l' l'' d'
 III d'' v' d' [l''_a l''_a v'_a v''_a]
 IV d'' l' v' d' [l''_a l''_a v'_a v''_a]

Mt I-II -; III dv; IV dl'vd

Length of d''-spine on tibia I 0.35 mm, diameter of tibia I at base of d''-spine 0.17-0.24 mm; on tibia IV 0.45-0.51 mm and 0.14-0.20 mm, respectively. Tm I 0.23. Position of d''-spine on tibia I 0.20-0.21.

Abdomen. — Cylindriciform, with flattened dorsal surface. Ground colour and small white dorsal blotches obscured by irregular grey and black pigment of outer layer; posterior surface black with small lighter areas. Ventral surface uniformly grey-black, with a small light patch in front of spinnerets. Lateral surface with irregular black streaks. Opercula and spinnerets brown, suffused with black. Genital area brown.

Palp (fig. 383, 385). — All segments yellow-brown, with the exception of the dark brown, apically blackish cymbium. Patella and tibia each with a dorsal spine near anterior margin, which is slightly longer than segment; tibia moreover with many spinehairs on lateral and ventral surfaces, which

are slightly shorter than the dorsal spine. Cymbium without spines. Paracymbium with narrow distal arm, tapering to a point. Tegulum with a shallow but distinct excavation antero-ventrally. Median apophysis (fig. 376) curving away from antero-mesal surface of tegulum and pointing in anterior direction in the unexpanded palp, its apex forming a simple strongly chitinous hook. Embolus (fig. 381, 382) bent perpendicularly, with strongly chitinous base, spermduct ending at sharp spermduct-tooth at tip, which has a small pointed ventral lobe just below tip, and a small pigmented elevation dorsally. Terminal apophysis (fig. 380) longer than wide, flattened dorso-ventrally, with about one and a half coil, first coil taking up nearly whole length of the element; coils very lightly grooved lengthwise. Lamella (fig. 384) long with a short proximal spur, which curves in mesal direction with sharp tip; free lateral projection on half length of element rather heavy and curved in dorsal direction; apex broadly rounded, rather rough dorsally. Transversal sclerite absent.

Female. — Measurements in mm. Total length 4.0-4.8; cephalothorax, length 1.75-1.8, width 1.35-1.4; abdomen, length 2.35-3.1, width 1.6-2.2, height 1.4-2.15; chelicerae, length 0.80-0.85, width 0.40-0.42.

Cephalothorax. — Colour as in male. Posterior margin excised, sides lightly constricted at border of head and thorax. Hairs on head shorter than in male. Sizes of eyes as in male, distance slightly smaller. Height of clypeus 0.09-0.10 of length of cephalothorax.

Chelicerae. — Stridulating file barely visible. Dorsal row with three teeth, basal tooth small, apical pair larger. Ventral row with three teeth, small and equidistant, basal tooth opposite to second tooth of dorsal row. Lateral margins of gnathocoxae parallel.

Legs. — Tibiae and metatarsi slightly darkened at tips. Length of femur I 1.2-1.3 times length cephalothorax; length of tibia I 12-13 diams. of segment. Measurements in mm (of holotype):

	I	II	III	IV
Fe	2.25	2.00	1.35	1.85
Pa	0.65	0.60	0.45	0.50
Ti	2.10	1.80	1.00	1.50
Mt	2.20	1.90	1.15	1.75
Ta	1.15	0.95	0.65	0.85

Chaetotaxy. — A d-spine was not present on femur I in the specimens examined. Other spines as in male, but tibiae I and II with a pair of v-spines. Length of d''-spine on tibia I 0.42-0.44 mm, diameter of tibia I at base of d''-spine 0.26 mm; on tibia IV 0.55-0.57 mm and 0.20 mm, respectively. Tm I 0.25-0.27. Position of d''-spine on tibia I 0.17-0.20.

Abdomen. — Dorsal surface flattened, posteriorly rounded. Dorsal surface with white area from base to three-fourths of length and on whole width of abdomen, clear white on lateral parts of this area, beige-coloured background visible around white blotches on mesal part; lateral margins of white area sinuate in front, dentate posteriorly, posterior margin sinuate. Lateral surface with white ventro-lateral band from base of abdomen to posterior surface, above spinnerets broad and contiguous with band of other side. Remainder of lateral surface mottled black and white, curving as a comparatively dark band to posterior fourth of dorsal surface, black with a row of small white dots there, separating the white areas of dorsal and posterior surfaces. Ventral surface blackish at sides against ventro-lateral white band, mottled white and black on central part, with some clear white spots concentrated on a triangular area, from epigastric furrow pointing to spinnerets. Opercula and spinnerets light brown, suffused with black.

Epigyne (fig. 377). — Ventral surface black-brown, with two oblique lateral black markings, which run from small lateral depressions in meso-apical direction. Posterior margin bluntly excised in the middle. Scape narrower than epigyneal opening, subtriangular.

Vulva (fig. 378, 379). — Much longer than wide. Atria fused for half of their length, slightly diverging on anterior half. Spiral grooves with about one coil or slightly more, from entrances in the middle of the ventral wall of either atrium to turning-points at apices. Receptacula curved inwards and to ventral side. Scape with semi-covered depression on ventral surface. Width of epigyneal aperture 0.31-0.33 mm.

Distribution. — Up to the present reported from Japan (Honshu) only.

Material examined.

Japan, Honshu. — 1 ♀ 1 ♂, Nara Pref., Nara, 11.v.1952, R. Oi (♀ holotype and ♂ "allotype"; CO); 1 ♀ 1 ♂, same locality, 29.iv.1957, R. Oi (♂ : Oi, 1960; both ML).

Neriene limbatinella (Bösenberg & Strand) comb. nov.

(fig. 386-393)

Linyphia limbatinella Bösenberg & Strand, 1906, Abh. senckenb. naturf. Ges., 30: 174, pl. 12 fig. 248 (description ♂; in type-series of *Neriene albolimbata* (Karsch), Japan). — Yaginuma, 1962a, Spid. fauna Japan: 18 (p.p.; catalogue, also referring to *L. limbatinella* sensu Oi [= *Neriene brongersmai* spec. nov.]).

Linyphia fenestrata Schenkel, 1937, Ark. Zool., 29A(1): 7, 76, fig. 26 (description ♀, China, Kansu). [new synonymy].

Prolinyphia bilineata Oi, 1960, Journ. Inst. Polyt., D, 11: 220, fig. 340-343 (description ♀ ♂, Japan, Honshu). — Yaginuma, 1962a, Spid. fauna Japan: 18 (catalogue). —

Namkung, 1964, *Atypus*, 33/34: 35, fig. 15 (Korea). — Paik, 1965a, *Educ. Journ.*, 3: 65, fig. 14-16 (Korea). [new synonymy].

Linyphia peltata; Schenkel, 1937, *Ark. Zool.*, 29A(1): 78 (p.p.; adults only; China, Kansu).

Types. — ♂ holotype of *Linyphia limbatinella* from Japan (ZMB). ♀ lectotype and one ♀ paralectotype of *Linyphia fenestrata*, by present designation, from China, Kansu (MS). ♀ holotype and ♂ paratype of *Prolinyphia bilineata* from Japan, Honshu (CO).

Remarks. — The origin of the holotype of *Linyphia limbatinella* is doubtful. According to Bösenberg & Strand (1906: 174) the specimen was found among the type-specimens of *Linyphia albolimbata* [= *Neriene albolimbata* (Karsch)]. However, Karsch did not mention a male specimen in the original description of the species. It remains, therefore, open to question, whether the specimen originates from the same locality as *albolimbata*. The provenance of the latter is rather vague too, we only know that the specimens came from Japan. Apparently Bösenberg did not remove the specimen of *limbatinella* from the tube of *albolimbata*.

The description of *L. fenestrata* was based on 2 ♀ from China, South Kansu (locality K 13). The 9 adult ♀ specimens of *L. peltata* from South Kansu (locality K 8), recorded in the same paper by Schenkel (1937: 78), were not recognized by Schenkel to belong to his own new species *fenestrata*. An adult ♂ from the type-locality (K 13) of *fenestrata*, again listed under *peltata* by Schenkel, undoubtedly is a ♂ of *N. limbatinella*.

Oi (1960: 220) has not recognized *limbatinella* from the too superficial description and figure of Bösenberg & Strand (1906), and he described the species again as *Prolinyphia bilineata*. The female specimen, which he identified with *L. limbatinella* (p. 229), certainly does not belong in the *peltata*-group, because of the black rings around the PME, and in view of the abdominal pattern (uniformly dark ventral surface). I have tentatively assigned this specimen to the new species *Neriene brongersmai*, a representative of the *hammeni*-group.

Male. — Measurements in mm. Total length 3.4-4.2; cephalothorax, length 1.45-2.0, width 1.05-1.5; abdomen, length 1.9-2.35, width 1.0-1.35, height 1.0-1.1; chelicerae, length 0.72-1.25, width 0.33-0.45.

Cephalothorax. — Yellowish-white (due to bleaching of specimen during conservation?) to light brown, faintly suffused with black at lateral margins, and with a narrow grey or black stripe from posterior margin to some distance behind PME, stripe becoming broader and fainter on posterior part of head. Posterior margin excised mesally, sides evenly rounded towards

front, very lightly constricted at border of head and thorax. Width about 0.75 of length, width of head 0.55 of width of thorax. From side, dorsal line rising evenly from posterior margin to eye-region, interrupted by a short level stretch at fovea; clypeus slightly concave below AME, lower part straight. Lateral margin of thorax with short hairs, long hairs on three rows on posterior part of head, at eye-region, and upper half of clypeus.

Eyes. — Eye-region narrower than width of head. Anterior row slightly procurved, posterior row slightly recurved. PME with narrow black rings drawn out into small triangles in front and behind. Diameter of PME 0.08-0.10 mm, laterals of same size, diameter of AME about 0.8 of diameter of PME. PME separated from each other by 1.1-1.3 diams., from PLE by 1.7-1.9 diams., and from AME by 1.1-1.2 diams. of PME. AME separated by about 0.7 of their own diameter. Height of clypeus 0.20-0.21 of length of cephalothorax.

Chelicerae. — Colour as cephalothorax. Lateral sides rather concave, diverging on apical halves, mesal sides strongly diverging. From side, strongly attenuate on apical half with narrow tip. Small blunt basal elevation present on lateral corner. Basal three-fifths of lateral surface with fine parallel ridges. Dorsal row with three small teeth at mesal corner of apical slant, close together, middle tooth largest. Ventral row with one or two very small teeth opposite to apical tooth of dorsal row.

Gnathocoxae. — Yellow-white to light brown; lateral margins slightly converging to front, curving outwards just below tip, truncated perpendicularly at apices. Labium grey-brown with lighter narrowly raised anterior margin. Sternum coloured as gnathocoxae; width 0.9 of length.

Legs. — Light yellow to light yellow-brown, narrowly darkened at tips of segments. Legs very long and thin; length of femur I 2.0-2.4 times length cephalothorax; length of tibia I 28-29 diams. of segment. Measurements (of "allotype" of *bilineata*) in mm:

	I	II	III	IV	palp
Fe	4.75	3.70	2.25	3.00	0.91
Pa	0.60	0.60	0.50	0.50	0.22
Ti	4.95	3.75	1.80	2.75	0.36
Mt	6.10	4.65	2.45	3.60	—
Ta	2.40	1.60	0.90	1.20	0.69

Chaetotaxy. — Fe I spineless; II-IV d. Pa I-IV d''d', basal spine short and weak.

Ti	I - II	v _b '	d	v'	v''	l'	v'	v''	l''	d'	[l' _a l'' _a v' _a v'' _a]
	III	v _b '	d''	v		l'				d'	[l' _a l'' _a v' _a v'' _a]
	IV		d''			l'				d'	[l' _a l'' _a v' _a v'' _a]

Mt I v; II d v v; III-IV d v l'

In all available specimens d''-spine broken off, diameter of tibia I at base of d''-spine measuring 0.15-0.18 mm; on tibia IV length of d''-spine 0.56 mm, diameter of segment 0.16 mm. Tm I 0.16. Position of d'' spine on tibia I 0.18-0.19.

Abdomen. — Cylindriform. In the Chinese specimen abdomen very bleached. In the two Japanese specimens investigated dorsal surface mainly white with a narrow median stripe and a narrow lateral stripe at either side, running nearly parallel from anterior surface to spinnerets; stripes of light brown background colour. Lateral surface light brown, lightly mottled with white blotches, and with a ventro-lateral white streak from dorsal margin of operculum to half length or two-thirds of abdomen. Ventral surface light brown with a clear white spot in front of spinnerets, and with some stray white blotches. Opercula and spinnerets light brown.

Palp (fig. 391, 393). — All segments light yellow-white. Patella with long dorsal spine, slightly less than three times as long as segment. Tibia with long curved dorsal spine, about two times as long as segment; a few long spinehairs on lateral and latero-ventral surfaces near anterior margin. Cymbium without spines. Paracymbium with narrow distal arm tapering to a sharp point. Tegulum conspicuously excised on antero-ventral side. Median apophysis (fig. 388) with dorsal tip hook-shaped, tip of hook pointing in lateral direction; in lateral view element very slender and evenly curved in antero-ventral direction. Embolus (fig. 392) curved around terminal apophysis with slender distal half and rather long bluntly rounded apical appendage; spermduct-tooth small. Terminal apophysis (fig. 390) with barely more than two coils, basal coil plate-like, second coil with transverse grooves at apical margin. Lamella differing from other species of the group by the presence of a sharp conical tooth in front of lateral arm; tooth about as large as slender anterior tip of the element; free lateral projection (fig. 393) long and slender with sharp tip; antero-mesal margin forming a sharp dorsal edge which ends in the antero-lateral tip; proximal tip tapering to a sharp point, lightly curved to mesal side. Transversal sclerite not present.

Female. — Measurements in mm. Total length 3.8-4.9; cephalothorax, length 1.45-1.9, width 1.0-1.3; abdomen, length 2.4-3.6, width 1.5-2.4, height 1.3-2.6; chelicerae, length 0.75-1.00, width 0.37-0.45.

Cephalothorax. — Coloured as in male. In the Japanese specimen examined (holotype of *Prolinyphia bilineata*) lateral margins and median stripe black, more distinct than in the available Chinese specimens. Eyes of same size as in male. PME separated from each other by 1.2 diams., from PLE by 1.4-1.6

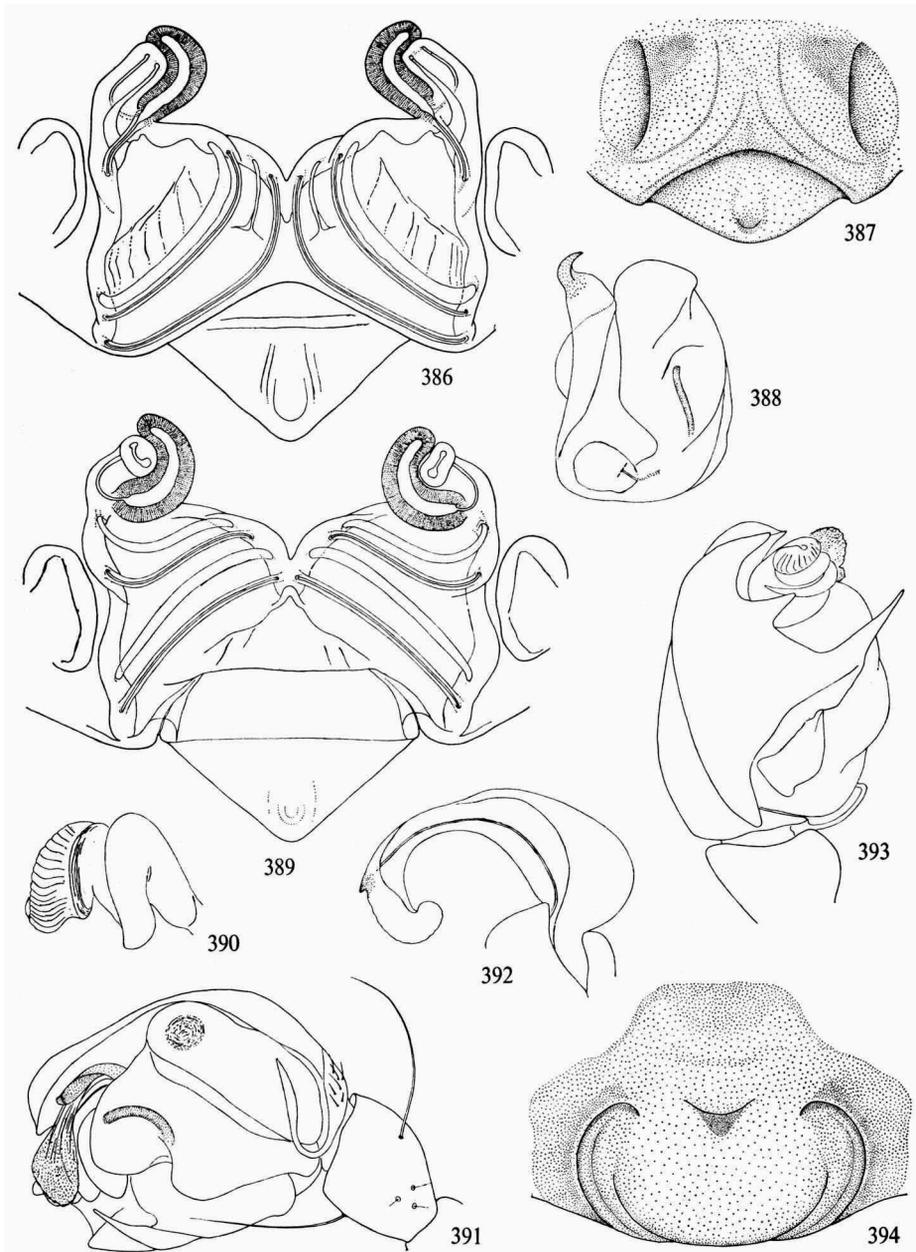


Fig. 386-393. *Neriene limbatinella*. 386, vulva, ventral aspect; 387, epigyne; 388, tegulum with median apophysis, mesal aspect; 389, vulva, dorsal aspect; 390, terminal apophysis; 391, male palp, lateral aspect; 392, embolus, dorsal aspect; 393, male palp, ventral aspect. Fig. 394. *Frontinellina frutetorum*, epigyne. 386, 389, $\times 123$; 387, 388, 391, 393, $\times 67$; 390, 392, 394, $\times 95$.

diams., and from AME by 1.3-1.4 diams. of PME. Height of clypeus 0.14-0.15 of length of cephalothorax.

Chelicerae. — Without basal tubercle. Stridulating file as in male. Number and spacing of cheliceral teeth as in male. Lateral margins of gnathocoxae parallel, apices rounded.

Legs. — Black apical rings on all segments except tarsi. Legs long and slender, but not as long and thin as in male, e.g., metatarsi I and II not or barely longer than corresponding tibiae. Length of femur I 1.6-1.7 times length cephalothorax; length of tibia I 13-15 diams. of segment. Measurements in mm (of holotype of *Prolinyphia bilineata*):

	I	II	III	IV
Fe	3.10	2.55	1.75	2.30
Pa	0.65	0.60	0.45	0.50
Ti	3.55	2.45	1.35	1.95
Mt	3.55	2.55	1.60	2.25
Ta	1.75	1.25	0.75	0.95

Chaetotaxy. — Fe I not spineless, but with a d- and l'-spine. Tibia III without a v₆''-spine, but otherwise not differing from male in the number of spines. Length of d''-spine on tibia I 0.36 mm, diameter of tibia I at base of d''-spine 0.19-0.24 mm; on tibia IV 0.50 mm and 0.19 mm, respectively. Tm I 0.14-0.17. Position of d''-spine on tibia I 0.17-0.20.

Abdomen. — The specimens from South Kansu have a rather globular abdomen, in the holotype of *bilineata* from Japan it is more cylindrical. Dorsal and lateral surfaces clear white, with a narrow grey mesal field on posterior surface. Specimen from Japan with two parallel black lines on posterior surface, which are continuous with two narrow black lines on dorsal surface, slightly converging in front and behind, enclosing a mesal area as white as remainder of dorsal surface; lateral surface of abdomen in this specimen bearing a blackish horizontal streak on anterior half, and three vertical blackish bars on posterior half, just reaching dorsal and ventral surfaces. Ventral surface light brown, with a clear white mesal line from epigastric furrow to spinnerets, and with some additional small white blotches. Opercula and spinnerets light brown.

Epigyne (fig. 387). — Protruding from ventral surface, with large opening posteriorly. Short scape rounded apically. A deep and sharply defined circular depression at either side of protruding epigyne.

Vulva (fig. 386, 389). — Atria conical, diverging, with a large common opening. Spiral grooves with two and a half coils from openings on mesal half of ventral wall of either atrium to apically situated turning-points; turning-points curved in dorsal direction; receptacula at dorsal side of apices,

curving in apical direction. Scape triangular with rounded tip, and with a small semi-covered depression on its ventral surface. Width of epigyneal aperture 0.29-0.36 mm.

Distribution and habitat. — China, Korea, Japan (Honshu, Kyushu). No data about habitat available.

Material examined.

China. — 2 ♀, S. Kansu, 1930, D. Hummel (♀ lectotype and paralectotype of *Linyphia fenestrata* Schenkel; MS); 1 ♂, do. (*L. peltata*; Schenkel, 1937; MS). 9 ♀, S. Kansu, Tan-chang (southern part of Min Shan Mountains), field on slope of mountain, 1900 m, 5.x.1930, D. Hummel (*L. peltata*; Schenkel, 1937; MS).

Japan. — 1 ♂, Japan?, Hilgendorf? (holotype *Linyphia limbatinella* Bösenberg & Strand; ZMB). — 1 ♀ 1 ♂, Honshu, Yamagata Pref., Haguro-Cho, 4.ix.1956, S. Okitsu (♀ holotype and ♂ "allotype" of *Prolinyphia bilineata* Oi; CO).

Microlinyphia and *Frontinellina*

As indicated in the introduction, several species, included by Bonnet in *Linyphia*, have to be transferred to *Microlinyphia*. However, *Linyphia frutetorum* C. L. Koch, tentatively placed in the *Microlinyphia*-group by Wiehle (1956: 324), is assumed to constitute a separate genus, which is closely related to the Nearctic *Frontinella*. The genus *Frontinellina* is introduced here, with *Linyphia frutetorum* C. L. Koch as type-species. The functional aspects have been studied for a European representative of either genus, and both are provisionally included in the key to the genera. A description of the genitalia of the two species is given below in order to facilitate the understanding of the descriptions of the functional aspects of these species. Nomenclature, distribution, and descriptions of the species will be discussed in a separate paper dealing with these genera.

Frontinellina gen. nov.

Type-species: *Linyphia frutetorum* C. L. Koch, 1834, Faun. Ins. Germaniae init., 127: pl. 19-20.

Medium sized animals. PME not placed on black tubercles. Chelicerae of male not slanting backwards as in *Microlinyphia*. Femora spineless. Metatarsus IV without trichobothrium. Cymbium of male palp tapering to a narrow tip. Paracymbium rather squarish. Embolus long and ribbon-shaped, coiled in long turns along palp and visible from all sides. Lamella sickle-shaped. Female vulva with two columns of spirally coiled tube with axial fertilization duct.



Fig. 395-401. *Frontinellina frutetorum*. 395, vulva, ventral aspect; 396, tegulum with median apophysis, mesal aspect; 397, radix, latero-dorsal aspect; 398, male palp, ventral aspect; 399, radix (*r*), with lamella (*l*) and two terminal appendages (*tap*), dorsal aspect; 400, do., ventral aspect; 401, male palp, lateral aspect. Fig. 402. *Microlinyphia impigra*, tegulum with median apophysis, mesal aspect. 395, $\times 123$; 396, 398, 401, $\times 49$; 397, 402, $\times 95$; 399, 400, $\times 67$.

Frontinellina frutetorum (C. L. Koch) comb. nov.

(fig. 394-401)

Male palp (fig. 398, 401). — Segments orange-brown, cymbium nearly black. Femur slightly fusiform, spineless. Patella short, with dorsal apical spine one and a half times as long as segment. Tibia higher than long as seen from side, with dorsal spine as long as height of segment. Tibia and cymbium with long hairs. Cymbium tapering to a narrow distal tip. Paracymbium a large and broad sclerite, with nearly parallel dorsal and ventral margins; distal margin emarginate, forming a dorsal and a ventral rounded tip; dorsal half with long hairs. Tegulum (fig. 396) disk-shaped, with laterally on distal surface a short blunt median apophysis, at the base of which the spermduct leaves the tegulum and goes directly to the embolus; a small blunt tooth, pointing in same direction as median apophysis, situated at dorsal margin of distal surface. Radix (fig. 397, 399, 400, *r*) broadly connected with median apophysis by membrane, proximal and ventral tips bluntly rounded, curving in dorsal and apical direction distally, tapering to a narrow curved tip. Embolus very long, lying in long coils and bends around tegulum and other elements, visible at the unexpanded palp from all sides; element ribbon-like at base and gradually becoming thread-like towards tip, attached by short rod-like base to central terminal bladder. Lamella (fig. 399, 400, *l*) large, with three short arms and one long curved arm; proximal arm with rounded tip, situated basally at mesal side of unexpanded palp; two short arms at mesal side, one free, the other attached by means of the central terminal bladder to radix, embolus, and terminal appendages; the long free curved arm visible as a semi-circular element in lateral view, curving in dorsal and apical direction, its distal part folded, forming a sheath through which the embolus passes with one of its coils; tip of latter arm serrate. Two terminal appendages (fig. 399, 400, *tap*) present, a lateral and a mesal one, both membranous with swollen bases, implanted on central terminal bladder, twisted parallel with each other in the unexpanded palp, tips folded together and concealing tip of embolus; lateral appendage with broad squarish base, marked by a black seam from base to tip; mesal appendage broadly connected with radix at base, slightly shorter than lateral appendage, tip folded and forming a sheath.

Epigyne (fig. 394). — Protruding ventrally and in posterior direction as a rounded projection, with a pair of curved slit-like entrances, which curve in mesal direction behind. Surface smooth, light brown or cream-coloured between slits. There is a small semi-covered depression mesally between ventral tips of slit-like entrances.

Vulva (fig. 395). — About four and a half coils of membranous spiral tube between slit-like entrances and turning-points, which lie laterally or ventrally of receptacula. First coils orientated obliquely, mesal sides of coils reaching into tip of mesal projection. Receptacula large and globular. Fertilization ducts running backwards through axes, slightly twisted, posteriorly curving along lateral side of entrances to dorsal wall.

Microlynphia Gerhardt

Microlynphia Gerhardt, 1928, Zeitschr. Morph. Ökol. Tiere, 10: 632. Type-species by original designation: *Linyphia pusilla* Sundevall.

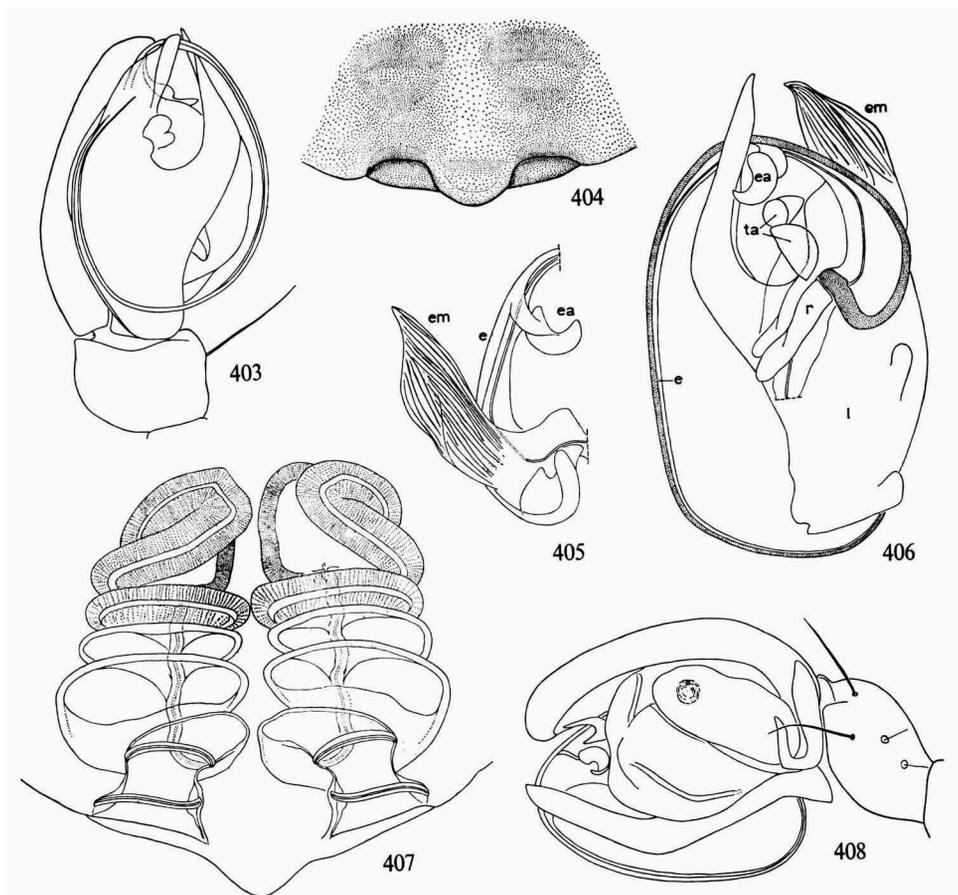


Fig. 403-408. *Microlynphia impigra*. 403, male palp, ventral aspect; 404, epigyne; 405, base of embolus (e), with embolic apophysis (ea) and embolic membrane (em); 406, embolic section, with radix (r), embolus (e), embolic apophysis (ea), embolic membrane (em), terminal apophysis (ta), and lamella (l); 407, vulva, ventral aspect; 408, male palp, lateral aspect. 403, 408, $\times 67$; 404-406, $\times 95$; 407, $\times 177$.

Animals of medium size. Cephalothorax of male comparatively long and narrow, less elongate in females. PME on black tubercles. Chelicerae of males long and narrow, parallel, slanting backwards towards gnathocoxae at an angle of approximately 45° . Chelicerae of males moreover with a strongly developed protrusion on basal half of posterior surface. Legs long and slender, at least femur I bearing spines. Metatarsus IV without trichobothrium.

Radix of male palp very small. Embolus long and thread-like, forming a large and conspicuous loop at the unexpanded palp. A small corkscrew-shaped embolic apophysis present near base of embolus. Terminal apophysis very small and inconspicuous. Lamella flat with rounded proximal tip. Female epigyne small and inconspicuous. Vulva with two columns of spiral tube; fertilization duct lying axially in column and making a loop around entrance of tube.

***Microlinyphia impigra* (O. Pickard-Cambridge)**

(fig. 402-408)

Linyphia impigra O. Pickard-Cambridge, 1871, Trans. Linn. Soc. London, 27: 422, pl. 55 fig. 18a-c (description ♂, England).

Male palp (fig. 403, 408). — Light brown, apical half of tibia and whole cymbium heavily suffused with black. Patella short, dorsal spine as long as segment. Tibia one and a half times as long as patella, and, when seen from side, as long as high at apex; anterior margin lightly incised dorso-laterally; one spine near incision and one lateral spine present, both as long as segment. Cymbium two times as long as tibia, often with a dorsal spine. Paracymbium U-shaped, distal arm half as long as proximal arm, tapering to a point. Proximal part of median apophysis (fig. 402) as long as distal part, the latter with a lightly curved sharp tip. Embolus (fig. 406, *e*) long, lying in a loop at ventral side of palp; length 1.2-1.5 mm; embolic apophysis (fig. 405, 406, *ea*) comparatively heavy, corkscrew-shaped with two turns, tapering to a point. Terminal apophysis (fig. 406, *ta*) very small, distal globular part with few hairs. Lamella (fig. 406, *l*) large, proximal tip truncate, mesal margin evenly curved towards rounded antero-mesal tip; lateral free projection long and narrow, bent inwards again on distal half, grooved on outside, protruding in front of antero-mesal tip of element, and reaching as far as sharp tip of embolic membrane (fig. 405, 406, *em*).

Epigyne (fig. 404). — Small and inconspicuous, the two entrances separated by an obtuse triangular mesal part, which has the ventral surface lightly depressed. Entrances small.

Vulva (fig. 407). — Spiral tubes with about four coils to turning-points,

the basal pair membranous, the apical pair chitinous. Fertilization ducts axially in columns of spiral tube, ending with a complete loop around entrances. Receptacula large. Width of epigyne in posterior view 0.29-0.32 mm, width of mesal part one-fourth of total width.

DISCUSSION OF TAXONOMIC PART

Notes on zoogeography. — The genus *Linyphia*, in the reduced sense of this paper, is restricted to the Palaearctic region, its main distribution lying in Europe. Only *Linyphia triangularis* occurs on the East Asiatic mainland, *L. hortensis* has been recorded from as far east as Turkestan, the other species probably are restricted to Europe.

Representatives of *Neriene* (table 2) can be found in the Holarctic, Ethiopian, and Oriental regions, shifting to high altitudes in the tropical zones. In South Africa they are found again on about sea-level. The *emphana*-, *radiata*-, and *peltata*-groups have not been recorded from the Ethiopian region so far, the *emphana*-group is lacking in the Oriental region. This may well be due to our fragmentary knowledge of the spider faunas of these regions. The *peltata*-group is not represented in North America, and this region being well-investigated, the chance of a representative yet being found there is negligible.

Five species of the genera dealt with in this paper are common to Europe and Asia, viz., *Linyphia triangularis*, *Neriene clathrata*, *N. montana*, *N. emphana*, and *N. radiata*; with the exception of the first species all are also found in Japan. Some European species have one or several related vicarious species in Asia, e.g., *N. albolimbata* (Japan), *N. cavaleriei* (mainland), and *N. oidedicata* (mainland and Japan) against *N. hammeni* in Europe; *N. angulifera* and *N. limbatinella* (both mainland and Japan) against *N. peltata* in Europe. *N. radiata* occurs in Europe and Asia (Japan inclusive), accompanied by *N. longipedella* in Asia and Japan, while a third species, *N. marginella*, is found on the island of Honshu. In contrast with these there are several strictly European species, e.g., *Linyphia hortensis* and *Neriene furtiva*, which are not known from East Asia. Our knowledge of the fauna of the East Asiatic mainland, unfortunately, is very scanty, and the above remarks are for the larger part based on the recent publications concerning Korea by Paik, Kim, and Namkung. How far the distributions of the East Asiatic and European species do reach, to the West and the East, respectively, is not known.

The distribution of the species of *Neriene* in North America shows striking differences between the Eastern and Western parts. The two Eastern North American species of the *hammeni*-group, viz., *N. variabilis* and *N. coosa*,

TABLE 2

Synopsis of the distribution of the species of *Neriere*

	Nearctic		Palearctic			Oriental Ethiopian
	West	East	Europe	Asia	Japan	
clathrata Sundevall		+	+	+	+	
kimyongkii Paik				+		
montana Clerck			+	+	+	
digna Keyserling	+					
furtiva O. Pickard-Cambridge			+			
redacta Chamberlin		+				
obtusa Locket						+
variabilis Banks		+				
coosa Gertsch		+				
hammeni Van Helsdingen			+			
albolimbata Karsch					+	
oidedicata spec. nov.				+	+	
cavaleriei Schenkel				+		
multidentata Schenkel				+		
kibonotensis Tullgren						+
helsdingeni Locket						+
natalensis spec. nov.						+
flammea spec. nov.						+
conica Locket						+
beccarii Thorell						+
macella Thorell						+
sundaica Simon						+
amiculata Simon						+
herbosa Oi					+	
brongersmai spec. nov.					+	
emphana Walckenaer			+	+	+	
litigiosa Keyserling	+					
radiata Walckenaer	+	+	+	+	+	
longipedella Bösenberg & Strand				+	+	
marginella Oi					+	
strandia Blauvelt						+
peltata Wider			+			
angulifera Schenkel				+	+	
kashmirica Di Caporiacco				+		
birmanica Thorell						+
katyae spec. nov.						+
japonica Oi				+	+	
fusca Oi					+	
limbatinella Bösenberg & Strand				+	+	

have no near relatives in the West, the species-group not being represented there. If this group has reached the New World by way of the Bering Strait and Aleutian island chain, it may have become isolated in the East by changing conditions. A Northern Atlantic connection is the other possibility, but this connection (by way of Iceland, Greenland, and Baffins Island) is not very likely from a zoogeographical point of view. The north-eastern distribution of *N. clathrata* is also suggestive in this respect, though this species may represent an imported species of the ballast-traffic period (Lindroth, 1957). The species was found in South-west England during the investigations of the sites where ballast was taken in those days (p. 190). It was not listed as a North American species by Lindroth, because he still considered the Nearctic *Linyphia waldea* a distinct species then. The single specimen of *N. peltata* found on West Greenland (Holm, 1967: 68) may have been imported too, or otherwise it has not crossed the Davis Street to Baffins Island, according to Lindroth a very effective faunistic barrier between the Palae-arctic and Nearctic regions.

The *emphana*-group is represented in Western North America by a single species, *N. litigiosa*, which does not cross the Continental Divide. Here a Siberian influence in the past is suggested, an influence which is almost generally accepted for arctic and subarctic animals. *Neriene radiata* is an example of a Holarctic species with a nearly uninterrupted circumpolar distribution.

A number of species are lacking on the British Isles, one of the best investigated countries of Europe as far as spiders are concerned. It is not very likely that species have been overlooked there. Nevertheless two European representatives of *Neriene*, likely to occur there, have not been found on these continental islands, viz., *N. hammeni* and *N. emphana*. Especially the conspicuous webs of the latter species cannot easily have escaped notice. Apparently these species did not reach this region when it was connected with the continent, the last time about 7000 years ago (Darlington, 1957: 493).

In Japan we rather have the reverse. The spider fauna of the East Asiatic mainland is very poorly investigated, while the Japanese fauna is comparatively well known. Though endemism is a well-known feature of the Japanese Islands, we may expect some of the now seemingly endemic forms to turn up on the Asiatic mainland. Recent investigations in Korea have already yielded many results in this respect. Up to the present five species are restricted to Japan, viz., *N. albolimbata*, *N. brongersmai*, *N. herbosa*, *N. marginella*, and *N. fusca*. On the mainland, two species occur that have not (yet) been found in Japan, viz., *Neriene cavaleriei* and *Linyphia triangularis*, from Kweichow(?) and Kansu, respectively.

The affinities between the European and Central African faunas are found to be very close on the generic level, as could be expected. Though *Linyphia* and some species-groups of *Neriene* have not been found in Africa, the differences between the Palaearctic and Ethiopian species of the groups represented are as slight as between the Palaearctic species mutually. Members of these groups have been found in the montane evergreen forest and the deciduous woods on the savannahs, rarely in lowland evergreen forest. In the savannahs they seem to prefer the relatively high humidity of the gallery forest along the rivers, and the overgrowth of dead termitaries. However, the habitat has not always been characterized in sufficient detail on the labels, and in some cases the type of vegetation therefore can only be guessed at. The above remarks about the habitat consequently are only of general nature. In many a case, but not exclusively, the specimens have been collected at unexpected places — after European standards — such as under bark of trees, under a heap of weeds, in litter and dead leaves, and under stones. In the South *Neriene* occurs, with different species, in the temperate subtropical forest on much lower altitudes than in Central Africa.

Endemism, found to occur on some East African mountains in the Erigonidae by Holm (1962), has not been met with here. Subspecies have not been found, and from this we may infer that the species are not isolated on these mountains. Probably they are less exclusively bound to special ecological conditions.

In the Oriental region *Neriene* is again found on higher altitudes. Not many species have been recorded so far, and only three species-groups are represented. *N. strandia* from Borneo fits reasonably well into the *radiata*-group, and the same applies to the two species of the *peltata*-group, viz., *N. birmanica* and *N. katyae*, from Burma and Ceylon, respectively. The species of the *hammeni*-group in this region, on the other hand, form a rather distinct group within the species-group, and demonstrate a much higher degree of isolation. The discontinuity between this sub-group and the Palaearctic species of the group is much larger than between the species of the Palaearctic and Ethiopian regions mutually.

Similar patterns of distribution, with groups of related species or subgenera being represented in most regions with one or more species, are presumed to be present in many other genera of the Linyphiidae. None of these genera, however, has been treated monographically yet, and it is, therefore, too early to discuss this possibly general trend.

Species, superspecies, or subspecies. — Differences between the species within one species-group of *Neriene* and *Linyphia* often are astonishingly

slight. If the species concerned are allopatric (as far as known), one is inclined to think of subspecies or, more likely here, of superspecific relationships. The discontinuities observed, however, are of the same order of size as those between the sympatric species. The distinction, for instance, between *N. hammeni* from Europe and *N. oidedicata* from East Asia is barely larger than the minute (but constant!) differences between the sympatric Ethiopian species *N. kibonotensis* and *N. helsdingeni*. The species can be distinguished by the shape of the genitalia in both cases, most easily by the shape of the terminal apophysis of the male palp and, in female specimens, by the ratio of width to length of the vulva. The species must be isolated, among others, by a mechanical barrier, i.e. the mechanical impossibility to establish functional contact between the genitalia. In the case of *kibonotensis* and *helsdingeni* the genitalia, moreover, were found to correlate with the size of the specimens of the two species independently.

There are several other examples of size differences between the genitalia of otherwise strongly resembling species. In the above mentioned case differences in size of the genitalia are correlated with differences in shape of the terminal apophysis. In two other cases above all the size plays a part, while the shape of the terminal apophysis is rather constant. The two European species *Linyphia hortensis* and *L. alpicola* are assumed to be ecologically isolated species, which differ, apart from the distinct abdominal patterns, in the size of the genitalia, but not or barely in the shape of these organs. The size of the genitalia was again found to correlate with the size of the specimens of the two species independently. The same phenomenon was observed in *Neriene macella* (from Burma and the Malay Peninsula) and *N. sundaica* (from Java and Lombok), which exclude each other geographically. On Sumatra a representative of the same subgroup has been found (*N. beccarii*), which can easily be distinguished by the shape and slightly different structure of the genitalia. Possibly *N. macella*, or *N. sundaica*, also occur on Sumatra, but the island is barely investigated in this respect. For the time being I prefer to maintain the two species under their respective names, as the sizes of the genitalia of the mainland and island populations differ widely, while the interval between the two size-ranges moreover is much larger than the ranges themselves. If the Sumatran hiatus is filled in in the future, a more gradual transition may come to light. Besides our insufficient knowledge of the geographical distribution, the much too small number of available specimens certainly also affects the discontinuity mentioned.

An example of gradual change in the size of the specimens and their genitalia, a clinal variation, has been found for *Neriene radiata*. Going from Western Europe to East Asia and Japan the absolute size of the specimens,

the length of cephalothorax and legs, and the size of the genitalia, gradually diminish. In North America the specimens from the East are smaller, from the West they are of the same size as specimens from Europe. Only the size of the genitalia changes, not their proportions, and the change in size of the genitalia keeps pace with the change in body measurements. Clinal variation has also been found in *N. clathrata*, *N. emphana*, and *N. longipedella*, but the phenomenon is most strikingly demonstrated by the holarctic *N. radiata*.

Sexual dimorphism. — A number of characters can be mentioned by which the two sexes of all species, dealt with in the present paper, seem to differ consistently. Only the most obvious cases of dimorphism have been mentioned or analyzed previously, e.g., the long and divergent chelicerae of the males of *Linyphia triangularis* by Lockett (1932) and by Lockett & Gardiner (1938). It is possible to list many others from the descriptions in the taxonomical part. A summary of these differences, which applies to the genera dealt with in this paper, but which may have a much wider scope, reads as follows.

Female specimens as a rule are larger than males; the difference mainly lies in the greater length of the abdomen, which can be very large in mature females when the time of egg-laying approaches; the size of the cephalothorax is barely different. The clypeus is always higher in males, and usually bears longer hairs. The chelicerae are proportionally longest in males, though not always as elongate as in *Linyphia triangularis*; the cheliceral teeth on the dorsal side are situated less regularly in males, not in one line; a basal tubercle usually is absent in females, or, if present, is smaller than in males. The anterior legs of the males often are lengthened, mainly because of the greater proportional length of the metatarsus and tarsus; the tibia and metatarsus always are very slender. The spines on the legs are much shorter in males, but the chaetotaxy is not affected. The male abdomen, as mentioned above, is much smaller proportionally and usually cylindrical; the abdominal pattern as a rule is rather faint or reduced.

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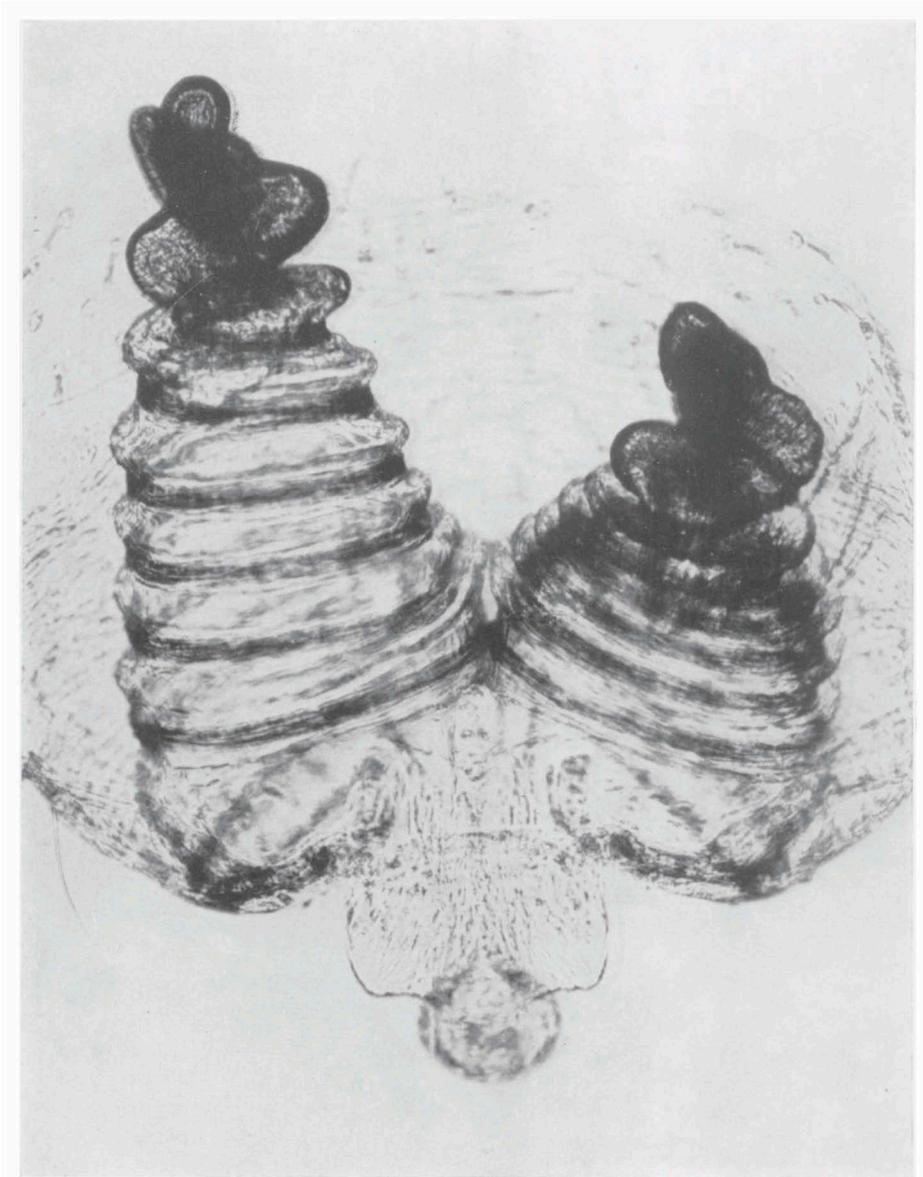
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Linyphia triangularis. Vulva with stretched left atrium, fixed during copulation, dorsal aspect. $\times 120$.

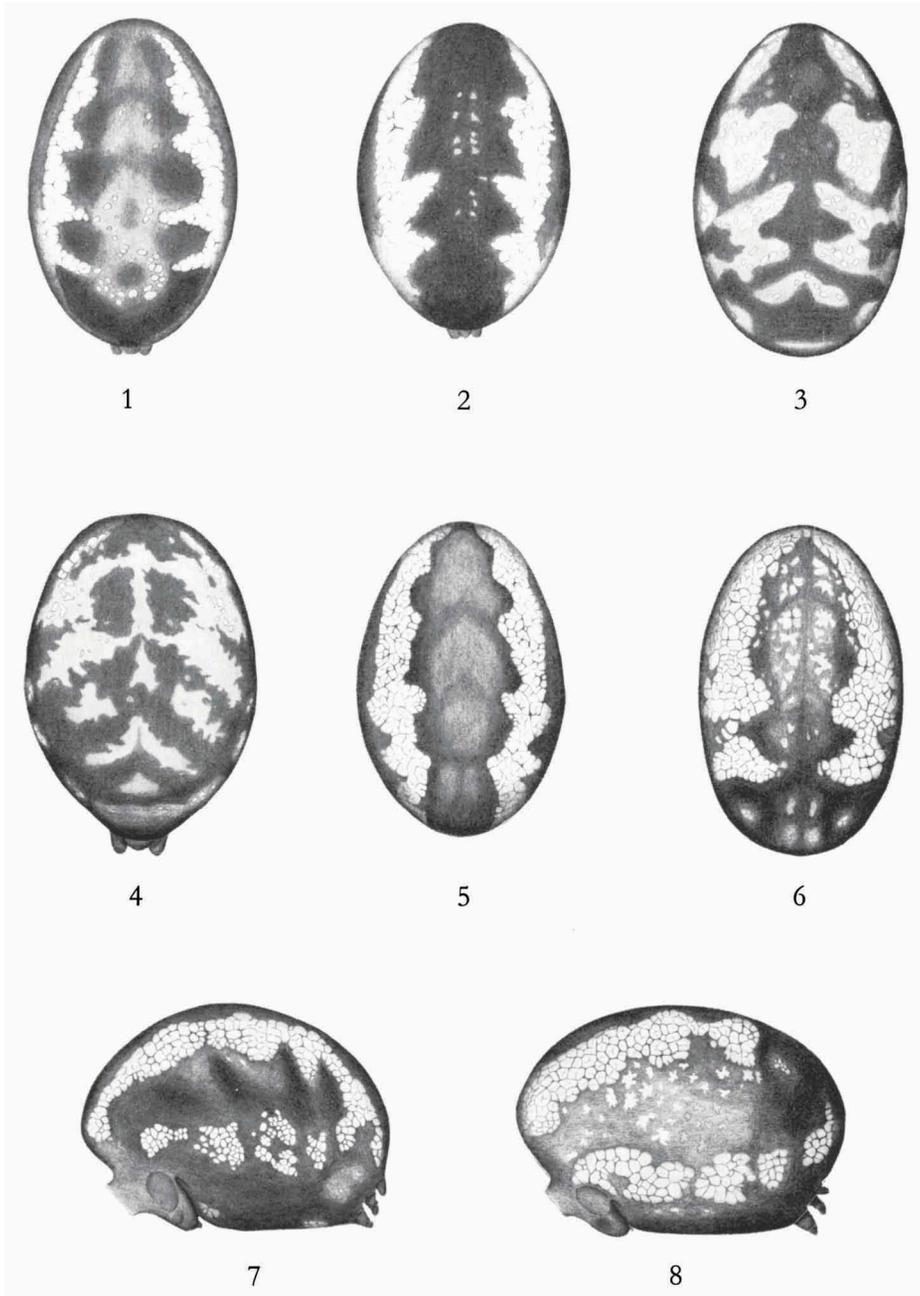


Fig. 1-8. Female abdomina. 1, *Linyphia hortensis*, dorsal aspect; 2, *L. alpicola*, do.; 3, *Neriene hammeni*, do.; 4, *N. herbosa*, do.; 5, *N. peltata*, do.; 6, *N. angulifera*, do.; 7, *N. peltata*, lateral aspect; 8, *N. angulifera*, do. 1-2, $\times 11$; 3, $\times 15$; 4-8, $\times 17$.