

**A RECAPITULATION OF THE NEARCTIC SPECIES OF  
*CENTROMERUS* DAHL (ARANEIDA, LINYPHIIDAE) WITH  
REMARKS ON *TUNAGYNA DEBILIS* (BANKS)**

by

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With 39 text-figures

In any new region the knowledge of the spider fauna, or of any other group of organisms, has to go through three successive stages. In the beginning there is a period of descriptive activity with many new species recorded and named, in the past usually by several authors independently. In the Nearctic Region this stage may have ended for New England, but this is hardly true for the Far West and the southeastern part. In particular the names of Emerton, McCook, Keyserling, Banks, Petrunkevitch, Crosby, Bishop, Chamberlin, and Ivie, not to mention many others, are forever associated with this period. By building up large collections and giving their finds to the world they have laid the foundations of New World Arachnology.

The second stage I would call the period devoted to regrouping and rearranging, and of summarizing local faunas. Older species have to be redescribed and furnished with illustrations. Many species have to be transferred to other genera, the genera have to be compared with those of other faunal regions. The following, third stage is that of the large revisions of smaller taxonomic units on a world-wide basis.

North American arachnology, at least as regards the Linyphiidae, now seems to be in the second stage. Of course the stages outlined above are not sharply divided but grade into each other, and neither are all families on the same level. The Theridiidae are an example of a group that is much further advanced in this respect than most other groups. Ivie's work (1969) on *Bathyphantes* is a typical second stage revision. This paper on *Centromerus* is intended to function on that same second stage level.

*Centromerus* was created by Dahl in 1886 for the reception of four European species. It has been regarded as a strictly Old World genus up

to as late as 1930, when Petrunkevitch described *Centromerus ovigerus* from Puerto Rico. But that species was soon recognized by Bryant (1940: 321) as a synonym of *Nesticus pallidus* Emerton<sup>1</sup>), and thus the genus became an Old World taxon again. It is not known, of course, when exactly the American arachnologists became aware of the availability of *Centromerus* for the inclusion of some of their commonest species, but the first written proof of recognition dates from 1944, when Chamberlin & Ivie transferred *Microneta quinquedentata* to *Centromerus* and at the same time described one new species in it (*C. claytoni*). Kaston subsequently transferred several other species from *Microneta* to *Centromerus* in 1948 and was followed unanimously by most authors.

During my work on North American Linyphiidae still other species were found to belong to this genus, also some new synonymies seemed worthwhile to publish, while a few species ascribed to *Centromerus* had to be removed from that genus. Moreover, not all species were found to have been properly described or depicted, while in a few cases additional distributional data were available. It thus seemed useful to summarize all available data for North America in order to facilitate the determination of the species of that region. Notably in a time of rising interest in mass-collecting of soil-living arthropods by means of pitfall traps or Tullgren sampling for ecological research. It is one of the purposes of this paper to make readily available the distributional and taxonomical data as well as the relevant literature.

*Centromerus* in its current conception is far from homogeneous. As regards North America there are two clearly separate groups of related species. I wonder whether any taxonomist, with the eight species of this paper new and yet to be described before him, would have the courage to put them all together in one genus. However, this is not a revision of the genus, and thus it is not the place to make far-reaching decisions about its status. A revision of the genus on a world-wide basis might throw some light not only on this question, but also on the affinities with the other genera in the Microneteae and Centromereae. In this paper I merely follow Wiehle's (1956) grouping of the species. A key to the species is not given as the number of species is small and the differences are mainly found in the genitalia.

With few exceptions the species dealt with in this paper have been described, or at one time have figured, in the genus *Microneta*. More

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1) Ivie (1969: 6) still listed it in *Centromerus*, probably not aware of Bryant's results; the description of the species unquestionably points to *Nesticus pallidus* Emerton.

than in the Old World, *Microneta* once served in the New World as one of the major genera of the Linyphiidae. Not only have species been transferred to *Centromerus*; many species have been placed in other genera, while recently I have found a number of cases myself where species were out of place in *Microneta*. A list of all North American species of *Microneta* and *Centromerus* together with their present generic combinations is therefore included in the present paper. It summarizes all shifts of names and synonymies later than 1939, and thus is supplementary to Bonnet's catalogue.

The present study is part of a larger investigation of North American Linyphiidae, supported in part by Public Health Service Research Grant AI-01944, from the National Institute of Allergy and Infectious Diseases, to H. W. Levi. Material used for this study in the first place came from the Museum of Comparative Zoology at Harvard University, Cambridge, U.S.A. (abbreviated in the text as MCZ), while a few additional specimens were received on loan from the American Museum of Natural History, New York (AMNH). I want to express my sincere thanks, regrettably in this single sentence only, to the two curators of these institutions, Dr. Herbert W. Levi and Dr. John A. L. Cooke, respectively. I am much obliged also to the following persons and institutions: Dr. K. W. Brown, Peabody Museum of Natural History at Yale University, New Haven, Connecticut (YPM); Mr. D. J. Clark †, British Museum (Natural History), London (BM); Dr. Robin E. Leech, Entomology Research Institute, Ottawa, Canada (ERI); Dr. E. Sutter, Naturhistorisches Museum, Basel, Switzerland (NMB); Mr. E. Taylor, Hope Department of Entomology, University Museum, Oxford, England (HDO); and Dr. A. Triplehorn, College of Biological Sciences, Ohio State University, Columbus, Ohio (OSU). Mr. D. J. Buckle, Saskatoon, Canada, spontaneously provided specimens from his private collection. The University of Utah Collection at Salt Lake City, Utah, has been abbreviated as UUC, the Rijksmuseum van Natuurlijke Historie at Leiden, Netherlands as ML.

#### **Centromerus Dahl, 1886**

Dahl, 1886, Schr. naturwiss. Ver. Schl.-Holst., 6: 73 (diagnosis).  
Type-species: *Micryphantès aequalis* C. L. Koch, 1841.

Description. — Usually small spiders, with a maximum of 4 mm. Legs not annulated, abdomen without distinct pattern and of dull coloration. AME small, close together, PME and lateral eyes larger and of equal size, separated by one-half to one diameter, lateral eyes contiguous.

Chelicerae with, at least in males, latero-dorsal rows of minute bristles for most of their length. Stridulating files not developed. Three dorsal teeth (exceptionally more, 5-6 in *denticulatus*), five or six small teeth in ventral row.

Legs with few spines. Anterior femora bearing spines (only a single l'-spine on femur I in *tennax* and *denticulatus*), posterior femora always spineless. All tibiae with two d-spines, except tibia IV in *persolutus* and *denticulatus* where only the d''-spine is present; no ventral spines. Metatarsi I and II with a single d-spine (*denticulatus* excepted). Position of d''-spine on tibia I 0.3-0.4, in *tennax* and *denticulatus* slightly less, 0.25-0.35 and 0.25, respectively. Tm I between 0.25 and 0.40.

Male palp: cymbium often humped dorsally or produced into a horn-like projection; paracymbium moderately complex, usually with one or more teeth; median apophysis always present and well-developed, often with more than one branch; radix proximally curved in lateral direction; Fickert's gland in radix always present; embolus short with spermduct-tooth proximally of tip; lamella sickle-shaped (*cornupalpis*-group) or smaller and shaped otherwise (*sylvaticus*-group); median membrane often sclerotized at base, sometimes (*sylvaticus*-group) this plate developed into a conspicuously denticulate sclerite.

Epigyne with a rigid scape bearing a socket at its tip (*cornupalpis*-group), or with a wrinkled and probably flexible scape (*sylvaticus*-group). Opening of spermducts at base of scape (*cornupalpis*-group) or on broad apical part of scape (*sylvaticus*-group).

Remarks. — Locket & Millidge (1953) mentioned only four species out of twelve that occur in the British Isles, where the male chelicerae were found to have dorso-lateral rows of minute bristles. Wiehle (1956) found these bristles in ten out of fifteen German species. In all the eight North American species (and also in the undescribed British Columbia species) these spines are present; they are, so far, a reliable generic character in this region.

As in the Old World, the North American portion of the genus was found to be variable as to the chaetotaxy of the legs, where femur I may or may not have one or more dorsal spines, tibia I may have a l'-spine, tibia IV may lack the second dorsal spine, while the metatarsal spines of legs I and II may be absent. The spination was also found to be variable within the species, especially as to the number of spines on femur II, which may be different for males and females (cf. *latidens* and *persolutus*).

For most species, dealt with in this paper, there are strong indications that the males become adult in the fall, overwinter in the adult stage, and remain active during the spring of the following year. This is exactly what Kronestedt (1968) found in Sweden (9 species). Where Kronestedt had the opportunity, because of his own ecological research, to indicate whether the peak of male activity was found before the winter or in the spring, I had to utilize the collecting dates on the labels of relatively few samples, and the indications are much less exact in consequence. The ecological requirements of the species, too, are not easily deduced from what has been put on the labels to that effect. Only for the few species that I have collected myself, in Massachusetts for the larger part, I have the privilege to record my own observations. All species are typically ground dwellers, usually collected by sifting moss, debris, or tussocks of grasses or sedges. Nothing seems to be known about the web or behaviour.

Annotated list of all specific names described in or used in combination with *Microneta* (or *Centromerus*) in North America north of Mexico, supplementary to Bonnet's catalogue.

- aeronautica* Petrunkevitch, 1929, California = *Linyphantus aeronauticus* (Petrunkevitch) (Ivie, 1967: 130, comb. nov.). — ♂ holotype in YPM, examined. This is a senior synonym of *Linyphantus ephedrus* (Chamberlin & Ivie, 1933) **syn. nov.**, types compared.
- anopla* Chamberlin & Ivie, 1933, Utah = *Meioneta uta* (Chamberlin, 1920) **syn. nov.**, comb. nov. — Type-material (1 ♀ 1 ♂) of *Microneta anopla* in AMNH, compared with ♂ holotype of *Microneta uta* in MCZ.
- claytoni* Chamberlin & Ivie, 1944, in *Centromerus*, Georgia = *Centromerus denticulatus* (Emerton) **syn. nov.** — ♀ holotype and one ♂ paratype in AMNH, examined; 10 ♀ paratypes in UUC, not examined (see page 37).
- complicata* Banks, 1892, New York = *Lepthyphantus intricatus* (Emerton, 1911) (Emerton, 1920: 319, = *Lepthyphantus intricatus* (Emerton) comb. nov., and *Microneta complicata* Banks **syn. nov.**). — ♀ holotype in MCZ, examined. Emerton (1920: 319) already recognized this synonymy, but the two were again treated as separate species by Bonnet, who apparently overlooked Emerton's remarks on the subject. Ivie (1969: 5, 6) also maintained them as separate species, placing them both in *Lepthyphantus*. The specific name *intricatus*, though younger than *complicatus* of Banks, has to be used since the latter is preoccupied by *Lepthyphantus complicatus* (Emerton, 1882), which stands as a good species.
- cornupalpis* O. Pickard-Cambridge, 1875, in *Erigone*, Massachusetts = *Centromerus cornupalpis* (O. Pickard-Cambridge) (Kaston, 1949: 136, comb. nov.) — ♂ holotype (?) in HDO (see page 11).
- denticulata* Emerton, 1909, New England = *Centromerus denticulatus* (Emerton) (Kaston, 1948: 137, comb. nov.) — ♂ holotype in MCZ, examined (see page 37).
- emertoni* Roewer, 1940, nom. nov. pro *Microneta pallida* Emerton, 1917. — See under *pallida*.
- evadens* Chamberlin, 1925, Massachusetts = *Meioneta evadens* (Chamberlin) (Kaston, 1948: 140, comb. nov.). — ♂ holotype in MCZ, examined.

- fabra* Keyserling, 1886, in *Erigone*, Alabama and Texas = *Meioneta fabra* (Keyserling) (Kaston, 1948: 139, comb. nov.).
- fratrella* Chamberlin, 1919, in *Grammonota*, Utah = *Meioneta fratrella* (Chamberlin) (Lowrie & Gertsch, 1955: 5, comb. nov.). — ♀ holotype in MCZ, examined.
- furcata* Emerton, 1882, New Hampshire = *Centromerus furcatus* (Emerton) comb. nov. — ♂ lectotype in MCZ, examined (see page 27).
- gargopa* Crosby & Bishop, 1929, California = *Tachygyna gargopa* (Crosby & Bishop) (Ivie, 1967: 129, 130, comb. nov.). In Bonnet (1958: 3951) under *Sciastes gargopa*, following Crosby & Bishop (1936a).
- gigantea* Banks, 1892, New York = *Nesticus pallidus* Emerton (comb. nov.?). — ♀ type in MCZ, examined. In Bonnet (1958: 3144) the species is listed as synonym of *Oedothorax brunneus* (Emerton).
- heathi* Chamberlin, 1921, Alaska = *Lepthyphantes complicatus* (Emerton) (Chamberlin & Ivie, 1947: 58, = *Lepthyphantes umbraticolus* (Keyserling) syn. nov.; Holm, 1958: 57, = *Lepthyphantes complicatus* (Emerton) syn. nov.). — ♀ holotype in MCZ, examined.
- insulana* Simon, 1900, Hawaiian Islands = *Ostearius melanopygius* (O. Pickard-Cambridge) **syn. nov.** — 1 ♂ and 1 ♀ syntypes from Hawaii, Kona, and Maui, Haleakala, in BM. Though Hawaii does not belong to the Nearctic Region in the strict sense, I take this opportunity to mention this new synonym of the much discussed species *O. melanopygius*, which seems to turn up everywhere. More recently collected material of this species from Hawaii has been examined in the MCZ. The species seems well established there.
- intricatus* Emerton, 1911, in *Bathyphantes*, New Hampshire = *Lepthyphantes intricatus* (Emerton) (Emerton, 1920: 319, comb. nov.). — ♂ holotype in MCZ examined. Recently recorded in the new combination *Centromerus intricatus* (Emerton) (Freitag, Ozburn & Leech, 1969: 1329, comb. nov.), which decision I cannot follow. See also under *complicata*.
- latens* Banks, 1892, New York = *Centromerus sylvaticus* (Blackwall) (Banks, 1916: 77, = *Microneta quinquedentata* Emerton; Holm, 1945: 42, 79, = *Centromerus sylvaticus* (Blackwall)). — Original material (?) of *Microneta latens* in MCZ, examined.
- latidens* Emerton, 1882, Connecticut = *Centromerus latidens* (Emerton) (Kaston, 1948: 136, comb. nov.). — Original material (?) in MCZ, examined (see page 22).
- llanoensis* Gertsch & Davis, 1936, Texas = *Meioneta llanoensis* (Gertsch & Davis) comb. nov. — ♂ holotype in AMNH, examined.
- longibulba* Emerton, 1882, Massachusetts = *Centromerus longibulbus* (Emerton) (Kaston, 1948: 136, comb. nov.). — ♂ holotype in MCZ, examined (see page 25).
- lophophor* Chamberlin & Ivie, 1933, Utah = *Meioneta lophophor* (Chamberlin & Ivie) (Chamberlin & Ivie, 1947: 59, comb. nov.).
- luteola* Banks, 1892, New York = *Centromerus latidens* (Emerton) **syn. nov.** — ♂ holotype in MCZ, examined. In Bonnet under *Bathyphantes luteolus*, following Crosby & Bishop (1928). Ivie (1969) listed it in a new combination *Meioneta luteola* (Banks).
- maritima* Emerton, 1919, Canada (Northwest Territory) = *Meioneta maritima* (Emerton) (Leech, 1966: 186, comb. nov.). — ♂ holotype in MCZ, examined. Leech (1966: 186, footnote) suggested the synonymy of this species with *Meioneta nigripes* (Simon, 1884), but I am not convinced of this. Specimens identified by Leech with *Meioneta nigripes* (Simon), now in the MCZ collection, probably belong to *Meioneta alaskensis* Holm, but certainly not to *M. nigripes*. *Meioneta alaskensis* and *M. maritima* are closely related and but slightly different taxa, that eventually may be found to belong to one polytypic species or to one super-species.

- meridionalis* Crosby & Bishop, 1936, Southeastern United States = *Meioneta meridionalis* (Crosby & Bishop) (Whitcomb & Bell, 1965: 42, comb. nov.?).
- micaria* Emerton, 1882, in *Bathyphantes*, Connecticut = *Meioneta micaria* (Emerton) (Chamberlin & Ivie, 1944: 88, comb. nov.). — Transferred to *Microneta* by Crosby & Bishop (1936b: 47), and on authority of these authors listed as such by Bonnet (1957: 2900).
- minutissima* Banks, 1892, New York = *Meioneta angulata* (Emerton) **syn. nov.** — ♂ holotype in MCZ, examined. The specimen is very small (1.1 mm), but it unmistakably belongs to *M. angulata*.
- multesima* O. Pickard-Cambridge, 1875, in *Erigone*, Massachusetts = *Macrargus multesimus* (O. Pickard-Cambridge) (Holm, 1945: 44, comb. nov.). Transferred to *Microneta* by Banks (1910: 35). Listed under this name by Bonnet (1957: 2900).
- olivacea* Emerton, 1882, New Hampshire = *Agyneta cauta* (O. Pickard-Cambridge) (Hackman, 1954: 15, syn. nov.). — 2 ♂ syntypes in MCZ, examined.
- olivena* Barrows, 1940, Tennessee = *Meioneta angulata* (Emerton) **syn. nov.** — ♂ lectotype, by present designation, in OSU, examined; ♀ syntype lost. Three, probably topotypic, specimens also in OSU, examined.
- orcina* Emerton, 1917, British Columbia = *Linyphantes orcinus* (Emerton) (Ivie, 1967: 130, comb. nov.). — ♂ holotype in MCZ, examined. This is a senior synonym of *Linyphantes longivulvus* Chamberlin & Ivie, 1942, **syn. nov.**, which was originally described from California.
- orines* Chamberlin & Ivie, 1933, Utah. — Not seen.
- pallida* Emerton, 1917, British Columbia = *Meioneta pallida* (Emerton) comb. nov. — Type-series in MCZ, examined. ♂ lectotype, by present designation, is *M. pallida*, ♀ belongs to *Erigone*.
- persoluta* O. Pickard-Cambridge, 1875, in *Erigone*, Massachusetts = *Centromerus persolutus* (O. Pickard-Cambridge) (Kaston, 1948: 135, comb. nov.). — ♂ lectotype, designated in this paper, in HDO; ♀ paralectotype, also in HDO, belongs to *Microneta viaria* (Blackwall) (see page 18).
- pinnata* Emerton, 1915, Canada (Saskatchewan) = *Allomengea pinnata* (Emerton) (Ivie, 1967: 130, comb. nov.). — ♂ holotype in MCZ, examined.
- protrudens* Chamberlin & Ivie, 1933, Utah. — Type in AMNH, not examined.
- quinquedentata* Emerton, 1882, Canada and U.S.A. = *Centromerus sylvaticus* (Blackwall) (Holm, 1945: 42, 79, syn. nov.). — Original material in MCZ, examined (see page 31).
- serrata* Emerton, 1909, "New England" = *Meioneta serrata* (Emerton) comb. nov. — Original (?) ♂ specimen from Boston, Massachusetts, in MCZ, examined. According to Kaston (1948: 137) this species belongs in *Centromerus*, but I do not agree. It is a senior synonym of *Meioneta beaufortensis* Barnes, 1953, described from North Carolina (2 ♂ type-specimens in AMNH, examined) **syn. nov.**
- soltaii* Banks, 1901, New Mexico = *Microneta viaria* (Blackwall) **syn. nov.** — Type-series (2 ♀ 2 ♂) in MCZ, examined.
- tennapax* Barrows, 1940, Tennessee = *Centromerus tennapax* (Barrows) comb. nov. — ♂ lectotype and ♀ paralectotype, by present designation, in OSU, examined (see page 14).
- tumoa* Chamberlin & Ivie, 1933, Utah = *Meioneta tumoa* (Chamberlin & Ivie) (Chamberlin & Ivie, 1947: 60, comb. nov.).
- ululabilis* Keyserling, 1886, in *Erigone*, Alaska = *Oreonetides vaginatus* (Thorell) **syn. nov.** — 2 ♀ syntypes (?; label reads "Kanaga, Aleuten", in original publication "Sitka, Alaska") in Marx Collection, at present in AMNH. Already mentioned in the combination *Oreonetides ululabilis* (Keyserling) by Chamberlin & Ivie (1947: 9, 10, 60).

*uta* Chamberlin, 1920, Utah = *Meioneta uta* (Chamberlin) comb. nov. — ♂ holotype in MCZ, examined. *Microneta anopla* Chamberlin & Ivie is a junior synonym.  
*viaria* Blackwall, 1841, in *Neriene*, mentioned from the United States for the first time by O. Pickard-Cambridge (1875). Remains in *Microneta*, of which it is the type-species.

Expecting to discover that *Centromeroides modestus*, described by Schenkel (1950) from California, after all would be a *Centromerus* I checked the ♀ holotype, with the following results.

*modestus* Schenkel, 1950, in *Centromeroides*, California = *Linyphantes aeronauticus* (Petrunkevitch, 1929) syn. nov., which is a senior synonym of *Linyphantes ephedrus* (Chamberlin & Ivie, 1933), as published in this paper (see above). — ♀ holotype in NMB, examined. *Centromeroides* Schenkel, 1950, a monotypic genus, consequently falls into synonymy with *Linyphantes* Chamberlin & Ivie, 1942.  
**Syn. nov.**

#### The *Centromerus cornupalpis* group

### *Centromerus cornupalpis* (O. Pickard-Cambridge, 1875) (figs. 1-5)

*Erigone cornupalpis* O. Pickard-Cambridge, 1875, Proc. Zool. Soc. London, 1875: 401, pl. 46 fig. 8 (descr. ♂, Massachusetts).

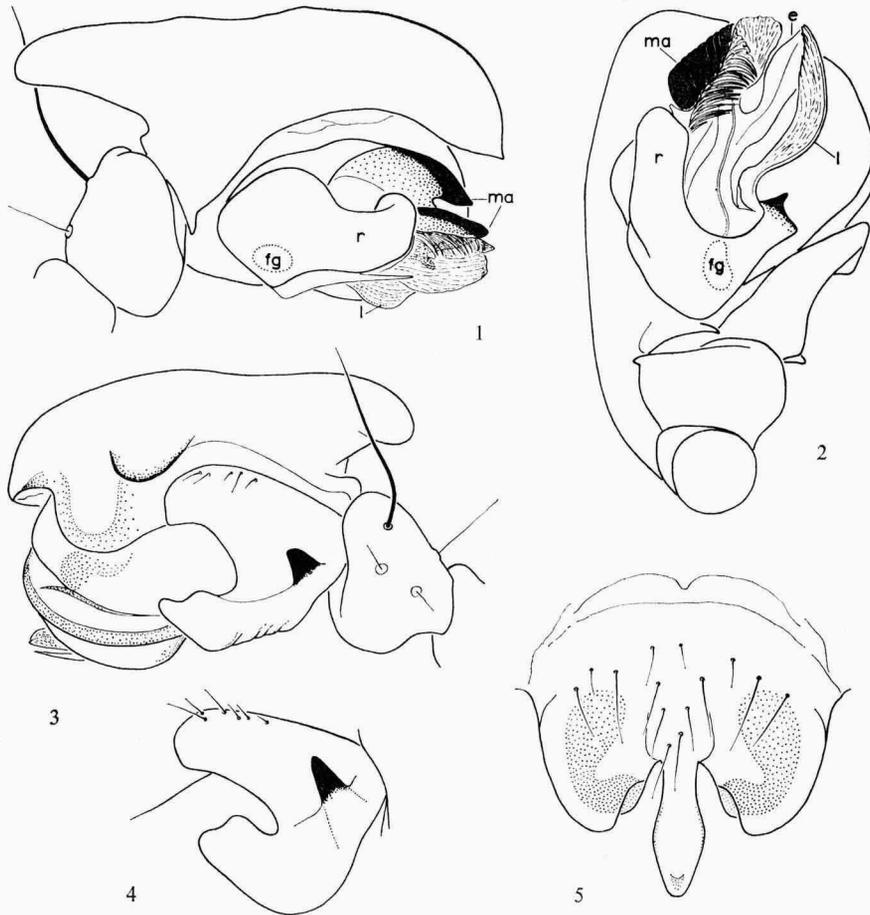
*Microneta cornupalpis*; Emerton, 1882, Proc. Connecticut Acad. Arts Sci., 6: 74, pl. 23 fig. 2 (descr. ♀ ♂, Massachusetts, Connecticut). — Elliott, 1953, Proc. Indiana Acad. Sci., 62: 310 (Indiana). — Jones, 1940, Trans. Illinois Acad. Sci., 33: 218 (Illinois). — Gibson, 1945, Journ. Tennessee Acad. Sci., 20: 215 (Tennessee); 1947, Ohio Journ. Sci., 47: 39 (Tennessee). — Muma, 1945, Bull. Univ. Maryland Agric. Exper. Stat., A 38: 33 (Maryland). — Rapp, 1946, Journ. New York Ent. Soc., 54: 318 (Illinois).

*Centromerus cornupalpis*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 136, pl. 16 figs. 316-318 (Connecticut). — Levi & Levi, 1951, Zoologica, New York, 36: 220 (?; Wyoming). — Hackman, 1954, Acta Zool. Fennica, 79: 56 (Newfoundland). — Lowrie & Gertsch, 1955, Amer. Mus. Novit., 1736: 5 (Wyoming; rare). — Levi et al., 1958, Trans. Wisconsin Acad. Sci., 47: 45 (Wisconsin). — Cannon, 1965, Ohio Journ. Sci., 65: 103 (Ohio). — Peck, 1966, Amer. Midland Natur., 76: 154 (Missouri). — Drew, 1967, Publ. Michigan St. Univ. Mus., Biol. Ser., 3: 170 (Michigan). — Vogel, 1968, Journ. New York Ent. Soc., 76: 102 (Pennsylvania).

*Microneta complicata*; Levi & Field, 1954, Amer. Midland Natur., 51: 446, fig. 21 (♀ only, ♂ is *Lepthyphantes intricatus*; Wisconsin).

For references up to 1940 see Bonnet (1957: 2898) under *Microneta cornupalpis*.

Type. — The species was described as *Erigone cornupalpis* from a single male specimen, that came from Brookline, Massachusetts, 1870, sent to O. Pickard-Cambridge by Emerton. The specimen probably came from the surroundings of Hammonds Pond, a favourite collecting site of Emerton that still exists in a more or less unchanged condition. It is a swampy mixed forest with patches of sphagnum, and beech forest on the



Figs. 1-5. *Centromerus cornupalpis*. 1-3, male palp, mesal, ventral, and lateral aspects, respectively (*fg* = Fickert's gland); 4, paracymbium of male palp, latero-ventral aspect; 5, epigyne. 1-5, X 120.

higher surrounding parts. In the Pickard-Cambridge collection in the Hope Department of Entomology, Oxford, England, there is a single vial present of this species with two specimens (1 ♀ 1 ♂), that come from "N. America var. locs., Emerton vid. letters" (not examined, personal information from Mr. Taylor at Oxford). As Pickard-Cambridge mentioned a single male specimen it is not very likely that the male specimen in the vial is the holotype. Moreover the vial is stored in bottle 574 that also contained the non-typical specimens of *Centromerus persolutus* (see under heading "Type"

at that species), and it is not unlikely that the contents of that bottle were received from Emerton at a later time. Bottle 655, holding the vial with the supposed type-series of *Erigone persoluta*, does not contain any specimens of *C. cornupalpis*.

From the illustrations in Levi & Field (1954: figs. 21-23) it is quite clear that the female of *Centromerus cornupalpis* was mistakenly associated with the male of *Microneta complicata* Banks (= *Lepthyphantes intricatus* (Emerton)). Apparently both species occur in that region, but the corresponding sexes were not collected, or not recognized.

Measurements. — Male, total length 2.0-2.8 mm, length cephalothorax 0.97-1.30 mm, width 0.75-1.0 mm, length chelicerae 0.37-0.52 mm, width 0.19-0.25 mm. Female, total length 2.0-2.6 mm, length cephalothorax 0.85-1.10 mm, width 0.60-0.79 mm, length chelicerae 0.34-0.45 mm, width 0.17-0.20 mm.

Cephalothorax, chelicerae, and legs light brown, lightly suffused with grey locally, e.g. at apical margins of coxae and lateral margins of thorax, which pigmentation, however, is not present in all specimens. Underside more strongly suffused with grey, on sternum and mouthparts as well as on abdomen. Dorsal and lateral surfaces of abdomen grey with faint indications of light transverse bars posteriorly and with transverse rows of light spots as in *C. latidens*.

Eyes with the typical arrangement of this species-group. Posterior median eyes half a diameter apart and at same distance from laterals, diameter of all eyes except AME measuring 0.075 mm. AME smaller (0.05 mm), half a diameter apart and three-fourths of a diameter from the ALE. Height of clypeus 0.16 of length of cephalothorax.

Chelicerae of male with the characteristic latero-dorsal rows of minute stubby bristles. In the females these rows also present but spines very minute, wartlike, and reduced in number. Dorsal row with three teeth, ventral row with five small denticles close together at the level of the interstice between second and third dorsal teeth.

Legs fairly slender, femora about as long as cephalothorax (0.95-1.05), ratio l/d of tibia I 6.0-7.0 in ♀, 7.5-8.5 in ♂. Femur I with one d-spine and one l'-spine, femur II with a single d-spine; in male specimens this spine sometimes present on one side only or, rarely, both femora of the second pair of legs spineless; in most female specimens femora II spineless, rarely a d-spine present on one or both sides. Posterior femora spineless. All tibiae with two d-spines, position of basalmost d-spine (d''-spine) on tibia I about 0.4. Tibial spines on anterior legs weakly developed and rather

hairlike, up to 1.5 diams. of segment long; on posterior legs spines much stronger but equally long. Metatarsi I and II with single short dorsal spines on half length. Tm I 0.33-0.36.

Male palp (figs. 1-4) characterized by the long proximo-dorsal horn on the cymbium, which curves lightly outwards at its tip. Proximal end of paracymbium rounded, in the lateral view concealed by the apical rim of the tibia; a strong, conical tooth present halfway between proximal tip and ventral branch; tip of the latter truncated, apical margin lightly emarginate. Median apophysis (*ma*) with a tooth-like dorsal part and a plate-like ventral projection, the latter with serrate margins. Radix (*r*) with a strong mesal branch, a rounded proximal margin, and with a narrow lateral branch that ends with two short conical teeth on the corners of the truncate tip; lamella (*l*) arising from just below tip of lateral branch at the inner bend of the element; no lateral projection present between base of lamella and lateral tip of radix (cf. *C. tennapax*), in this respect resembling *C. furcata*. Embolus (*e*) with a rather basally situated spermduct-tooth.

Epigyne (fig. 5) resembling that of *C. tennapax*, but the scape for the larger part (half of its length or more) lying in front of a line between the postero-lateral corners of the epigyne, these corners projecting strongly in posterior direction. Entrances of spermducts situated at mesal sides of projecting lateral parts of scape, facing the narrow finger-like median projection. Total width of epigyne 0.26-0.32 mm, length of free, narrow part of scape 0.14-0.17 mm.

Distribution. — *Centromerus cornupalpis* certainly is one of the common species in the northeastern part of North America, occurring in the wet and decaying leaf-litter stratum of swampy forests. It was collected by myself in large quantities in all habitats of this type around Boston in late fall, winter and spring. Records in the literature range from Newfoundland (Hackman, 1954) to as far south as North Carolina (Banks, 1911; also in this paper) and Tennessee (Gibson, 1945, 1947); in the west records come from Missouri (Peck, 1966), Illinois (Weese, 1924; Holmquist, 1926; Jones, 1940; Rapp, 1946), and Wisconsin (Levi & Field, 1954, sub *Microneta complicata*; Levi et al., 1958). The species has been mentioned from most states in between, to the west there is a gap, at least one in literature, between this northeastern area and a few isolated records from Utah (Chamberlin & Ivie, 1933) and Wyoming (probable record, Levi & Levi, 1951; Lowrie & Gertsch, 1955, rare). Of course this coincides with the relatively poor knowledge of the spider fauna of the Great Plains.

The best indicator of the mating-period of a species is to check the collecting data for the males. All males have been found from October to December and from March to May. It probably is the snow cover rather than the absence of males that has prevented collectors to supply midwinter records, and the species most likely occurs in the adult stage from late fall through the winter till spring, adult females even as late as May. It thus fits very well into the periodicity which seems to be typical for the genus.

#### Material examined.

Many samples have been examined from Massachusetts, New York and Michigan, fewer samples from New Hampshire, Connecticut, Ohio and Illinois (most in MCZ, a fair number from Massachusetts in MI.). Also from the following states.

Virginia. — 6 ♂, Alexandria, R. V. Chamberlin (MCZ). — 8 ♂, Falls Church, N. Banks (MCZ).

North Carolina. — 1 ♂, Durham Co., junction of Co. Road 1116 and Chapel Hill Blvd., mixed broomsedge and young pine, pitfalls, 2.iv.1964, J. W. Berry (MCZ).

Missouri. — 2 ♀, Williamsville, 5.xi.1969-17.ii.1970, Malaise trap, J. T. Becker (ERI).

Wisconsin. — 1 ♂, Grant Co., Wyalusing State Park, litter, 23.x.1954, H. W. Levi (MCZ). — 1 ♀, Jefferson Co., bog near Cambridge, sphagnum, 20.iv.1956, H. W. Levi (identified as *Microneta complicata* Banks; MCZ).

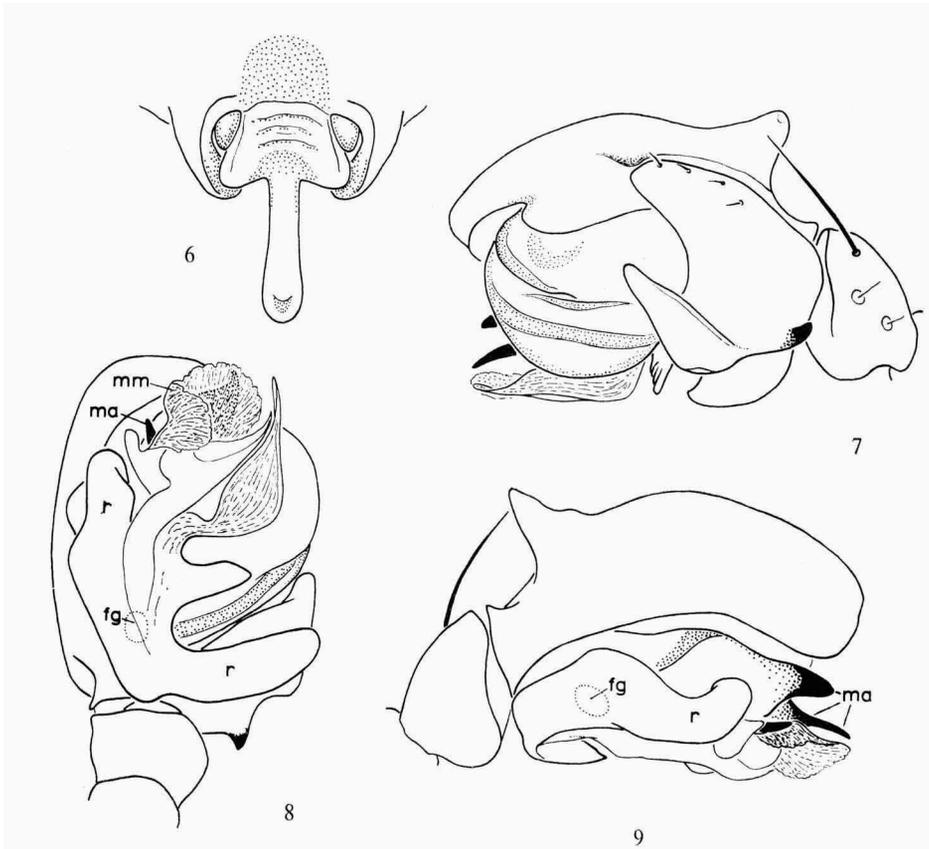
#### **Centromerus tennapax** (Barrows, 1940) comb. nov. (figs. 6-9)

*Microneta tennapax* Barrows, 1940, Ohio Journ. Sci., 40: 136, figs. 9, 9a, 9c (descr. ♂ ♀, Tennessee). — Vogel, 1967, Mem. Amer. Ent. Soc., 23: 98 (catalog.).

Types. — ♂ lectotype and 1 ♀ paralectotype, by present designation, from Tennessee, Great Smoky Mountains National Park, Clingmans Dome, summit (appr. 6600 ft.), 19.iii.1937, W. M. Barrows (?) (OSU).

The Barrows Collection at the College of Biological Sciences, Ohio State University, Columbus, Ohio, contains only one female and one male specimen, of which all the information on the label corresponds in detail with that given with the original description, except for the number of specimens. Barrows mentioned "several males and females", and that is more than one specimen of each sex. The male is herewith designated as lectotype.

There is, however, a second vial in the same collection, containing two males from the same locality but collected earlier, viz., on 5 September, 1936. A second label, with the same locality, but giving 6 September 1936 as



Figs. 6-9. *Centromerus tennapax*. 6, epigyne; 7-9, male palp, lateral, ventral, and mesal aspects, respectively (*fg* = Fickert's gland). 6-9, X 133.

collecting date, bears the female symbol, but a female could not be found. Still another vial, holding a single female, agrees as to the collecting date, but comes from the Indian Gap, also in the Smoky Mountains. Because of the disagreement as to the collecting dates, or in the other case the locality, I do not regard the contents of these vials as belonging to the type series, even though it is not unthinkable that Barrows included them in his description, what then might explain the use of the plural form to indicate the number of specimens available to him.

The species was first described from the Great Smoky Mountains National Park, but it can now be stated to occur also further north in Ohio and New York. Data as to the ecological preferences of the species could not be traced from the labels.

Barrows compared *Microneta tennapax* with *M. latidens* Emerton, and

especially compared the median apophyses ("black teeth on end of palp" or "palpal spines") of the two species. It clearly fits into the group of *cornupalpis*, *persolutus*, *longibulbus* and *latidens*, all of which, incidentally, were formerly placed in *Microneta*. A short description follows here.

Measurements. — Male, total length 1.85-2.35 mm, length cephalothorax 0.95-1.20 mm, width 0.75-0.90 mm, length chelicerae 0.38-0.50 mm, width 0.19-0.24 mm. Female, total length 1.80-2.35 mm, length cephalothorax 0.92-1.00 mm, width 0.70-0.77 mm, length chelicerae 0.36-0.38 mm, width 0.20-0.21 mm.

Cephalothorax and appendages brown with grey suffusion forming striae and a dorsal shield-shaped spot on the cephalothorax, and faint subapical rings on femora and tibiae. Chelicerae brown as cephalothorax sternum and mouth-parts a shade darker. Abdomen grey with a brown tinge.

Eyes. Diameter of PME measuring 0.06 mm, lateral eyes of same size. All posterior eyes separated from each other by half a diameter. Anterior eyes separated by two-thirds of the diameter of an AME, which measures 0.04 mm or slightly less.

Chelicerae of male with a latero-dorsal row of minute spines on basal three-fourths, as is typical for *Centromerus*. Dorsal row with 3 teeth in both sexes. No stridulating files visible.

Legs rather stout, femur I shorter than cephalothorax ( $\delta$  0.9,  $\text{♀}$  0.9-1.0), tibia I about as long as femur I and fairly stout (l/d 6.5-7.5 in  $\delta$ , 6.0-7.0 in  $\text{♀}$ ). Femur I with a l'-spine, femur II with a d-spine, posterior femora spineless. All tibiae with 2 d-spines, no lateral spines, position of basal-most spine on tibia I 0.28-0.36. Tibial spines on anterior legs very thin, hair-like, 1.4-1.6 diams. of tibia long. Spines on tibiae III-IV more robust and also longer, up to 3 diams. of tibia. Metatarsi I-II with a single short spine on half length. Tm I 0.35-0.38.

Male palp (figs. 7-9) characterized by the moderately horned cymbium and the shape of the paracymbium. Horn on cymbium moderately slender and curved in retro-lateral directions at extreme tip. Distal branch of paracymbium tapering to a blunt tip, a short conical tooth at proximo-ventral corner of element pointing backwards. Median apophysis with three distal branches, viz., a broad dorsal one, a very slender lateral one, and a sharply tipped meso-ventral one. Proximal side-branch of radix ( $r$ ) perpendicular to main part, about straight, slender, with rounded tip, lateral projection between this branch and lamella half as long and truncated obliquely. Median membrane ( $mm$ ) with a small and barely sclerotized lobe at base, visible

in the ventral aspect (fig. 8) just distally of the radix (homologue of the serrate chitinous sclerite in *C. sylvaticus*?).

Epigyne (fig. 6) resembling that of *C. cornupalpis* (O. Pickard-Cambridge) but differing in the following points. The posterior margin of the broad basal part of the scape lying about at the same level as the posterolateral corners of the epigyne, the narrow part of the scape thus projecting for about its full length. In *cornupalpis* the broad part of the scape ends much more anteriorly, and the narrow apical part of the scape consequently lies for half of its length or more in front of the line between the posterolateral corners of the epigyne (compare figs. 5 and 6).

#### Material examined.

New York. — 1 ♂, Ithaca, Coy Glen, 23.v.1911, N. Banks (MCZ). 1 ♀, Ithaca, N. Banks (MCZ).

Ohio. — 1 ♀, Hocking Co., Clear Creek, 14.v.1941, W. M. Barrows (OSU).

Tennessee. — 1 ♀ 1 ♂, Great Smoky Mountains National Park, Clingmans Dome, appr. 6600 ft., 19.iii.1937, W. M. Barrows (♂ lectotype and ♀ paralectotype of *Microneta tennapar*; OSU). 2 ♂, same locality, 5.ix.1936, W. M. Barrows (OSU). 1 ♀, Great Smoky Mountains National Park, Indian Gap, 19.iii.1937, W. M. Barrows (OSU). 1 ♀, Great Smoky Mountains National Park, Newfound Gap, 30.viii.1930, N. Banks (MCZ). 1 ♀ 1 ♂, Great Smoky Mountains National Park, 15.iv.1935, A. M. Chickering (MCZ).

#### **Centromerus persolutus** (O. Pickard-Cambridge, 1875) (figs. 10-13)

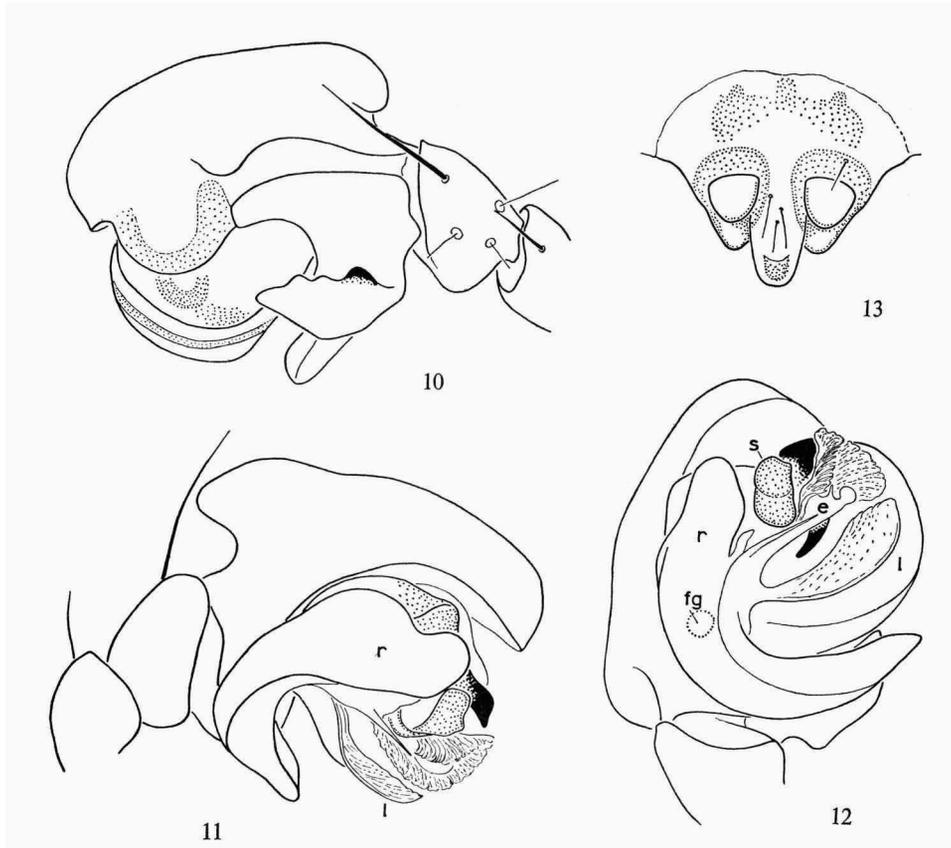
*Erigone persoluta* O. Pickard-Cambridge, 1875, Proc. Zool. Soc. London, 1875: 400, pl. 46 figs. 7a-c (descr. ♂, Massachusetts; ♀ belongs to *Microneta viaria* (Blackwall), see below).

*Microneta persoluta*; Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 74, pl. 23 fig. 3 (descr. ♀ ♂, Massachusetts, New Hampshire); 1909, Trans. Connecticut Acad. Arts Sci., 14: 197, pl. 4 fig. 11 (new figures of genitalia).

*Centromerus persolutus*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 135, pl. 17 figs. 334-338 (Connecticut). — Hackman, 1954, Acta Zool. Fennica, 79: 56 (Newfoundland). — Levi & Field, 1954, Amer. Midland Natur., 51: 444 (Wisconsin). — Drew, 1967, Publ. Mich. St. Univ. Mus., Biol. Ser. 3: 170 (Michigan). — Freitag, Ozburn & Leech, 1969, Canad. Ent., 101: 1331 (Ontario).

For a complete list of references up to 1940, see Bonnet (1957: 2901) under *Microneta persoluta*.

Type. — The species was described from specimens that came from Swampscott north of Boston, Essex Co., collected in March 1874 by J. H. Emerton and sent to Pickard-Cambridge. In the Pickard-Cambridge collection, at the Hope Department of Entomology, Oxford, there are at present two vials referring to *Erigone persoluta* and holding specimens that, according to their labels, came from Emerton. One tube (bottle 574,



Figs. 10-13. *Centromerus persolutus*. 10-12, male palp, lateral, mesal, and ventral aspects, respectively (*fg* = Fickert's gland); 13, epigyne. 10-13, X 133.

vial 36: 2 ♂) comes from "N. America var. locs., Emerton vid. letters"; both specimens belong to *Centromerus persolutus*. The other vial (bottle 655, vial B: 1 ♀ 1 ♂) comes from a bottle labelled "Boston, U.S.A., Emerton"; the ♂ corresponds with the current conception of *C. persolutus*, while the ♀ belongs to another species, viz., *Microneta viaria* (Blackwall). This is indeed what I expected to find, as the figure of the epigyne in Pickard-Cambridge's description (1875: fig. 7d) was done well enough to recognize *Microneta viaria*. From the agreement of the two species present in this second vial with the two species depicted by Pickard-Cambridge, taking into account also the data on the bottle label, we may safely infer that this second vial contains the original specimens. The ♂ is herewith designated as lectotype.

*C. persolutus* is a small species that is not uncommonly found in leaf-litter, but not necessarily in wet places (cf. *C. cornupalpis*). The genitalia have been depicted, apart from Pickard-Cambridge's illustrations, by Emerton in 1882, and again in 1909 from under a more usual angle. New figures giving several aspects of the palp are given in this paper.

Measurements. — Male, total length 1.75-2.2 mm, length cephalothorax 0.82-1.00 mm, width 0.65-0.77 mm, length chelicerae 0.35-0.41 mm, width 0.17-0.19 mm. Female, total length 1.5-1.8 mm, length cephalothorax 0.70-0.77 mm, width 0.52-0.57 mm, length chelicerae 0.29-0.31 mm, width 0.15-0.16 mm.

Light brown to brown with grey to dark grey abdomen. Cephalothorax with narrow grey lateral margins and faint striae, legs and chelicerae lightly suffused with grey. Sternum and coxae more heavily suffused with grey, not much lighter than abdomen. No regular pattern visible on dorsal surface of abdomen, but some faint spots sometimes discernible.

AME small, their diameter measuring slightly less than 0.04 mm, separated from each other by two-thirds of a diameter and by the same distance from the laterals. All other eyes about equal in size, diameter of PME 0.06 mm, interstices between eyes of posterior row three-fifths of a diameter. Height of clypeus 0.16 of length of cephalothorax.

Chelicerae of male with the characteristic latero-dorsal row of minute conical setae from one-fourth to three-fourths of length. Male and female chelicerae with three fair-sized dorsal teeth and five to six very small and closely set denticles in the ventral row opposite to the third dorsal tooth.

Legs comparatively short and stout. Femur I shorter than cephalothorax (0.8-0.85 in ♂ and ♀), tibia I slightly shorter than femur I and stout ( $l/d$  5.5-6.0 in ♂, 5.0-5.5 in ♀). Chaetotaxy of male: femur I with one d-spine and one l'-spine, femur II usually with one d-spine, other femora spineless. Tibiae I-III with two d-spines, but tibia IV with a d''-spine only. Basalmost d-spine on tibia I on 0.35-0.4 of length. Metatarsi I-II with a single d-spine on 0.55 of length. Chaetotaxy of female differing from that of male as has been found also for *C. latidens*: femur I with a l'-spine only, the d-spine never present, femur II usually spineless or, very rarely, with a d-spine. In the male femur II with a d-spine in most specimens, sometimes on one side only, exceptionally both femora II spineless. Tibial spines of anterior legs weakly developed, as long as or slightly longer than diameter of segment, on posterior legs spines strong and between 1.5 and 2.0 diams. of segment long. Tm 0.36-0.42.

Male palp (figs. 10-12) with the cymbium only shortly horned. Paracymbium bearing a plump conical tooth at the proximal end of the dorsal margin of the ventral branch, which otherwise bears two small lobe-like dents; tip of ventral branch sharp. Proximal margin of paracymbium lightly emarginate at either side of a blunt protrusion in the middle that points backwards. Radix (*r*) evenly curved from rounded anterior tip to tapering and slightly compressed and blade-like latero-ventral tip, the lamella (*l*) and embolus (*e*) arising from the concave side of the element. Median apophysis with an apical branch and with a slender curved branch, curving backwards and visible in the ventral aspect between embolus and lamella. A basal sclerite (*s*) of the median membrane visible next to the anterior tip of the radix, small, oblong to oval.

Epigyne (fig. 13) of same structure as that of *C. latidens*, but much smaller and with shorter scape. Width measuring 0.12-0.15 mm, length of scape 0.11-0.13 mm, width of scape 0.05-0.06 mm.

Distribution. — *Centromerus persolutus* is a northern Nearctic species with New York, Michigan and Wisconsin as southern and western boundaries of its area. Recorded from Newfoundland, Ontario, Quebec, Maine (this paper), New Hampshire, Massachusetts and Connecticut. An isolated find in Saskatchewan indicates that the species also occurs farther to the west.

A species that is found in the adult stage from September through the winter till early May (males) with some summer records (females), the latter probably late survivors of their generation. Ecological data, as far as available, point to the leaf-litter stratum, also in the drier types of forest, in contrast to *C. cornupalpis*, while there are a few records from sphagnum. The species is easily collected by sifting debris in such places.

#### Material examined.

Maine. — 2♀, Orono, 1924, leg. Blake (MCZ).

Saskatchewan. — 1♀, Lady Lake, 4.v.1970, willow-alder swamp, D. J. Buckle (private collection of Mr. D. J. Buckle).

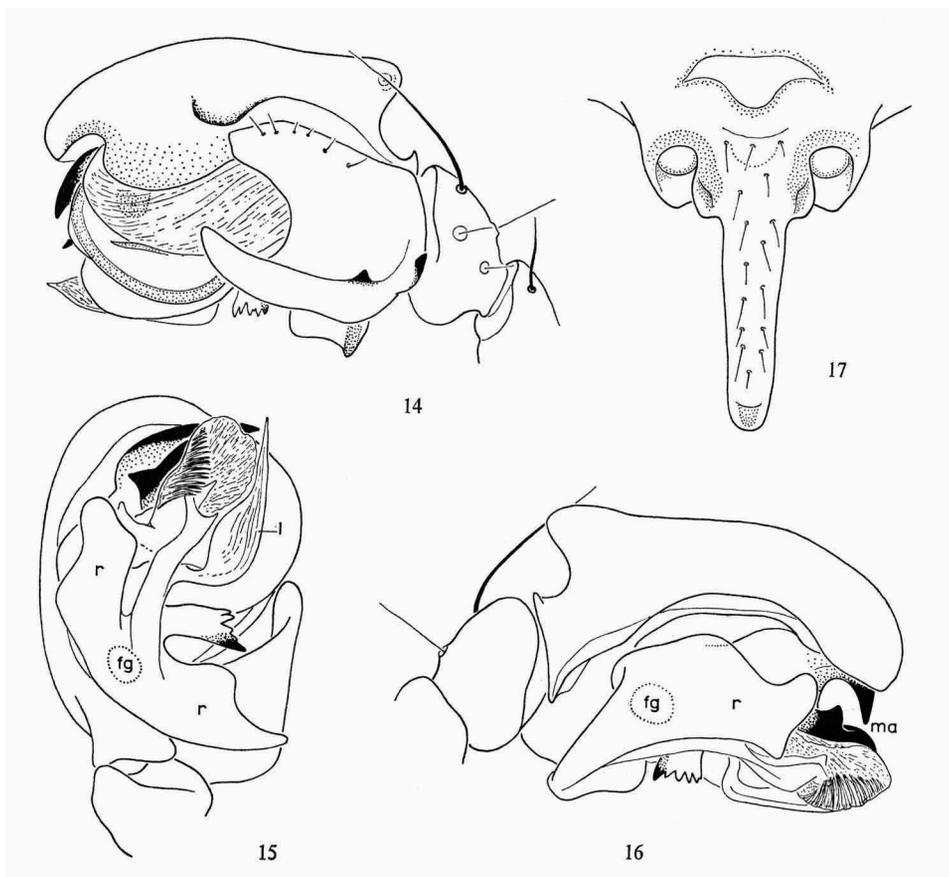
Besides the two vials in the Pickard-Cambridge collection at Oxford (HDO), mentioned under "Type", and the specimens from Maine and Saskatchewan, mentioned here as first records for these states, I have seen numerous samples from New Hampshire (MCZ and ML), Massachusetts (MCZ and ML), Michigan (MCZ) and Wisconsin (MCZ), and a few samples from New York (MCZ). The species appears to be quite common in all these areas.

**Centromerus latidens** (Emerton, 1882)

(figs. 14-17)

*Microneta latidens* Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 76, pl. 24 fig. 4 (descr. ♂, Connecticut). — Archer, 1940, Journ. Alabama Acad. Sci., 12: 28 (Alabama, cave). — Kurata, 1941, Univ. Toronto Studies Biol., 48: 110 (faunal list, Ontario, Canada). — Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35 (9): 93 (Georgia). — Gibson, 1945, Journ. Tennessee Acad. Sci., 20: 215 (Tennessee). — Dowdy, 1955, Ann. Ent. Soc. Amer., 48: 82 (Missouri).

*Centromerus latidens*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 136, pl. 17 figs. 325-329 (descr. ♀ ♂, Connecticut). — Hackman, 1954, Acta Zool. Fennica, 79: 56 (Newfoundland). — Peck, 1966, Amer. Midland Natur., 76: 154 (Missouri). — Peck, 1970, Florida Ent., 53: 204 (Florida, cave). — Vogel, 1968, Journ. New York Ent. Soc., 76: 102 (W. Virginia). — Barr, 1968, Int. Journ. Speleol., 3: 164 (Kentucky, Mammoth Cave).



Figs. 14-17. *Centromerus latidens*. 14-16, male palp, lateral, ventral, and mesal aspects, respectively (fg = Fickert's gland); 17, epigyne. 14-16, X 114; 17, X 120.

*Microneta luteola* Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892: 47, pl. 2 fig. 48 (descr. ♂, New York); 1910, Bull. U.S. Nat. Mus., 72: 35 (catalog.); 1916, Proc. Acad. Nat. Sci. Philadelphia, 68: 77, pl. 10 fig. 2 (New York; might belong to *Bathyphantes*?). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 258 (catalog.).

**Syn. nov.**

*Bathyphantes luteolus*; Crosby & Bishop, 1928, Mem. Cornell Univ. Agric. Exper. Stat., 101: 1043 (New York).

*Meioneta luteola*; Ivie, 1969, Amer. Mus. Novit., 2364: 6 (removed from *Bathyphantes*).

For complete list of references up to 1940 see Bonnet (1957: 2900) under *Microneta latidens*.

Types. — Two vials are present in the collection of the Museum of Comparative Zoology at Cambridge which, according to the data on their labels, might represent original specimens of Emerton's *Microneta latidens*. One vial contains 1 ♀ and 2 ♂ specimens and is labelled: Connecticut, New Haven, December 1880, J. H. Emerton. The second vial, with 1 ♀ and 3 ♂, shows the same data on its label, with a more precise locality added: Pine Swamp. Emerton's original description (1882) deals only with the male, while females were probably not available, as may be inferred from the absence of any remark about the epigyne in his first description of the species. As both vials mentioned above are the only ones that bear collecting dates previous to 1882, but both contain females as well as males, we must conclude that either the original sample with one or more males got lost, or Emerton later added newly collected females to the original sample.

A single male specimen of *Microneta luteola* Banks, in bad shape and with only one loose palp left, according to its label comes from New York, Ithaca, N. Banks (MCZ). This agrees with the type-locality given in Banks' paper (1892) and the specimen safely can be treated as the holotype. Banks himself (1916) considered the possibility to transfer the species to *Bathyphantes*, and Crosby & Bishop (1928) followed that suggestion. Ivie (1969) placed it in *Meioneta*, without any comment. However, it is most probable that he has examined the specimen mentioned above — even though he does not say so in his paper — as he has received on loan all types of the Museum of Comparative Zoology pertaining to *Bathyphantes* in the course of his study of that genus. It undoubtedly belongs to *Centromerus*, and is conspecific with *C. latidens*.

The species has been depicted previously by Emerton (1882: pl. 24 fig. 4; 1909: pl. 4 fig. 12), while Kaston (1948) used Emerton's 1909 figures for his "Spiders of Connecticut". For the sake of completeness I add my own drawings here to the following description.

Measurements. — Male, total length 2.1-2.5 mm, length cephalothorax 1.0-1.2 mm, width 0.77-0.95 mm, length chelicerae 0.41-0.52 mm, width 0.19-0.22 mm. Female, total length 2.0-2.4 mm, length cephalothorax 0.82-0.97 mm, width 0.60-0.70 mm, length chelicerae 0.36-0.41 mm, width 0.16-0.20 mm.

Legs, chelicerae, and cephalothorax light brown, the latter with narrow grey lateral margins and faint striae. Sternum, gnathocoxae, and labium with dark grey suffusion. Abdomen light to dark grey, ventrally usually darker than dorsally. A light triangular spot or transverse bar usually present above spinnerets. In not too old specimens there are four rows of small light spots dorsally on the abdomen, as depicted by Emerton (1909: pl. 4 fig. 12) (see also Kaston, 1948: fig. 325).

Eyes as in other species of this group, AME small and close together, others large and subequal, the eyes in the posterior row separated from each other by two-thirds of the diameter of the PME, which measures 0.070 mm. Height of clypeus 0.15 of length of cephalothorax.

Chelicerae of male with a row of minute bristle-hairs dorso-laterally, as is characteristic for this group. Dorsal margin with three teeth, ventral margin with five closely set and minute denticles opposite to the interstice of second and third dorsal teeth.

Legs fairly slender. Femur I as long as cephalothorax (♀) or slightly longer (♂), tibia I slender in the male, less so in the female (l/d 9-10 in ♂, around 7.5 in ♀). Chaetotaxy of male: femur I with one d- and one l'-spine, femur II with a d-spine only, other femora without spines. All tibiae with two d-spines, the basalmost (d''-spine) on tibia I on 0.4 of length of segment. Metatarsi I-II with a single d-spine on half length. Chaetotaxy of female: femur I with a single l'-spine, II-IV spineless, otherwise as in male. Spines on tibiae in male about as long as diameter of segment, on tibiae I-II weakly developed. In the female the spines are longer (1.5 diam.), but equally weak. Tm I 0.31-0.35.

Male palp (figs. 14-16) closely resembling those of the other species of this group. Horn on the cymbium slightly more obtuse than in *C. tennapax*, equally curved retro-laterally at tip. Paracymbium longer than high, bearing a small upright tooth on its posterior margin (as in *C. tennapax*), and a second denticle on the upper ridge of the ventral branch of the element slightly in front of the first tooth. Median apophysis (*ma*) with a long and slender dorsal branch which points outwards, other branches shorter and conical. Radix (*r*) evenly curved, proximal tip (in the unexpanded palp) tapering, lateral projection between proximal tip and base of lamella (*l*)

much longer than wide and serrate at outer margin. Retro-lateral margin of radix between lateral projection and proximal tip carinate. Palp most conveniently characterized by the shape of the radix and its lateral projection.

Epigyne (fig. 17) with long scape reaching halfway to spinnerets. Scape hairy to as far as just proximally of the socket at tip. Length of scape 0.32-0.36 mm, width at base 0.15 mm, total width of epigyne 0.23-0.25 mm.

Distribution. — *Centromerus latidens* has been recorded from the following provinces and states in Canada and the U.S.A.: Newfoundland (Hackman, 1954), Ontario (Kurata, 1941), New Hampshire (Emerton, 1913), Connecticut (Emerton, 1882), New York (Crosby & Bishop, 1928), Ohio (Barrows, 1924), W. Virginia (Vogel, 1968), Tennessee (Gibson, 1945), Georgia (Chamberlin & Ivie, 1944), Florida (Peck, 1970, cavernicolous), Alabama (Archer, 1940, cavernicolous), and Missouri (Dowdy, 1955; Peck, 1966). Additional records are given below from Maryland, Michigan and Texas. Many samples are also present, in the collection of the Museum of Comparative Zoology, from Massachusetts, and several from New York and Connecticut. We may summarize the distribution of this species, as far as known till now, as eastern and southeastern North America.

The species is easily collected by sifting litter in woods, and its occurrence in caves certainly is not obligatory. Adult specimens in fall and spring, from October till May.

Because of its long scape, the females of the small Erigonid spider *Tunagyna debilis* (Banks) were frequently found to have been confounded with this species, at least in the collection of the Museum of Comparative Zoology (see Appendix).

#### Material examined.

Massachusetts. — Specimens have been examined from the following localities: Brookline (Hammonds Pond), Arlington Heights, Blue Hills S. of Boston, Myles Standish State Forest N. of Wareham, and Wellesley (all MCZ).

New York. — Ithaca, Fall Creek and Six Mile Creek, both collected by N. Banks (MCZ).

Maryland. — 1 ♀, Anne Arundel Co., Patuxent Wildlife Refuge, 1.xi.1960, H. W. Hurlbutt, beneath rotting log (MCZ).

Michigan. — 17 ♀ 11 ♂, Calhoun Co., Ott Biol. Preserve, xi.1947, A. M. Chickering. 1 ♀, do., iv.1948. 1 ♀ 1 ♂, do., 23.iv. 1949 (all MCZ).

Texas. — 1 ♀, Denton Co., Stony Oaks, on ground, 18.iv.1944, S. Jones (MCZ).

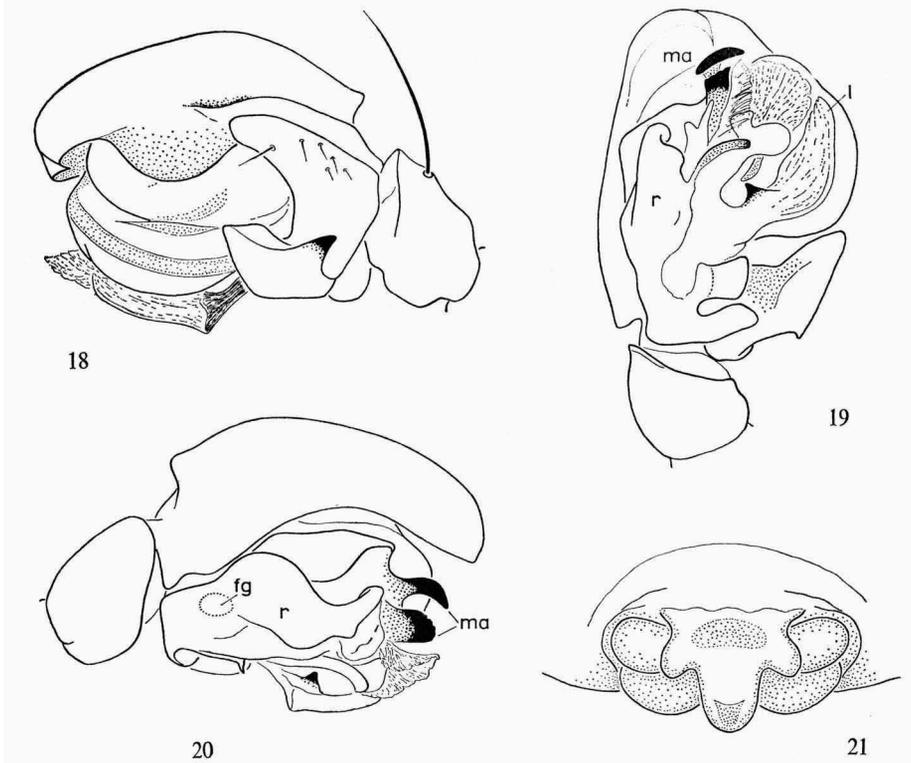
**Centromerus longibulbus** (Emerton, 1882)

(figs. 18-21)

*Microneta longibulbus* Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 76, pl. 24 fig. 6 (descr. ♂, Massachusetts). — Banks, 1895, Journ. New York Ent. Soc., 3: 88 (faunal list; Long Island, New York); 1910, Bull. U.S. Nat. Mus., 72: 35 (catalog.; *longibulba*). — Bryant, 1908, Occ. Pap. Boston Soc. Nat. Hist., 7: 44 (faunal list; Massachusetts). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 258 (catalog.). — Crosby & Bishop, 1928, Mem. Cornell Univ. Agric. Exper. Stat., 101: 1049 (faunal list; New York).

*Erigone longibulba*; Marx, 1890, Proc. U.S. Nat. Mus., 12: 534 (catalog.).

*Centromerus longibulbus*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 136, pl. 17 figs. 339-340 (diag. ♀ ♂; no new localities; figs. after Emerton, 1882). — Hackman, 1954, Acta Zool. Fennica, 79: 5, 56 (Newfoundland).



Figs. 18-21. *Centromerus longibulbus*. 18-20, male palp, lateral, ventral, and mesal aspects, respectively (*fg* = Fickert's gland); 21, epigyne. 18-21, X 133.

Type. — ♂ holotype from Milton, Massachusetts, 26.x.1873, J. H. Emerton (MCZ).

This very small species is known from comparatively few localities in

eastern North America, from New York in the south to as far north as Newfoundland. Specimens were obtained by sifting leaf-mould (Emerton, 1882; Hackman, 1954). The males I have examined myself date from October and April, the females from the same months but recorded also from May (Crosby & Bishop, 1928: New York), and June and August (Hackman, 1954: Newfoundland).

It is a typical *Centromerus* species, the male having the latero-dorsal row of minute bristles on the chelicerae. The species clearly fits in the group of *cornupalpis*. The most important characters are given here.

Measurements. — Male, total length 1.75-2.0 mm, length cephalothorax 0.87-1.02 mm, width 0.72-0.82 mm, length chelicerae 0.35-0.42 mm, width 0.16-0.22 mm. Female, total length 1.25-1.70 mm, length cephalothorax 0.57-0.80 mm, width 0.47-0.60 mm, length chelicerae 0.26-0.30 mm, width 0.14-0.16 mm.

Cephalothorax and legs brown, abdomen greyish. Chelicerae of male with a row of latero-dorsal short bristles from base to slightly past middle. Dorsal row with 3(-4) teeth. No stridulating files present.

Eyes very unequal in size, the AME very small, their diameter measuring about 0.035 mm, separated from each other by about two-thirds of their diameter and from ALE by one-half diameter. Other eyes of about equal size, their diameters measuring 0.065-0.070 mm, PME separated from each other by two-thirds of their diameter, from PLE by one-half diameter. Height of clypeus 0.16 of length cephalothorax.

Legs short and stout. Femur I slightly shorter than cephalothorax (0.9 in ♂, 0.85-0.9 in ♀), tibia I short and stout (l/d 5.5-6.5 in ♂, 5.0-6.0 in ♀). Femur I with a d-spine (0.55) and a l'-spine (0.7), femur II with a d-spine only; III-IV spineless. All tibiae except IV with 2 d-spines, the basalmost situated at 0.3-0.4 of length of segment, l-spine never present. Metatarsi I and II with a single d-spine on half length, posterior legs without metatarsal spines. Spines weak on anterior legs but becoming increasingly stronger in posterior direction, e.g. d-spines of tibia I hardly longer than diameter of segment, on tibia IV nearly 2 diams. Tm I 0.35-0.38.

Male palp (figs. 18-20) characterized by the blackish proximal tooth on the lateral branch of the paracymbium (fig. 18), and by the shape of the radix (*r*) when viewed from the ventral side (fig. 19). Cymbium slightly humped proximo-dorsally. Dorsalmost branch of median apophysis (*ma*) with narrow shaft and broadened tip (fig. 19), ventralmost branch with serrate distal margin. Proximal arm of radix perpendicular to main part

of element, a squarish and obliquely situated plate halfway between this proximal arm and base of lamella (*l*).

Epigyne depicted here for the first time (fig. 21). Scape short and broad with two lateral lobes, the surface slightly depressed between these lobes. Whole organ very small, length of scape slightly shorter than its width, the latter measuring 0.12-0.15 mm, total width of epigyne 0.22-0.24 mm.

#### Material examined.

New Hampshire. — 1 ♂, Coos Co., second Lake of Connecting Lakes, x.1969, P. J. Darlington (MCZ).

Massachusetts. — 1 ♂, Milton, S. of Boston, under dead leaves, 26.x.1873, J. H. Emerton (holotype; MCZ). — 3 ♀ 2 ♂, Berkshire Co., Windsor, 1.vi.1935, C. R. Crosby (AMNH).

New York. — 1 ♀ 1 ♂, Tompkins Co., Ringwood, 27.iv.1935, C. R. Crosby (AMNH). 2 ♀, West Danby, 2.x.1932, C. R. Crosby (AMNH).

### **Centromerus furcatus** (Emerton, 1882) comb. nov.

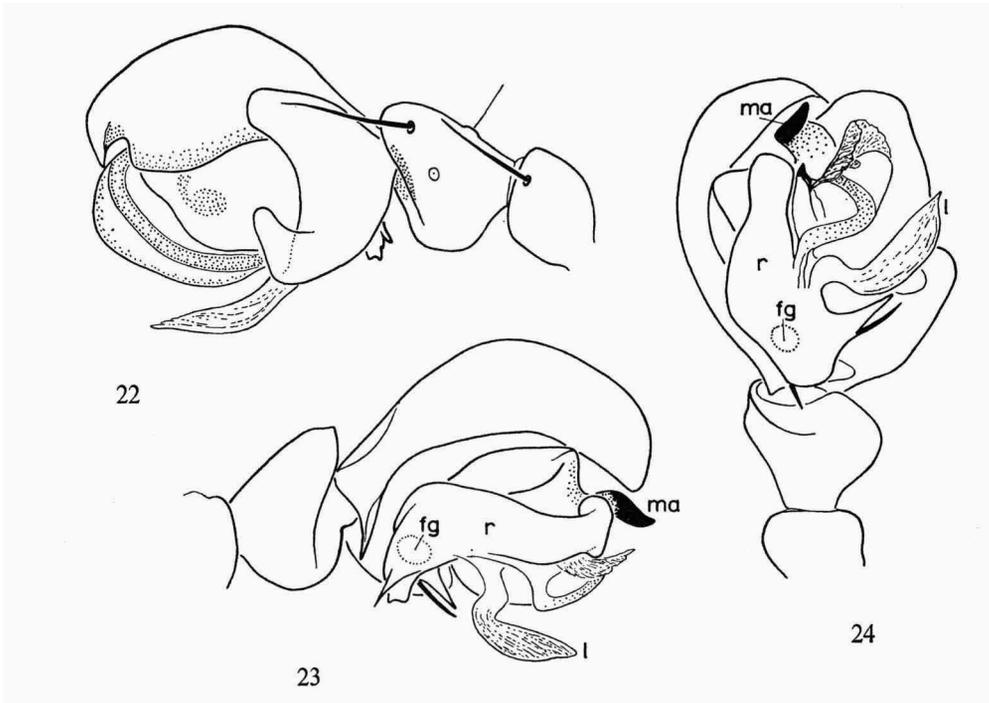
(figs. 22-24)

*Microneta furcata* Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 76, pl. 24 fig. 5 (descr. ♂, New Hampshire, White Mountains); 1920, Trans. Roy. Canad. Inst., 12: 320 (catalog; Canada, Lake Mégantic). — Bryant, 1908, Occ. Pap. Boston Soc. Nat. Hist., 7: 44 (faunal list; cit. Emerton, 1882). — Banks, 1910, Bull. U.S. Nat. Mus., 72: 35 (catalog). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 257 (catalog). — Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 561 (northern New England; might belong in other genus).

*Erigone furcata*; Marx, 1890, Proc. U.S. Nat. Mus., 12: 534 (catalog).

Types. — ♂ lectotype, by present designation, from New Hampshire, Mt. Washington, 13.vi.1877, J. H. Emerton (MCZ); 3 paralectotypic male palps from ridge between Mt. Washington and Mt. Clay, 13.vi.1877, J. H. Emerton (MCZ).

In his original description, Emerton (1882) mentioned only one locality, viz., White Mountains, New Hampshire, on the ridge between Mt. Washington and Mt. Clay. In the collection of the Museum of Comparative Zoology at Cambridge there is one vial with a label referring to that locality, mentioning 13 June 1877 as collecting date and J. H. Emerton as collector. Otherwise the vial contains only a mixture of loose parts: (1) 3 palps of *Microneta furcata* males, (2) a loose abdomen of a female specimen which cannot belong to *furcata*, (3) one loose palp which is not of *M. furcata*, and (4) many legs which might belong to any of the specimens involved. This certainly is a poor type-series to select a lectotype from. However, there is a second vial, labelled "Mt. Washington, 13 June 1877, J. H. Emerton". This vial contains one male specimen of *M. furcata*, in fair



Figs. 22-24. *Centromerus furcatus*, male palp, lateral, mesal, and ventral aspects, respectively (*fg* = Fickert's gland). 22-24, X 150.

condition, and one male of *Diplocentria bidentata* (Emerton). Obviously the contents of both vials were collected on one and the same trip. It may be disputable whether Emerton had the second, now the only complete, specimen before him when describing the species and depicting the palp, but, if this is not the case, it is the only available topotypic specimen, which, moreover, was collected on the same day and by the same collector. In fact, it could be considered to belong to the same series in a broad sense. I have therefore designated as lectotype this last mentioned specimen from Mt. Washington, as it is the only specimen that could serve as the nomenclatorial reference specimen.

Up to the present the species has been recorded by Emerton only, from the White Mountains, New Hampshire, U.S.A. (1882), and from Lake Mégantic, Quebec, Canada (1920). I have seen only one other specimen, again a male, from the White Mountains. Females to my knowledge have not yet been found. The species is a typical small *Centromerus* with the characteristic row of short stubby hairs latero-dorsally on the chelicerae. A concise description of the male is given here.

Measurements. — Total length 1.4-1.7 mm, length cephalothorax 0.80-0.87 mm, width 0.62-0.67 mm, length chelicerae 0.31-0.35 mm, width 0.17-0.19 mm.

Cephalothorax and legs uniformly brown, lateral margins of cephalothorax greyish. Sternum, labium and gnathocoxae suffused with black. Abdomen dark grey. Chelicerae with latero-dorsal row of short and thick hairs on two-thirds of length. Dorsal row with three teeth. No stridulating files visible.

AME small and close together and very close to ALE. Diameter of PME about 0.06 mm, separated from each other and from PLE by half a diameter. Lateral eyes of same size as PME. PME with black anterior and posterior triangles, the anterior ones fused with black bases of lateral eyes and blackish area around AME. Height of clypeus 0.14 of length of cephalothorax.

Legs short, length femur I 0.9 of length cephalothorax, length of tibia I 6 diams. of segment. Femur I with a d-spine (0.55) and a l'-spine (0.70), femur II with a single d-spine, posterior femora spineless. All tibiae with 2 d-spines, position of d''-spine on tibia I 0.30. Tibia I without l'-spine. Metatarsi I and II probably with a single d-spine. In all available specimens the spines are missing, but the scars are still visible, be it with difficulty because of the small size of the specimens. Tm I 0.32.

Male palp (figs. 22-24) characterized by the simple paracymbium and the humpless cymbium; and by the spine-like appendages or projections of the proximal part of the radix (*r*), one pointing in proximo-ventral direction and one in mesal direction and slightly forward. Median apophysis (*ma*) with a simple, though slightly twisted, apical branch. Lamella (*l*) as in other species of the group.

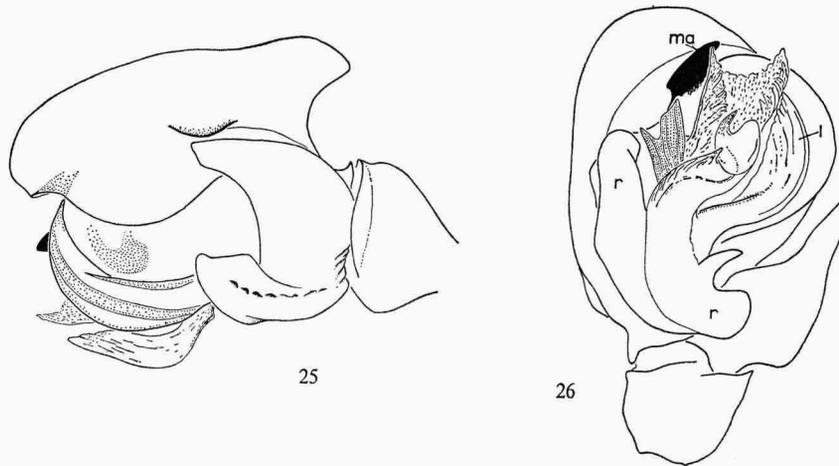
#### Material examined.

Besides the type-series from the White Mountains, New Hampshire (1 ♂ and 3 additional palps), I have re-examined Emerton's specimen from Canada (1 ♂, Quebec, Lake Mégantic, vii.1916, J. H. Emerton; MCZ) and included one new specimen in the descriptive notes given above (1 ♂, New Hampshire, Grafton Co., North Woodstock, 4.vi.1908, J. H. Emerton; MCZ). Based on these data the distribution of the species is restricted to northeastern North America.

#### **Centromerus spec.**

(figs. 25-26)

A single male specimen from British Columbia, Terrace (about 75 mi.



Figs. 25-26. *Centromerus* spec., male palp, lateral and ventral aspects (*r* = radix, *ma* = median apophysis, *l* = lamella). X 120.

inland east of Prince Rupert), 1920, Mrs. Hippisley, was found in the collection of the Museum of Comparative Zoology at Cambridge. The specimen is very incomplete, with the legs badly damaged, the abdomen missing, and only one loose palp present. It is included in this paper, though with figures of the palp only, because it seems of zoogeographical importance. A complete description should wait till we have better material available.

The species belongs to the *cornupalpis*-group, which herewith is proven to occur also on the Pacific side of the continent. Up to the present only *C. cornupalpis* itself had been found west of the Continental Divide (Utah, Wyoming), but the other species seemed to be restricted to the eastern half of the continent. Of the *sylvaticus*-group, *C. sylvaticus* is known to have a Holarctic distribution, but the only other North American species, *C. denticulatus*, again occurs in the east only. Of course we must realize that the western states have been much less extensively collected than New England and the east in general, and that we may expect records of the "eastern" species of this paper, or new species, when these regions will be properly investigated. More material of the species, of which the palp is depicted here, then certainly will turn up.

The specimen from Terrace, mentioned above, resembles *C. longibulbus* (Emerton) in the shape of the radix (*r*), but the paracymbium lacks the large lateral tooth. Instead it has a row of small wart-like denticles. The median apophysis does not have the ventral branch with serrate apical

margin of *C. longibulbus*. The cymbium of the specimen from British Columbia is much more strongly horned than in *C. longibulbus*. Of the other characters I mention only the dorso-lateral rows of minute spines on the chelicerae.

The *Centromerus sylvaticus* group

**Centromerus sylvaticus** (Blackwall, 1841)

(figs. 27-31)

*Neriere sylvatica* Blackwall, 1841, Trans. Linn. Soc. London, 18: 644 (descr. ♂, Great Britain (Wales)).

*Centromerus silvaticus*; Dahl, 1886, Schr. naturwiss. Ver. Schl.-Holst., 6: 74 (new combination).

For subsequent references (of *sylvaticus* and *silvaticus*) and synonyms concerning Europe and Asia up to 1940, see Bonnet (1956: 997, under *C. silvaticus*). For references to North American records see Bonnet (1957: 2902, under *Microneta quinquedentata*) and below.

*Microneta quinquedentata* Emerton, 1882, Trans. Connecticut Acad. Arts Sci., 6: 75, pl. 24 fig. 2 (descr. ♀ ♂, from several localities in Canada and New England). — Kurata, 1939, Canad. Field. Nat., 53: 82 (Ontario); 1941, Univ. Toronto Stud. Biol., 48: 110 (Ontario). — Holm, 1945, Arkiv Zool., 36A (15): 42, 79 (= *C. sylvaticus*).

*Centromerus quinquedentatus*; Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35 (9): 81 (compared with *C. claytoni*).

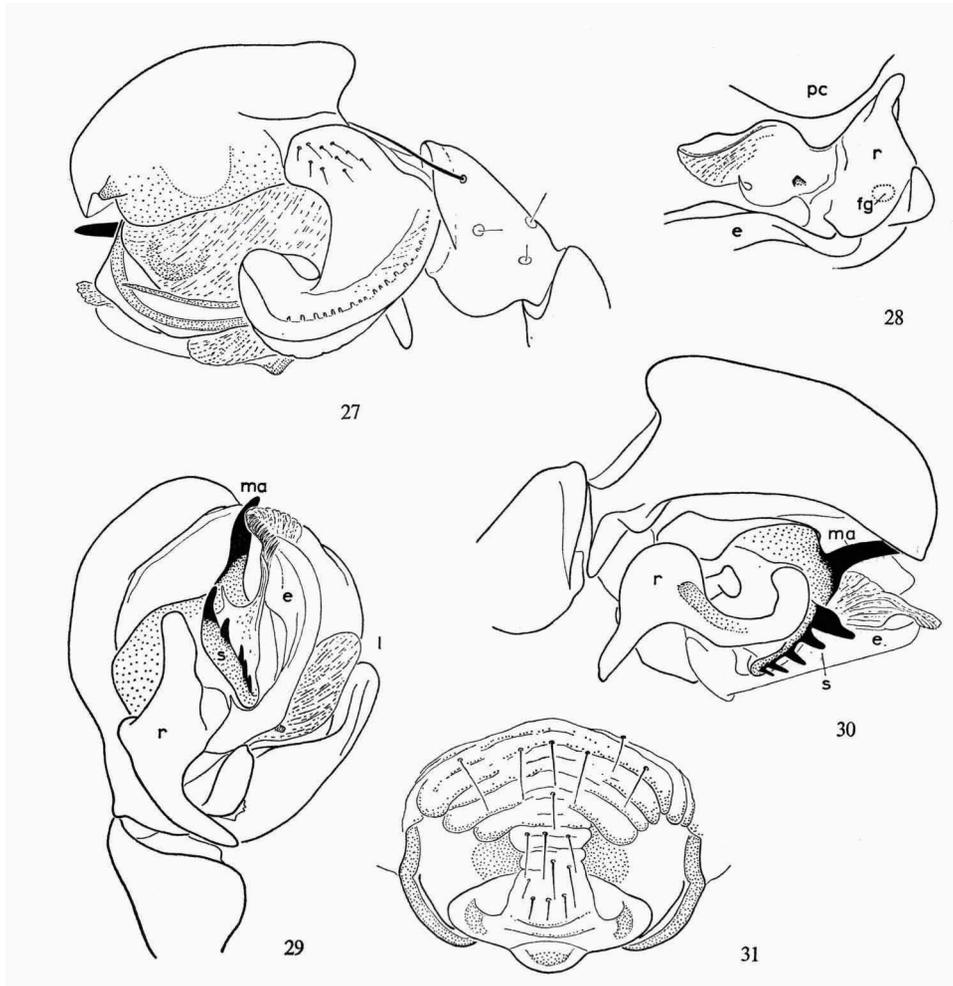
*Microneta latens* Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892: 46, pl. 5 fig. 46 (descr. ♀ and subadult ♂, New York); 1916, Proc. Acad. Nat. Sci. Philadelphia, 68: 77 (= *M. quinquedentata*).

*Centromerus sylvaticus*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 135, pl. 16 figs. 313-315 (Connecticut). — Levi & Field, 1954, Amer. Midland Natur., 51: 444 (Wisconsin). — Hackman, 1954, Acta Zool. Fennica, 79: 56 (Newfoundland). — Lindroth, 1957, Faunal connections Europe — N. America: 97 (? introduced in N. America). — Holm, 1960, Zool. Bidr. Uppsala, 33: 126 (Aleutian Islands).

Types. — The type-specimens of *Neriere sylvatica* Blackwall probably are lost. Material of two of the localities mentioned in the original description of *Microneta quinquedentata* by Emerton (1882) is still present in the collection of the Museum of Comparative Zoology at Cambridge, U.S.A., viz., from Canada, Montreal, November 1876, leg. J. H. Emerton (2 ♀ 1 ♂) and from Massachusetts, Swampscott, 23 October 1873, leg. J. H. Emerton (2 ♀ 1 ♂). Of *Microneta latens* Banks a series is still in existence from New York, Ithaca, consisting of many females, males, and juveniles (MCZ). Lectotypes have not been selected.

*Centromerus sylvaticus* is the largest of the Nearctic species of the genus. It is quite common in Europe, and from the great number of specimens in the MCZ collection we may infer this to be the case in North America also.

The species has been described and depicted in the European literature



Figs. 27-31. *Centromerus sylvaticus*. 27, male palp, lateral aspect; 28, lamella, latero-ventral aspect between embolus (*e*) and paracymbium (*pc*), *fg* is Fickert's gland; 29-30, male palp, ventral and mesal aspects, respectively; 31, epigyne. 27-30, X 96; 31, X 114.

on several occasions, but for the sake of completeness, as well as to facilitate comparison with the closely related *Centromerus denticulatus*, the only other representative of this species-group in North America, a summary of the most diagnostic characters together with new figures are given here.

Measurements. — Male, total length 2.5-3.0 mm (Kaston, 1948: 2.0-2.6 mm), length cephalothorax 1.25-1.52 mm, width 0.97-1.15 mm, length chelicerae 0.51-0.61 mm, width 0.24-0.29 mm. Female, total length 2.2-3.7

mm, length cephalothorax 1.10-1.40 mm, width 0.82-1.02 mm, length chelicerae 0.47-0.60 mm, width 0.24-0.30 mm.

Animals uniformly light brown with grey-brown abdomen. Grey suffusion, if present, very light and evenly distributed.

Arrangement of eyes as in the other species of the genus, with the posterior eyes and lateral eyes of about equal size (diameter 0.075-0.085 mm), the eyes of the posterior row separated by two-thirds of their diameter or slightly more; AME smaller, their diameter measuring 0.06 mm, separated by slightly less than half their own diameter and by two-thirds of a diameter from the ALE. Height of clypeus 0.16-0.20 of length of cephalothorax.

Chelicerae of male with the latero-dorsal row of stubby spines. Dorsal row with three teeth, ventral row with five or six small denticles, close together opposite to the third dorsal tooth.

Legs comparatively long and slender, femur I as long as cephalothorax or very nearly so, tibia I long and slender ( $l/d$  8.5-9.5 in ♂, 8.0-8.5 in ♀). Femur I with 2 d and 1  $l'$ -spine, basalmost d-spine on 0.3, the others around 0.6 of length; femur II with 2 d-spines, other femora spineless. Patellae with a single basal d-spine, all tibiae with 2 d-spines, tibia I with an additional  $l'$ -spine; basalmost  $d''$ -spine on tibia I on 0.4,  $l'$ -spine on 0.55. Metatarsi I-II with a d-spine on half length. Spines on anterior legs, in male and female, weakly developed and hair-like but long, the  $d''$ -spine on tibia I measuring nearly 2 diams. in the male and about 1.5 diam. in female. Posterior legs with strong spines, that have a length of 2-2.5 diams. of their respective segments. Tm I 0.36-0.42.

Male palp (figs. 27-30) much more complex than in the species of the *cornupalpis*-group. Cymbium humped dorso-proximally. Paracymbium large, ventral margin evenly rounded and adorned with 20 or more small truncate denticles along the dorsal side of the thickened margin. Median apophysis (*ma*) with a long and slender apical branch, and with a lateral branch that curves backwards and is invisible at the unexpanded palp. Radix (*r*) of very complex shape, the knob-shaped "proximal" tip situated close to the base of the median apophysis; three more branches present to this element, viz., a curved one mesally, a broad and apically rounded part proximo-dorsally, lying next to the middle portion of the paracymbium, and a slender and tapering ventral branch that points in latero-ventral direction; the broad proximo-dorsal branch bearing some denticles on the surface closest to the paracymbium. Lamella (*l*) short but distinctly visible in the latero-ventral aspect between paracymbium and base of embolus. Embolus (*e*) much stronger developed than in the *cornupalpis*-group, lightly curved,

its tip covered by the median membrane, the latter bearing the typically toothed (with five teeth) sclerite (*s*) at its base.

The palp is most easily recognized by the shape of the slender ventral branch of the radix, by the shape of the toothed sclerite, and by the shape and the extensive dentition of the paracymbium.

Epigyne (fig. 31) transversely oval-shaped, wider than long. Scape with broad wrinkled base, narrow middle portion, and a broad apical part that is much wider than long and nearly as wide as the basal part of the scape; posterior margin of apical part rounded with the mesal part, bearing the socket, protruding slightly further in posterior direction than the side portions (cf. *C. denticulatus*). Total width of the epigyne 0.36-0.39 mm, width of apical portion of scape 0.24-0.26 mm.

Remarks. — The elements of the male palp were studied in detail and depicted by Merrett (1963: fig. 23), and though I can follow him in the greater part of his results I do not agree with him as to some of the names used for the different elements. Instead of using the term terminal apophysis for the small latero-ventral sclerite I would suggest to call this element the lamella, a name used by Merrett for the slender ventral branch of the radix. However, this branch clearly is integrated with the radix, while the Fickert's gland lies in the main body of the radix very close to the ventral branch under consideration. In my opinion this indicates that we are dealing here with a true part of the radix. In the two other — both European — species of the genus studied by Merrett (figs. 24-25), too, the term lamella has been used for a, in my opinion, integral part of the radix, while the real lamella has been called terminal apophysis.

In all species of the North American *cornupalpis*-group studied by me there is a distinct sickle-shaped lamella, attached to the radix just proximally of the embolus. To this group certainly also belong the European *C. arcanus* (O. Pickard-Cambridge) and *C. subalpinus* De Lessert, and possibly the other species of Wiehle's group B (Wiehle, 1956: 52, B. Arcanus-Gruppe). In *C. persolutus* (O. Pickard-Cambridge) from North America, as well as in the European *C. arcanus* (O. Pickard-Cambridge), a well-sclerotized element is present at the anterior portion of the palp, lying between the anteriormost tip of the radix and the embolus. This element I consider the homologue of the basal sclerite of the median membrane of the *sylvaticus*-group.

Distribution. — *Centromerus sylvaticus* most probably has a Holarctic distribution. In Europe the species is common, and so it is in eastern North America. Records from Asia are scarce, but they nevertheless support the

idea of a Holarctic distribution (Ermolajev, 1934: Siberia; Sytschewskaja, 1935: Kamtchatka; Oi, 1960: Japan, Honshu). From the Nearctic region there are many records for the northeastern part (mostly as *Microneta quinquedentata* Emerton), from Newfoundland to as far south as New York, and to as far west as Wisconsin and Ontario. More recently, Holm (1960) recorded the species from the other side of the continent, viz., the Aleutian Islands. The numerous records from Alberta and Saskatchewan (this paper) clearly show that the distributional gaps are caused by the lack of collections from the intervening areas in the first place.

Lindroth (1957: 97) has marked *C. sylvaticus* as a possible case of introduction from Europe by man, be it a doubtful case. The occurrence of the species on the Aleutian Islands and in the state of Alberta, not yet known when Lindroth compiled his list, makes the hypothetical introduction even more doubtful, and most probably the time has come to remove *C. sylvaticus* from the list of introductions for which man is to be held responsible.

The leaf-litter stratum in various types of forest, and also the ground layer with mosses and other vegetation in more open habitats, are the places where one may expect to find *C. sylvaticus*, a species that, again, occurs in the adult stage in the fall, winter, and spring.

#### Material examined.

U.S.A. — Besides the series mentioned under "Types", many samples have been examined from Massachusetts, New Hampshire, Michigan, and Wisconsin (MCZ). A number of specimens from several localities in Massachusetts are present in the collection at Leiden (ML). The specimens from Alaska, Aleutian Islands mentioned by Holm (1960), have been re-examined (MCZ).

Canada. — 2 ♀, Alberta, Taber, Oldman River, 25.viii.1957, riverbottom, cottonwoods, H. W. and L. R. Levi (MCZ). — 1 ♀ 2 ♂, Alberta, Edmonton, 30.ix.1969, M. B. Mair (ERI). — 1 ♂, Alberta, George Lake (53° 57' N; 114° 06' W), 20.ix.1966, R. E. Leech; 1 ♀ 10 ♂, do., pitfall trap; 2 ♀ 12 ♂, do., 25.ix.1966; 5 ♀ 15 ♂, do., 1.x.1966 (all ERI). 2 ♀ 1 ♂, Saskatchewan, Lady Lake, 9-26.viii.1970, poplar woods, D. J. Buckle; 15 ♀ 52 ♂, do., 3-30.ix.1970, willow, sedge, pittrap, D. J. Buckle (all in private collection of Mr. D. J. Buckle).

### **Centromerus denticulatus** (Emerton, 1909)

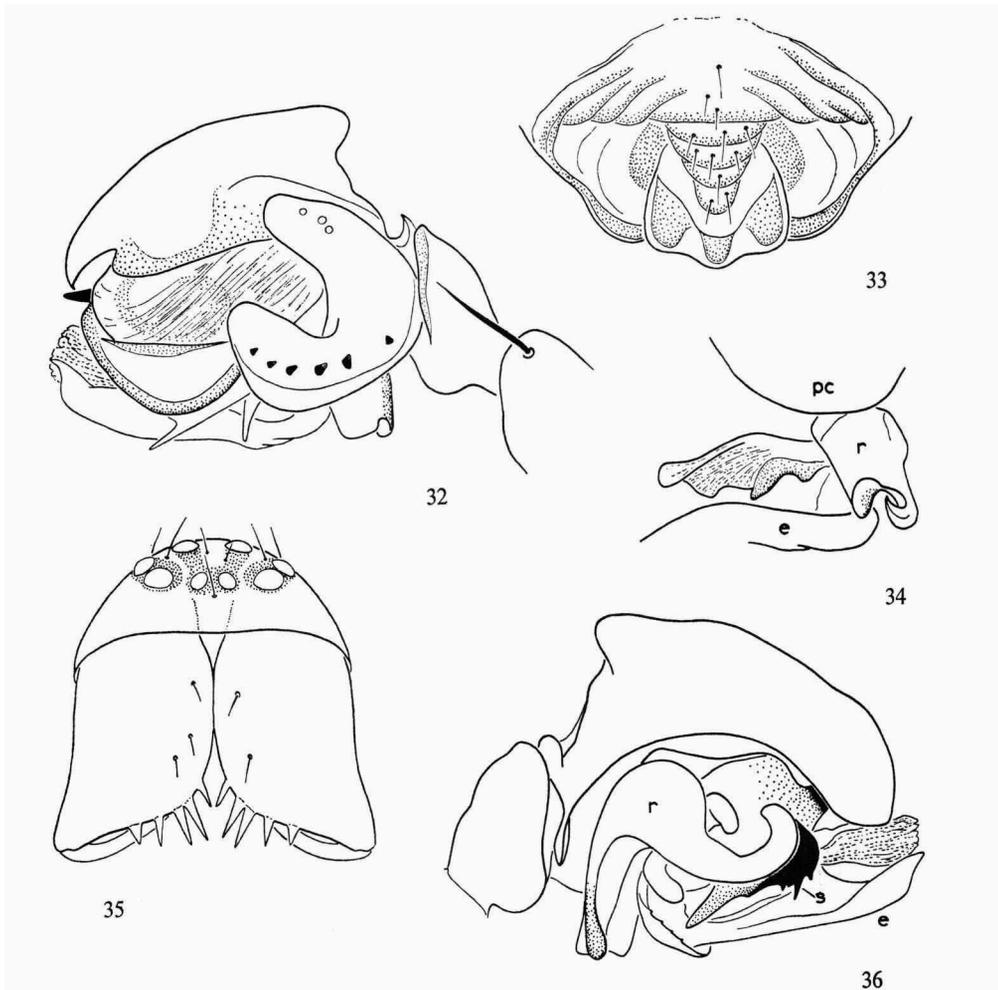
(figs. 32-36)

*Microneta denticulata* Emerton, 1909, Trans. Connecticut Acad. Arts Sci., 14: 197, pl. 4 fig. 14 (descr. ♂, New England). — Banks, 1910, Bull. U.S. Nat. Mus., 72: 35 (catalog). — Petrunkevitch, 1911, Bull. Amer. Mus. Nat. Hist., 29: 257 (catalog). —

Crosby & Bishop, 1928, Mem. Cornell Univ. Agric. Exper. Stat., 101: 1049 (New York, Long Island).

*Centromerus denticulatus*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 137, pl. 17 fig. 333 (descr. ♀ ♂, no new records). — Holsinger & Peck, 1971, Nat. Speleol. Soc. Bull., 33: 31 (Georgia).

*Centromerus claytoni* Chamberlin & Ivie, 1944, Bull. Univ. Utah, 35 (9): 80, fig. 143 (descr. ♀ ♂, Georgia). — Vogel, 1967, Mem. Amer. Ent. Soc., 23: 91 (catalog.).  
**Syn. nov.**



Figs. 32-36. *Centromerus denticulatus*. 32, male palp, lateral aspect; 33, epigyne; 34, lamella, latero-ventral aspect between embolus (*e*) and paracymbium (*pc*); 35, chelicerae of female; 36, male palp, mesal aspect. X 133.

Types. — In Emerton's original description of *Microneta denticulata* no locality is explicitly mentioned, but as the whole paper deals with the

New England spider fauna, the type-locality should be situated in that region. In the collection of the Museum of Comparative Zoology at Cambridge, U.S.A., there are two vials that might contain the original specimen of the species, viz., one from Carlisle Pines, about 20 miles to the NW of Boston, Massachusetts (1 ♂) and one from Magnolia near Gloucester at the Atlantic coast of Massachusetts (1 ♂). All other available vials either contain females, or the specimens were not collected by Emerton, or they were collected by Emerton later than 1909. The male from Carlisle Pines is located in the type-collection, and was marked holotype by Miss E. B. Bryant.

The ♀ holotype and ♂ allotype (according to the publication, but the label reads: ♂ holotype and ♀ allotype) of *Centromerus claytoni* from Georgia are in the American Museum of Natural History, New York, and have been examined. There should be 10 more ♀ specimens, paratypes, in the collection of the University of Utah, Salt Lake City.

Chamberlin & Ivie (1944: 81) already noted that their new species was closely related to *Centromerus quinquedentatus* (Emerton) [= *Centromerus sylvaticus* (Blackwall)], but apparently they have overlooked *Microneta denticulata* Emerton. Both belong to the same species-group, and up to the present they are the only two species of the group known to occur in the Nearctic region. In the Palaearctic region the group is rich in species and comprises the larger part of the genus.

*C. denticulatus* is much smaller than *C. sylvaticus* and probably rather rare, judging from the low number of records and available specimens. The female was never depicted before, while there exists only one illustration of the male palp (Emerton, 1909: pl. 4 fig. 14), which was published again by Kaston (1948: fig. 333). The species is slightly aberrant, differing from its group members in having six dorsal teeth on the modified chelicerae, and possessing very short and stout legs.

Measurements. — Male, total length 1.6-1.85 mm, length cephalothorax 0.80-0.90 mm, width 0.67-0.77 mm, length chelicerae 0.40-0.45 mm, width 0.20-0.24 mm, Female, total length 1.55-1.65 mm, length cephalothorax 0.65-0.78 mm, width 0.52-0.62 mm, length chelicerae 0.38-0.41 mm, width 0.22-0.24 mm.

Cephalothorax, chelicerae and legs brown; sternum, gnathocoxae and coxae heavily suffused with grey; cephalothorax with narrow grey or blackish margins and ditto striae. Abdomen dark, blackish with oblique light streaks laterally, giving it a wrinkled appearance, and with minute light points scattered over ventral and dorsal surfaces.

Eyes of posterior row separated by about the diameter of the PME, which measures 0.050 mm. AME smaller, 0.035 mm in diameter, separated from each other and from ALE by two-thirds of their diameter. Height of clypeus 0.10-0.13 of length of cephalothorax.

Chelicerae (fig. 35) different from those of the other North American species, in shape as well as in dentition. Lateral surfaces diverging in apical direction, making each chelicera stout and massive. Dorsally five or six teeth which are very long and slender, especially the second and third teeth which stand close together or even are fused at their bases. Ventral margin with four or five teeth opposite to third to apical dorsal teeth, long and slender if compared with the other species of the genus, though shorter than the dorsal teeth. Male chelicerae with an irregular double row of minute stubby bristles dorso-laterally on basal halves, but only few of these bristles on the apical halves.

Legs very short and stout. Femur I only 0.6-0.7 of length of cephalothorax; tibia I as long as femur I, ratio l/d 4-4.5 in females, 5-5.5 in males. Spines few and weak, barely different from the other setae but for their upright position. Femur I with a single l'-spine close to apex, other femora spineless. All patellae with a single apical d-spine. Tibiae I and II with two dorsal spines, on III and IV only the d''-spine present. Tibial spines about as long as diameter of segments. Position of d''-spine on tibia I 0.25. Metatarsi spineless, Tm I 0.25-0.30.

Male palp (figs. 32, 34, 36) smaller but of same general structure as in *C. sylvaticus* (Blackwall). Cymbium humped dorso-laterally; a small hook-like projection at the very base against apical margin of tibia and dorsal margin of paracymbium. Paracymbium large, simply curved, ventral branch with six conical teeth dorso-laterally. Median apophysis with a long and slender apical branch and a shorter hook, curving backwards (not visible in my figures). Radix (*r*) of same S-shaped type as in *sylvaticus*, but ventral projection less slender; in *denticulatus* ventral projection broad with curled margins. Embolus (*e*) well-developed and rather sclerotized. Median membrane with one large sharp tooth and some smaller denticles on sclerite (*s*) at base. Lamella small, situated between paracymbium and base of embolus (fig. 34).

Epigyne (fig. 33) with scape wrinkled at base and widening at tip behind narrow middle portion; posterior margin of apical part barely protruding mesally (cf. *C. sylvaticus*). Epigyne as a whole wider than long, width measuring 0.30-0.34 mm, width of scape at apical portion 0.14-0.16 mm.

The chelicerae (fig. 35) of *Centromerus denticulatus* are strongly re-

miniscent to the mouthparts of *Tapinopa longidens* (Wider) from Europe and *T. bilineata* (Hentz) from North America. The resemblance is due primarily to the long and slender dorsal teeth. For the genus *Centromerus* the dentition is quite exceptional and exuberant, the usual number of teeth in the dorsal row being three, and moreover never of such a particular elongate shape. Even in the larger species, as for instance *Centromerus sylvaticus* (Blackwall), the teeth are much shorter in proportion to the dimensions of the chelicerae. The strongly built and well-armed chelicerae of *denticulatus* — the name certainly was well chosen — might be an adaptation to a special kind of prey, as it is in *Tapinopa longidens* (and in *T. bilineata*?) (diplopods). It certainly is not a case of sexual dimorphism, not unusual in the Linyphiidae, as here the chelicerae are of similar shape in both sexes.

Distribution. — Most specimens originate from the East Coast region, from Maine in the north to Georgia in the south. A single specimen from Michigan forms the westernmost point of the area of the species as far as known at present. Apart from the female specimens from Maine, that were collected in August, all specimens were taken in late fall, winter, and spring. No data are known about the habitat of the species. According to Holsinger & Peck (1971: 31, 32) the species is found in caves in Georgia, southeastern Tennessee and northern Alabama. The occurrence in caves should not be considered obligatory.

#### Material examined.

Maine. — 3 ♀, Long Island [about 10 miles off the coast S. of Arcadia National Park], 27.viii.1906. E. B. Bryant (MCZ).

Massachusetts. — 1 ♂, Middlesex Co., Carlisle Pines, 1.x.1904, J. H. Emerton (? holotype of *Microneta denticulata* Emerton; MCZ). 1 ♂, Essex Co., Magnolia, 19.iv.1906, J. H. Emerton (? type material; MCZ). 1 ♂, Barnstable Co., Chatham, 10.vi. J. H. Emerton (MCZ). 1 ♀ 1 ♂, Suffolk Co., Clarendon Hills, 27.iii.1908, J. H. Emerton (MCZ). 1 ♀ 1 ♂, do., 7.v.1914, J. H. Emerton (MCZ). 4 ♀, Norfolk Co., Sharon, 28.v.1920, J. H. Emerton (MCZ).

Michigan. — 1 ♀, Calhoun Co., Ott Biology Preserve, 14.xii.1946, A. M. Chickering (MCZ).

Georgia. — 1 ♀ 1 ♂, Rabun Co., N. W. Clayton, 28.iv.1943, W. Ivie (♀ holotype and ♂ allotype of *Centromerus claytoni* Chamberlin & Ivie; AMNH).

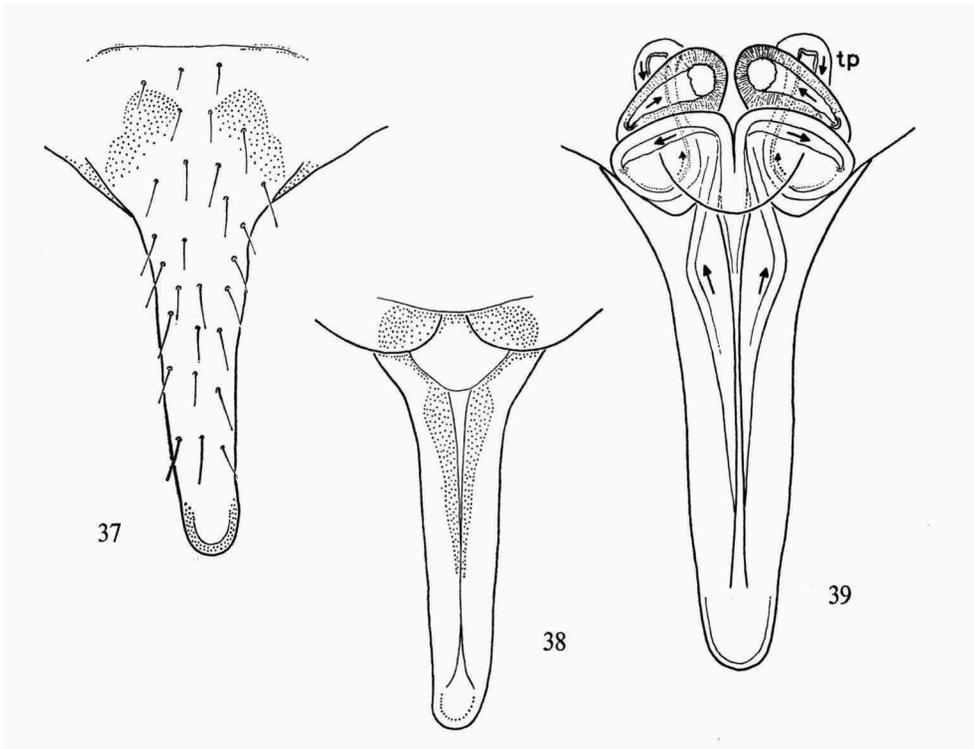
#### APPENDIX

### **Tunagyna debilis** (Banks, 1892)

(figs. 37-39)

*Tmeticus debilis* Banks, 1892, Proc. Acad. Nat. Sci. Philadelphia, 1892: 40, pl. 4 fig. 20 (descr. ♀ ♂, figs. epigyne and palp; epigyne is not *T. debilis*; New York). — Emerton, 1909, Trans. Connecticut Acad. Arts Sci., 14: 193, pl. 4 figs. 3-3b (figs. palp, descr. ♂, Massachusetts).

*Tunagyna debilis*; Kaston, 1948, Bull. Connecticut Geol. Nat. Hist. Survey, 70: 174, figs. 473-475 (descr. ♀ ♂, figs. palp; Massachusetts). — Renault, 1968, Int. Rep. Forest Res. Lab. Fredericton, New Brunswick, M 39: iii, figs. 82-83; (figs. epigyne and palp; New Brunswick: epigyne is not *T. debilis*).



Figs. 37-39. *Tunagyna debilis*. 37, epigyne, ventral aspect; 38, do., dorsal aspect; 39, vulva, dorsal aspect, the arrows indicating the path the embolus has to follow to the turning-points and the sperm from there to the receptacula. 37-38, X 142; 39, X 185.

The four above mentioned references are the only ones that give illustrations of this small erigonid spider. There are many other records from a region roughly delimited by Newfoundland, New Brunswick, Massachusetts, New York, Michigan, Wisconsin and Ontario. I have seen specimens from Manitoba, Saskatchewan and Alberta (see under Material examined). In Massachusetts the species is very common and very frequently collected from leaf-litter samples in deciduous or mixed forest, especially in the swampy parts.

The epigyne (figs. 37-38) is a long finger-like process, pointing back-

wards or slightly away from the ventral surface of the abdomen, and roughly resembles the epigyne of *Centromerus latidens* (Emerton), though the latter has a pair of lateral lobes at the base. The species is included in this paper for that very reason. It is not surprising then that in several cases females of the two species had been confused with each other, at least in the collection of the Museum of Comparative Zoology. This is the more understandable when we know that the epigyne of *Tunagyna debilis* never has been depicted. Banks (1892) gave a reasonably clear figure of the ♂ palp of *Tmeticus debilis*, but the epigyne depicted by him is not that species. The type-series (MCZ: 2 ♀ 2 ♂, New York, Ithaca, N. Banks) consists of two males of *T. debilis* and two females of two different *Eperigone* species, one of which is *Eperigone trilobata* (Emerton) and probably served as a model for Banks' illustration.

Emerton (1909) only gave three different aspects of the male palp, but did not depict the epigyne. He gave a fairly elaborate description of the male palp, but no mention was made of the female. We know, however, that Emerton had female specimens because there is one vial with two females from Clarendon Hills in Massachusetts, collected in November 1904 by Emerton (MCZ). We may therefore infer that Emerton did not recognize these long-scaped females as belonging to *Tmeticus debilis*, at least not in 1909. There are two more vials, with males and females together, collected by Emerton in October and November 1908 (from Tyngsboro and Lexington, both in Massachusetts, both in MCZ), but as his 1909 paper was issued in January 1909, he certainly was not able to include these.

On two more occasions only have figures of *Tunagyna debilis* been given. Kaston (1948) reproduced Emerton's 1909 figures of the ♂ palp but, though he described the epigyne, did not depict the female genital organ. Renault (1968), in an illustrated key to the spiders of fir-spruce forests in New Brunswick, Canada, gave a good illustration of the male palp, but again the epigyne cannot be that of *T. debilis*.

It thus seems that a drawing of the epigyne is produced here for the first time. A figure of the vulva (fig. 39) is added in order to show how the long thread-like embolus correlates with the duct to the receptaculum seminis. The long scape appears to be mesally grooved on its dorsal side, thus giving access to a membraneous duct or tube. The paired ducts run parallel near the mesal line to as far as the semi-circular dorsal plate, then curve outwards along the dorsal side towards the base of the scape, then turn inwards and to the ventral side and with a gradual curve in anterior direction, reaching the turning-points (*tp*) at the anteriormost lateral tips

of the vulva. At the turning-points the tubes, by now heavily sclerotized, are bent to the side, then curve in posterior direction and to the dorsal side, and finally widen into the mesally situated receptacula. The fertilization-ducts are short, leaving the receptacula at the posterior sides and curving in dorsal direction to their open ends at either side of the dorsal plate.

The male palp is of simple build, but rather developed in its simplicity. The median apophysis is a very short and slender process on the mesal side on half length of the palp, visible in the ventral aspect of the palp (Emerton, 1909: pl. 4 fig. 3; Kaston, 1948: fig. 473; visible at left side of drawing between embolus and radix). The radix is drawn out anteriorly into a long and curved, slender process with a short side-branch at the beginning of the curve. The embolus is long and thread-like and springs forth from the proximal part of the radix, running along the mesal side of the palp to the tip where it curves sideways parallel with the slender tip of the radix, its tip protected by the median membrane. The tegulum bears a latero-apical membraneous projection. The palpal tibia is without an apophysis, but the distal margin is more heavily sclerotized dorsally.

The placing of the monotypic genus *Tunagyna* is uncertain. All tibiae, except those of the fourth pair of legs, have two dorsal spines, the femora and metatarsi are spineless. The fourth metatarsus bears no trichobothrium. Tm I 0.4. The cephalothorax is unmodified, without lateral pits and the cephalic part not raised. The branchial opercula are very lightly reticulate, but probably not functional as stridulatory organs. Using European literature it should be close to *Microcentria* Schenkel (= *Smodigoides* Crosby & Bishop)<sup>1</sup>), which does not have the long scape, long embolus and long radix, but has comparable chaetotaxy and general structure. Judging from the epigyne it is close to *Eulaira* Chamberlin & Ivie and *Tachygyna* Chamberlin & Ivie, but I am not familiar with these predominantly Western Nearctic genera.

#### Material examined.

Manitoba. — 2 ♂, Birtle, L. G. Worley (MCZ).

Saskatchewan. — 1 ♀, Lady Lake, willow-alder swamp, 4.v.1970; 1 ♀, do., marsh, vii.1970; 1 ♀, sedge, willows, 3-30.ix.1970; 1 ♀, do., pittrap in spruce woods, 8-15.v.1971; all D. J. Buckle leg. (private collection of Mr. D. J. Buckle).

Alberta. — 4 ♀, Spring Creek Basin, 22-23.v.1969, D. W. Chomyn (ERI).

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<sup>1</sup>) Recently considered to be a synonym also of *Diplocentria* Hull by Wunderlich (1970: 407), but his arguments are not very convincing.

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