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## The Spider Genus *Neon* in North America

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The jumping spiders of the genus *Neon* are among the smallest members of the large family Salticidae. As compared with more typical salticids, which are mostly conspicuous diurnal vagrants, they live more obscurely in darker situations. The neons hunt on the ground beneath grass, low vegetation, and miscellaneous debris, and occasionally may be found under stones, logs, or other objects lying on the soil. The sifting of soil detritus in coniferous or deciduous woods usually brings to light examples of these tiny big-eyed jumping spiders.

Simon assigned *Neon* to the group Chalcoscirteae along with the typical genus *Chalcoscirtus*. These latter spiders are characterized essentially as follows: median groove of the carapace obsolete; cheliceral tooth of lower margin obsolete; male with conspicuous shining scutum on abdomen; spines on legs few and weak except beneath the tibiae and metatarsi of first two pairs of legs. *Neon* seemingly has not quite attained the acme of these features. The median groove of the carapace is still discernible as a small point or short groove on most specimens. The cheliceral tooth is still present but is relatively thin and small. Only occasionally do the males of *Neon* have conspicuous sclerotization of the dorsum of the abdomen, but even then the scutum is not polished and rarely has precise definition on the margins. Both genera include small spiders with few strongly developed leg spines except beneath the front legs.

A third American genus that may belong to the Chalcoscirteae is *Neonella* Gertsch. The only known species (*Neonella vinnula* Gertsch,

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1936, Amer. Mus. Novitates, no. 852, p. 24, figs. 28, 29) occurs in the southern states from Florida to Texas and New Mexico.

The genus *Neon* seems to be restricted to the Northern Hemisphere. At least six species are known from Europe, and these are paralleled by a like number of North American representatives. One of these, *Neon reticulatus* Blackwall, extends from Europe and Siberia into Alaska and the mountains of western North America. Very close allies are *Neon robustus* Lohmander of Sweden, and *Neon nellii* Peckham and Peckham, which has long been considered to be the only American species. A related series includes *Neon valentulus* Falconer of Europe and two new species from the United States herein described as *Neon ellamae* and *N. plutonus*. A well-marked species group is represented in Europe by *Neon laevis* Simon, for which Lohmander established the subgenus *Dicroneon*. The California *Neon avalonus*, new species, is a close relative. And finally the curious *Neon pixii*, new species, of our western mountains, with both basal and apical spiraling of the thin embolus, is represented in southern Europe by two similar species, *Neon rayi* Simon and *N. pusio* Simon.

The Cuban species described as *Neon nigripes* by Bryant (1940, Bull. Mus. Comp. Zool., vol. 86, p. 504, figs. 293, 297) presents genitalic differences that clearly indicate it must be assigned to a different genus.

During the course of this study we have called upon a number of individuals for loan material or other aid. To the following we extend our sincere thanks for their cooperation: Dr. Henry Dietrich of Cornell University; Dr. Herbert W. Levi of the University of Wisconsin; Dr. Harriet Frizzell of Rolla, Missouri; Mr. Hugh B. Leech of the California Academy of Sciences; Dr. Ake Holm of Zoologiska Institutionen, Uppsala, Sweden; and Mr. G. H. Locket and Dr. A. F. Millidge of England. The last three colleagues generously supplied us with European specimens for comparison with the American species.

#### GENUS *NEON* SIMON

*Neon* SIMON, 1876, Les arachnides de France, vol. 3, p. 210; 1901, Histoire naturelle des araignées, vol. 2, p. 577. PECKHAM AND PECKHAM, 1909, Trans. Wisconsin Acad. Sci., vol. 16, p. 588. COMSTOCK, 1913 (1912), The spider book, p. 675. SIMON, 1937, Les arachnides de France, vol. 6, p. 1181. COMSTOCK, 1940, The spider book, rev. ed., p. 683. LOHMANDER, 1945, Meddel. Göteborgs Mus. Zool. Avd., vol. 3, pp. 31-75. KASTON, 1948, Connecticut State Geol. Nat. Hist. Surv., Bull., no. 70, p. 457. LOCKET AND MILLEDGE, 1951, British spiders, vol. 1, p. 220.

*Dicroneon* LOHMANDER, 1944, Arch. Zool., vol. 35A, no. 16, p. 7.

GENOTYPES: Of *Neon*: *Salticus reticulatus* Blackwall; of *Dicroneon*: *Neon laevis* Simon.

Very small spiders (1.5 mm.-3.0 mm.) of the section Unidentati in which the tooth on the lower chelical margin is small and thin. Carapace moderately longer than wide, truncated in front, only slightly rounded on the sides, broadly rounded behind, the height about equal to three-fourths of width. Eyes large and prominent, the front row slightly recurved, and the anterior median eyes largest. Posterior eyes large, subequal in size to the anterior laterals, and set on the side margins at middle of carapace. Quadrangle of lateral eyes only three-fourths as long as broad, as wide behind as in front. Median groove of carapace a slight point or linear, nearly obsolete depression. Clypeus narrow, equal in height to about the radius of an anterior lateral eye. Abdomen suboval, of moderate height, the dorsum usually without scutum, but in some males the integument is sclerotized and of yellowish cast. Tibia and tarsus of female palpus thickened. Legs of moderate length, the formula usually 4132, the first pair slightly heavier and more darkly colored. Fourth legs much longer than third pair. Two front pairs of legs with strong ventral spines (the tibiae 2-2-2-0 and metatarsi 2-2) but those on posterior legs weak.

Male palpi quite large for the size of the spiders. Cymbium and bulb heavy and lying when at rest on the under side of the femur, which is moderately excavated to hold the rounded edge of the bulb and presents a well-marked rounded carina on each side at apex. Tibia of palpus with a more or less strongly developed process on retrolateral side. Embolus originating at various points on prolateral side of bulb and following the contour of the bulb to the apex, where the spine passes over and lies in a modified groove of the cymbium. Base of embolus an unadorned ring of variable dimensions which in some species is coiled more than two revolutions (*pixii*, new species; *rayi* Simon). In other species base of embolus heavy and presenting a conspicuous, finely spiculate lobe (*reticulatus*, *nellii*, etc.).

Epigynum consisting of two suboval atria, typically separated by a thin median septum, in which lie the small atriobursal orifices. Internal structure of voluminous receptacles or convoluted tubes usually clearly visible through the integument.

The species are quite easily separated by reference to the figures of the genitalia. The size and shape of the external atria and relative size of the internal receptacles of the epigynum are useful features for separating the females. The males are readily identified by reference to the palpal figures and the following key:

#### KEY TO THE NEARCTIC MALES OF *Neon*

1. Base of embolus with a conspicuous spiculate outgrowth (subgenus *Neon*) . . . . . 2
- Base of embolus without an outgrowth (subgenus *Dicroneon*) . . . . . 5

2. Embolus of moderate length, basally heavy, originating in front of middle of bulb (fig. 11) . . . . . 3  
     Embolus a very long, thin spine originating behind middle of bulb (fig. 4) . . 4
3. Base of embolus a thick, semilunar ring (fig. 9); eastern United States . . .  
     . . . . . *Neon nellii* Peckham and Peckham  
     Base of embolus a much thinner ring (fig. 13); western United States . . .  
     . . . . . *Neon reticulatus* Blackwall
4. Base of embolus narrower (fig. 3); Rocky Mountain states to California  
     . . . . . *Neon ellamae*, new species  
     Base of embolus nearly round (fig. 5); New York south to Florida . . . .  
     . . . . . *Neon plutonus*, new species
5. Embolus widely spiraled at base and apex . . . . . *Neon pixii*, new species  
     Embolus with a single coil at base but not spiraled at apex . . . . .  
     . . . . . *Neon avalonus*, new species

*Neon ellamae*, new species

Figures 1-4, 6, 7

*Neon nellii* CHAMBERLIN AND GERTSCH, 1928, Proc. Biol. Soc. Washington, vol. 41, p. 187. CHAMBERLIN AND IVIE, 1933, Bull. Univ. Utah, vol. 23, no. 4, p. 53; 1941, *ibid.*, vol. 31, no. 8, p. 31.

Females vary from 2.2 mm. to 3.0 mm. and average about 2.6 mm. in total length. Dorsal view of entire spider as shown in figure 1.

Carapace pale to bright yellowish brown, with a black or sooty pattern as follows: Sides with dusky streaks and a narrow black marginal seam; front with a black band across the anterior eyes and clypeus which is joined at right angle by a band on each side running back to the posterior eyes. Sternum dusky over a pale base color. Labium, maxillae, and chelicerae yellowish, but each with a large dusky patch. Pedipalps dusky to black. First legs mostly dusky to black, with paler patches at base of femora and the tarsi whitish. Other legs with dusky femora and faint to well-marked dusky rings on other segments. Abdomen yellowish, with a dusky to blackish pattern as follows: dorsum mostly dark but showing small pale points and a series of distinct yellowish chevrons; in gravid specimens the dorsum is paler and the pattern dispersed; sides of abdomen mottled; venter dusky, with four indistinct paler stripes from median groove to spinnerets.

Female from northeast of Fruitland, Idaho: Total length, 2.80 mm. Carapace 1.10 mm. long, 0.85 mm. wide. Abdomen 1.70 mm. long, 1.30 mm. wide.

Carapace thinly clothed with grayish hairs and a few weak dark bristles. Carapace slightly longer than wide, subtruncated in front, slightly rounded on the sides, broadly rounded behind, quite high, the height at the posterior eyes 0.65 mm.; from this point the carapace slopes down

moderately to the front eyes and drops off precipitously behind to the caudal margin. Median groove evident as a slight linear depression only 0.05 mm. long. Clypeus very narrow, equal in height to one-third of diameter of an anterior lateral eye. Front eye row moderately recurved, the upper edges of the four eyes forming a straight line, the median eyes very much larger (0.25 mm.) than the lateral (0.16 mm.). Small eyes of second row set about midway between the lateral eyes of first and third rows. Third eye row only slightly wider than the first, the posterior eyes 0.16 mm., pointing laterad. Quadrangle of lateral eyes broader than long, 0.85 mm. to 0.65 mm.

Sternum 0.47 mm. long, 0.35 mm. wide. Labium broadly rounded apically, about two-thirds as long as broad, half as high as the parallel, apically subtruncated maxillae. Coxae and under side of carapace sparsely set with grayish hairs. Apical joints of palpus moderately thickened. Legs clothed with grayish hairs and without spines except as follows: first tibia with 2-2-2-0 strong ventral spines; first metatarsus with 2-2 ventral spines. Leg formula, 4132.

	I	II	III	IV
Femur	0.65 mm.	0.53 mm.	0.55 mm.	0.68 mm.
Patella	0.36	0.30	0.30	0.31
Tibia	0.40	0.30	0.33	0.48
Metatarsus	0.30	0.27	0.33	0.46
Tarsus	0.25	0.22	0.25	0.30
Total	1.96 mm.	1.62 mm.	1.76 mm.	2.23 mm.

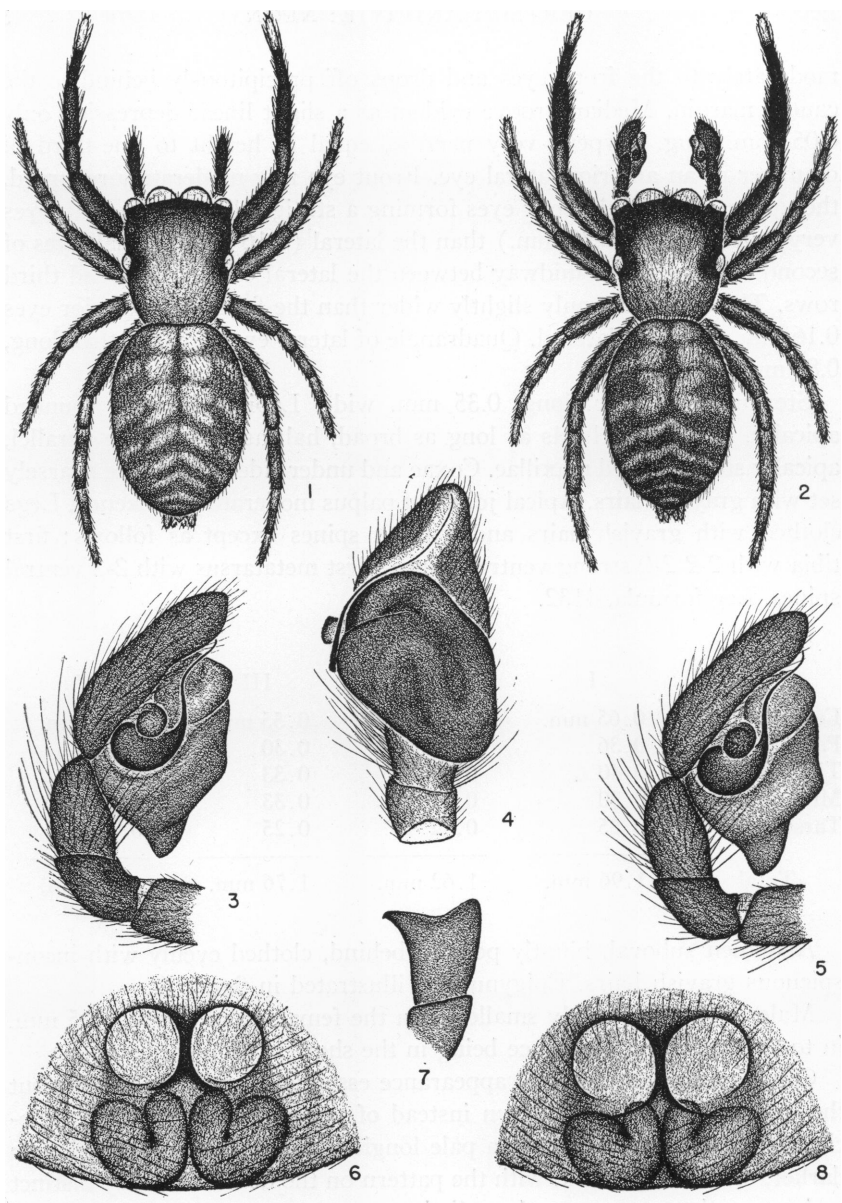
Abdomen suboval, bluntly pointed behind, clothed evenly with inconspicuous grayish hairs. Epigynum as illustrated in figure 6.

Males are only slightly smaller than the females and average 2.5 mm. in total length, the difference being in the shorter, thinner abdomen.

Color pattern and general appearance essentially as in the female, but the base color is orange-brown instead of yellowish. Legs darker, especially the femora which have a pale longitudinal stripe above. Abdomen darker, often sooty black, with the pattern on the dorsum usually distinct and presenting a more or less distinct orange scutum. Dorsal view of entire spider as shown in figure 2.

Male from north of Fruitland, Idaho: Total length, 2.60 mm. Carapace 1.15 mm. long, 0.95 mm. wide. Abdomen 1.50 mm. long, 1.00 mm. wide.

Structure in very close agreement with the female. Legs proportionately a little longer. First leg spined as in female. Second leg with 2-2-2-0



FIGS. 1-4. *Neon ellamae*, new species. 1. Dorsal view of female. 2. Dorsal view of male. 3. Left male palpus, prolateral view. 4. Left male palpus, ventral view.

FIG. 5. *Neon plutonus*, new species, left male palpus, prolateral view.

FIGS. 6-7. *Neon ellamae*, new species. 6. Epigynum, ventral view. 7. Tibia of left male palpus, retrolateral view.

FIG. 8. *Neon plutonus*, new species, epigynum, ventral view.

ventral spines on tibia and 2-2 ventral spines on metatarsus. Posterior legs with weak ventral and lateral spines.

	I	II	III	IV
Femur	0.80 mm.	0.66 mm.	0.71 mm.	0.81 mm.
Patella	0.45	0.40	0.30	0.35
Tibia	0.60	0.42	0.43	0.63
Metatarsus	0.40	0.34	0.43	0.60
Tarsus	0.30	0.25	0.30	0.30
Total	2.55 mm.	2.07 mm.	2.17 mm.	2.69 mm.

Palpus as illustrated in figures 3, 4, and 7. Embolus thin, originating at middle of bulb on prolateral side.

TYPE LOCALITY: Male holotype, female allotype, and numerous male and female paratypes from northeast of Fruitland, Idaho, May 20 (W. Ivie).

DISTRIBUTION: Western United States from Utah and Idaho to California and Oregon.

RECORDS: *California*: Santa Barbara, February to September (H. L. Shantz), many male and female paratypes. Ben Lomond (Chamberlin and Ivie, 1941), male and female. *Oregon*: Rogue River Valley, April, 1934 (R. F. Lawrence), one female paratype. Pinehurst, September 10 (W. Ivie), female paratype. *Idaho*: Payette, June 20 (W. Ivie), female paratype. *Utah*: City Creek, Salt Lake City, August 2 (W. Ivie), female paratype. Jordan River, near Salt Lake City, May 4 (W. Ivie), female paratype. Verdure (Chamberlin and Gertsch, 1928), male. Clear Creek, Raft River Mountains (Chamberlin and Ivie, 1933), one female.

*Neon ellamae*, new species, has as its nearest relatives the European *valentulus* and the following new species, *N. plutonus*, of the eastern United States. It averages slightly larger than either of these species. In *ellamae* the palpus is heavier and has a somewhat longer embolus, which is broader at its base and forms a more pronounced curve on the prolateral side of the cymbium. The differences in the epigyna are well shown in the illustrations. The broadly oval atria of *ellamae* are narrower than the prominent internal receptacles and are at most equal in length to the space between their caudal edges and the genital groove. In *plutonus* the atria are proportionately very much larger and are longer than the space between their caudal edges and the genital groove.

The present species is dedicated respectfully to Mrs. Ella May Ivie, mother of the second author, from whose farm near Fruitland, Idaho, have come many specimens of this fine little *Neon*.

*Neon plutonus*, new species

Figures 5, 8

Color and structure in close agreement with those of *Neon ellamae*, new species, and with those of the European *Neon valentulus*. Carapace light orange-brown to dusky brown, with the black pattern framing the eyes distinct. Dorsum of abdomen pale yellowish brown, with dusky gray to blackish chevrons, or entire dorsum quite uniform brown, with a few pale spots visible in some males. Legs brownish, the first pair darkest, the posterior pairs with contrasting spots.

Male from Suffolk County, New York: Total length, 2.00 mm. Carapace 0.96 mm. long, 0.75 mm. wide. Abdomen 1.00 mm. long, 0.75 mm. wide.

Quadrangle of side eyes much broader (0.75 mm.) than long (0.56 mm.) and slightly wider behind, the eyes subequal in size. First leg: femur, 0.58 mm., patella, 0.35 mm., tibia, 0.40 mm., metatarsus, 0.30 mm., and tarsus, 0.24 mm.; total, 1.87 mm. Patella and tibia of fourth leg, 0.69 mm.

Palpus as illustrated in figure 5.

Female from Gainesville, Florida: Total length, 1.95 mm. Carapace 0.90 mm. long, 0.75 mm. wide. Abdomen 1.05 mm. long, 0.85 mm. wide.

Quadrangle of side eyes much broader (0.75 mm.) than long (0.56 mm.) and slightly wider behind, the eyes subequal in size. First leg: femur, 0.53 mm., patella, 0.30 mm., tibia, 0.35 mm., metatarsus, 0.25 mm., and tarsus, 0.20 mm.; total, 1.63 mm. Patella and tibia of fourth leg, 0.56 mm.

Epigynum as illustrated in figure 8.

TYPE LOCALITY: Male holotype and female allotype from Gainesville, Florida, February 18, 1939 (W. J. Gertsch).

DISTRIBUTION: Eastern States from New York south to Florida.

RECORDS: *New York*: Suffolk County: Long Pond, June 29, 1924 (S. C. Bishop), male paratype. Baiting Hollow, Sound Beach, Long Island, May 23, 1924, male paratype. Orange County: Little Pond, May 28, 1920, male paratype. Wayne County: Mud Pond, Zurich, May 17, 1931, male paratype. Monroe County: Mendon Park, May 18, 1930, male paratypes. *Georgia*: Three miles north of Savannah, March 15, 1954 (W. Ivie), four female paratypes. *Florida*: Green Cove Springs, February 19, 1936, male paratype.

*Neon reticulatus* Blackwall

Figures 12-14, 16



*Salpicus reticulatus* BLACKWALL, 1853, Ann. Mag. Nat. Hist., ser. 2, vol. 11, p. 14.

*Neon reticulatus* SIMON, 1876, Les arachnides de France, vol. 3, p. 210; 1937, op. cit., vol. 6, pt. 5, pp. 1184, 1254, figs. 1863–1865. LOHMANDER, 1945, Meddel. Göteborgs Mus. Zool. Avd., vol. 3, p. 40, figs. 40–46. LOCKET AND MILLIDGE, 1954, British spiders, vol. 1, p. 221, figs. 109c, 109f.

*Neon obliquus* BANKS, 1895, Canadian Ent., vol. 27, p. 98.

*Neon nellii* WORLEY, 1932, Univ. Washington Publ. Biol., vol. 1, p. 60. CHAMBERLIN AND IVIE, 1947, Bull. Univ. Utah, vol. 37, no. 10, p. 72.

Seven females vary from 2.2 mm. to 2.9 mm. and average 2.6 mm. in total length.

Coloration in close agreement with that of *Neon nellii* and other species. Carapace bright yellowish brown, with the black narrow marginal seam and the typical rectangular black pattern enclosing the eyes in good contrast. Palpi dusky. Legs bright yellowish brown, the first pair only slightly darker and not noticeably dusky, all the legs with indistinct dusky rings. Sternum and under side of carapace yellowish brown, sometimes dusky. Abdomen whitish to pale yellow, the dorsum with a dusky to black pattern of chevrons and reticulations.

Female from Goble, Oregon: Total length, 2.50 mm. Carapace 1.15 mm. long, 0.90 mm. wide. Abdomen 1.35 mm. long, 1.05 mm. wide.

Structure in close agreement with that of *Neon nellii* and relatives. Quadrangle of lateral eyes much broader (0.90 mm.) than long (0.66 mm.). Posterior eyes 0.16 mm. in diameter, equal in size to the anterior lateral but smaller than the anterior median which are 0.25 mm. in diameter. Spination of legs typical. First leg: femur, 0.67 mm., patella, 0.39 mm., tibia, 0.46 mm., metatarsus, 0.33 mm., and tarsus, 0.27 mm.; total, 2.12 mm. Tibia and patella of fourth leg, 0.79 mm.

Epigynum as illustrated in figure 12.

Male from Coquille, Oregon: Total length, 2.65 mm. Carapace 1.15 mm. long, 0.99 mm. wide. Abdomen 1.50 mm. long, 1.15 mm. wide.

Color pattern as in female but with more duskiness. Sides of carapace with black streaks and reticulations. Sternum dusky. First leg dusky brown, blackish on the sides of the basal segments, the remaining legs paler but with dusky rings and spotting. Abdomen entirely covered above by a yellow scutum and with a dusky pattern beneath.

Quadrangle of side eyes broader (0.92 mm.) than long (0.70 mm.). Tibia and patella of first leg, 0.93 mm.

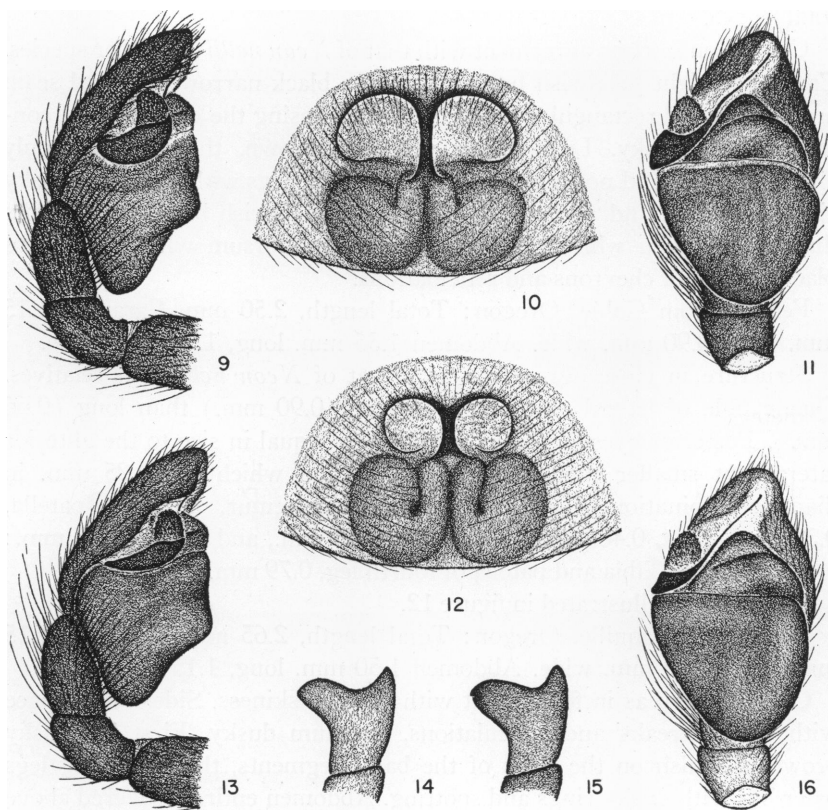
Palpus as illustrated in figures 13, 14, and 16. Embolus a thin spine originating on prolateral side of bulb well in front of the middle and passing across apical edge to lie in cymbial groove.

TYPE LOCALITIES: Of *Salpicus reticulatus*, near Oakland, Derbyshire,

England, original material probably lost; of *Neon obliquus* Banks, Olympia, Washington, one male and immature female cotypes in the Museum of Comparative Zoölogy.

DISTRIBUTION: All of Europe; eastern Siberia; Alaska southward through British Columbia to Washington and Oregon and Rocky Mountains south into Arizona.

RECORDS: *Alaska*: Matanuska Valley (Chamberlin and Ivie, 1947), immature specimen presumably this species. *British Columbia*: Terrace,



FIGS. 9-11. *Neon nelli* Peckham and Peckham. 9. Left male palpus, prolateral view. 10. Epigynum, ventral view. 11. Left male palpus, ventral view.

FIGS. 12-14. *Neon reticulatus* Blackwall. 12. Epigynum, ventral view. 13. Left male palpus, prolateral view. 14. Tibia of left male palpus, retrolateral view.

FIG. 15. *Neon nelli* Peckham and Peckham, tibia of left male palpus, retrolateral view.

FIG. 16. *Neon reticulatus* Blackwall, left male palpus, ventral view.

June, July, 1931 (M. E. Hippisley), seven females; Wellington, Vancouver Island, June 20, 1951 (R. Guppy), one male. *Washington*: Olympia, type locality of *Neon obliquus* (Banks, 1895); Hoh River, Olympic National Park, August 3, 1954 (C. J. Goodnight), one female; Arlington, September 11, 1935 (W. Ivie), female; Elwha River, Olympic National Park, July 15, 1954 (H. Levi), female. *Oregon*: Coquille, May 18, 1938 (H. B. Leech), one male; Goble, April, 1938 (K. Gray and J. Schuh), five females; Coos Head, September 12, 1947 (I. Newell), three females; Waldport, June 11, 1936, male, two females, in sphagnum. *Arizona*: Santa Catalina Mountains, 7800 feet, June 25, 1940 (O. Bryant), one male.

Specimens of *Neon reticulatus* from England, Sweden, Finland, and Switzerland have been available for comparison with the relatively few American examples listed above. No differences of consequence have been noted during study of specimens from these widely separated regions. Simon (1937, *Les arachnides de France*, vol. 6, p. 1254) records *reticulatus* from the United States on the authority of J. H. Emerton. The source of this record is unknown to us, but undoubtedly it was based on the allied *Neon nellii*.

*Neon nellii* Peckham and Peckham

Figures 9–11, 15

*Neon nellii* PECKHAM AND PECKHAM, 1888, *Trans. Wisconsin Acad. Sci.*, vol. 7, p. 88, pl. 1, fig. 65, pl. 6, fig. 65. EMERTON, 1891, *Trans. Connecticut Acad. Sci.*, vol. 8, p. 22, pl. 20, figs. 1–1c; 1894, *ibid.*, vol. 9, p. 420. BANKS, 1895, *Jour. New York Ent. Soc.*, vol. 3, p. 92. PECKHAM AND PECKHAM, 1895, *Occas. Papers Nat. Hist. Soc. Wisconsin*, vol. 2, p. 175. EMERTON, 1902, *The common spiders of the United States*, p. 47, figs. 130, 131. BRYANT, 1908, *Occas. Papers Boston Soc. Nat. Hist.*, vol. 7, p. 92. PECKHAM AND PECKHAM, 1909, *Trans. Wisconsin Acad. Sci.*, vol. 16, p. 588, pl. 1, figs. 5–5b. EMERTON, 1910, *Appalachia Jour.*, vol. 12, p. 156. BANKS, 1911, *Proc. Acad. Nat. Sci. Philadelphia*, p. 456. PETRUNKEVITCH, 1911, *Bull. Amer. Mus. Nat. Hist.*, vol. 29, p. 676 (catalogue). COMSTOCK, 1913 (1912), *The spider book*, p. 675. EMERTON, 1920, *Trans. Roy. Canadian Inst.*, vol. 12, p. 338; 1930, *Publ. Nantucket Maria Mitchell Assoc.*, vol. 3, no. 2, p. 172. BRIMLEY, 1938, *Insects of North Carolina*, p. 484. COMSTOCK, 1940, *The spider book*, rev. ed., p. 683. CHICKERING, 1943, *Papers Michigan Acad. Sci.*, vol. 29, p. 179, figs. 74–77. CHAMBERLIN AND IVIE, 1944, *Bull. Univ. Utah*, vol. 35, no. 9, p. 204. KASTON, 1948, *Connecticut State Geol. Nat. Hist. Surv.*, *Bull.*, no. 70, p. 457, pl. 90, figs. 1663–1666. LEVI AND FIELD, 1954, *Amer. Midland Nat.*, vol. 51, no. 2, p. 462. HACKMAN, 1954, *Acta Zool. Fennica*, vol. 79, pp. 9, 90.

Females vary from 1.80 mm. to 3.00 mm., and average about 2.55 mm. in total length.

Carapace pale to bright yellowish or orange-brown, sometimes suffused

with smoky, but usually paler, with the black maculation joining the eyes distinct. Sternum and under side of carapace yellowish, without contrasting markings. Legs pale yellowish, with more or less distinct dark rings and maculations in average specimens, but in darker spiders the appendages are heavily mottled. Dorsum of abdomen with a more or less distinct series of dusky chevrons and reticulations.

Female from Trenton Falls, New York: Total length, 2.60 mm. Carapace 1.10 mm. long, 0.82 mm. wide. Abdomen 1.35 mm. long, 1.10 mm. wide.

Quadrangle of side eyes much broader (0.83 mm.) than long (0.58 mm.), as wide behind as in front. First leg: femur, 0.58 mm., patella, 0.34 mm., tibia, 0.40 mm., metatarsus, 0.28 mm., and tarsus, 0.23 mm.; total, 1.83 mm. Tibia and patella of fourth leg, 0.75 mm.

Epigynum as illustrated in figure 10.

Males average about 2.55 mm., as do the females.

Coloration essentially as in the females. Base color of carapace more often orange or smoky brown. First pair of legs blackish. Abdomen sclerotized, pale to bright yellowish, the pattern often indistinct or dispersed.

Male from Willoughby, Ohio: Total length, 2.55 mm. Carapace 1.27 mm. long, 0.97 mm. wide. Abdomen 1.30 mm. long, 1.07 mm. wide.

Quadrangle of side eyes much broader (0.97 mm.) than long (0.71 mm.), as wide behind as in front. First leg: femur, 0.78 mm., patella, 0.44 mm., tibia, 0.55 mm., metatarsus, 0.38 mm., and tarsus, 0.27 mm.; total, 2.42 mm. Tibia and patella of fourth leg, 0.95 mm.

Palpus as illustrated in figures 9, 11, and 15. Embolus at base a broad semilunar ring, which originates on prolateral side of bulb in front of center and curves to the ventral side where it narrows rapidly to a thin spine. From inner side of embolus near the base projects a rounded, heavily spiculate lobe. The distal spine of embolus crosses the bulb and lies in a smooth groove at end of cymbium. Tibial apophysis a short rounded spur.

TYPE LOCALITIES: Male and female cotypes from Pennsylvania and Canada, presumably in the Museum of Comparative Zoölogy.

DISTRIBUTION: Widespread in the eastern United States from Georgia and Texas northward, into Canada and westward to the Rocky Mountains.

RECORDS: *Labrador*: One female without specific locality. *Newfoundland*: Hogans Pond (Hackman, 1954). *Ontario*: Lake Opeongo, Algonquin Park, June 26–July 7, 1945 (W. Ivie, T. Kurata); August 17, 1948 (W. J. Gertsch, T. Kurata). Bear Island and Island 1024, Lake Temagami.

gami, August 15–25, 1946 (W. J. Gertsch, W. Ivie, T. Kurata). Five miles east of Gore Bay, Manitoulin Island, July 26, 1948 (W. J. Gertsch, W. Ivie, T. Kurata). Batchawana, July 29, 1948 (W. J. Gertsch, W. Ivie, T. Kurata). Nipigon, August 12, 1948 (W. J. Gertsch, T. Kurata). *Maine*: Presque Isle, August 26, 1925. Molunkus Pond, August 25, 1925. Mount Desert Island, June 23, 1943 (W. Procter). Monhegan (Bryant, 1908). Portland (Bryant, 1908). *New Hampshire*: Lake Winnepesaukee (Bryant, 1908). West Ossipee, August, 1936 (S. Mulaik). *Massachusetts*: Eastham, May 31, 1935 (Crosby). Mount Wachusett, October 28, 1932 (Crosby). Otter River, July 22, 1921. Concord, June, 1933 (W. J. Gertsch, W. Ivie). Sharon (Bryant, 1908). Brookline (Bryant, 1908). Nantucket, Hidden Forest, Taupaushau Pond (Emerton, 1930). *Connecticut*: Kaston (1948, p. 457) has listed 10 localities from all parts of the state. *New York*: Widespread in the state, reported from 33 localities by Crosby and Bishop (1926, p. 1071); many additional state records in Cornell and American Museum collections. *New Jersey*: Sussex County: High Point State Park, June 19, 1945 (C. and M. Goodnight). Schooley Mountain, May 23, 1910. Ramsey, June, 1941 (W. J. Gertsch). Lambertville, May, 1953 (W. Ivie). *Pennsylvania*: Shillington, June 20, 1937 (L. Hook). Jamison, April, 1954 (W. Ivie). *North Carolina*: Swannanoa Valley (Banks, 1911; Brimley, 1938). *Tennessee*: Trail to Alum Cave, Great Smoky Mountain National Park, June 21, 1941 (C. and M. Goodnight). New Found Gap, Great Smoky Mountain National Park, June 19, 1941 (C. and M. Goodnight). *Georgia*: Folkston, February 18, 1936. Gainesville, April 24, 1943 (Chamberlin and Ivie, 1944). *Illinois*: Salts, May 24, 1926 (Smith). *Ohio*: Lake County: Willoughby, May 6, 1949 (J. Pallister). *Michigan*: Numerous localities in both peninsulas of state (Chickering, 1943). *Wisconsin*: Manitowoc County: Point Beach State Forest (Levi and Field, 1954). Door County: Fishcreek, July 25, 1949 (Levi and Field, 1954). Sawyer County: Flambeau State Forest, September 26, 1952 (H. Levi). Grant County: Wyalusing State Park, June 15, 1949 (Levi and Field, 1954); Fennimore, June 13, 1949 (Levi and Field, 1954). Dane County: Madison (Levi and Field, 1954). Lincoln County: Merrill (Levi and Field, 1954). *Minnesota*: Minneapolis, May, 1932 (W. J. Gertsch). *South Dakota*: Custer County: Near the Needles, Black Hills, June 24, 1954 (H. Levi). *New Mexico*: Valencia County (C. C. Hoff).

*Neon nellii* closely resembles its near relative *reticulatus* in general appearance but is readily differentiated by details of the genitalia. The atria of the epigynum in *nellii* are very large and approach in size the large oval receptacles, whereas in *reticulatus* the quite small atria have only

half of the diameter of the receptacles. In the palpus of *nellii* the embolus is very much heavier at the base.

*Neon avalonus*, new species

Figures 17-20

Coloration and structure in both sexes in close agreement with *Neon nellii* and paler specimens of *Neon ellamae*. Black pattern enclosing eyes distinct and sides of carapace with few dark streaks. Dorsum of abdomen with grayish chevrons on a whitish base, but the male has a quite distinct, sclerotized yellowish patch or scutum, covering two-thirds of the dorsum. Posterior legs with dusky spots and rings and the front legs strongly marked with black.

FEMALE: Total length, 2.20 mm. Carapace 1.05 mm. long, 0.87 mm. wide. Abdomen 1.10 mm. long, 0.75 mm. wide.

Quadrangle of side eyes much broader (0.87 mm.) than long (0.60 mm.), slightly wider in front than behind (0.85 mm.), the eyes subequal in size. First leg: femur, 0.62 mm., patella, 0.36 mm., tibia, 0.45 mm., metatarsus, 0.30 mm., and tarsus, 0.25 mm.; total, 1.98 mm. Tibia and patella of fourth leg, 0.80 mm.

Epigynum as illustrated in figure 18.

MALE: Total length, 2.65 mm. Carapace 1.20 mm. long, 1.00 mm. wide. Abdomen 1.45 mm. long, 1.20 mm. wide.

Quadrangle of side eyes much broader (1.00 mm.) than long (0.72 mm.), as broad behind as in front. First leg: femur, 0.82 mm., patella, 0.46 mm., tibia, 0.61 mm., metatarsus, 0.40 mm., and tarsus, 0.30 mm.; total, 2.59 mm. Tibia and patella of fourth leg, 0.93 mm.

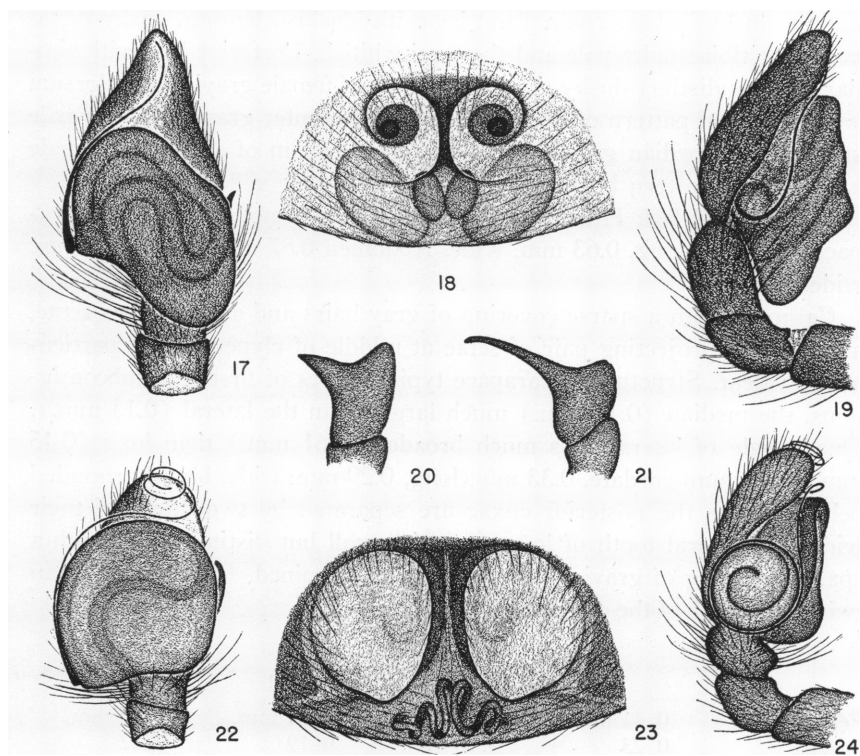
Palpus as illustrated in figures 17, 19, and 20. Embolus thin, originating on prolateral side below middle of bulb. Tibial apophysis a thin, pointed spur much longer than in the other species of the *nellii* series.

TYPE LOCALITY: Male holotype from San Luis Obispo, California, August 3, 1953 (W. J. Gertsch and J. W. Gertsch).

DISTRIBUTION: This species occurs along the California coast from near Los Angeles to the vicinity of San Francisco.

RECORDS: *California*: Black Mountain, August 22, 1918, female allotype. Santa Catalina Island, May 14, 1936 (S. C. Bishop), female paratype.

*Neon avalonus* belongs to the section of the genus in which the base of the embolus is not provided with a prominent spiculate outgrowth. The male palpus agrees in this feature and in many other details with that of the European *Neon laevis* Simon. It differs from that species in the proportions of various elements of the palpus as may be best appreciated by



FIGS. 17-20. *Neon avalonus*, new species. 17. Left male palpus, ventral view. 18. Epigynum, ventral view. 19. Left male palpus, prolateral view. 20. Tibia of left male palpus, prolateral view.

FIGS. 21-24. *Neon pixii*, new species. 21. Tibia of left male palpus, retrolateral view. 22. Left male palpus, ventral view. 23. Epigynum, ventral view. 24. Left male palpus, prolateral view.

comparison of the figures. The females differ quite significantly in epigyna. The epigynum of *laevis* has the shallow atria very large and abruptly dilated behind into a broad, subtriangular piece, whereas in *avalonus* the atria are of more modest size and have their posterior limits remote from the genital groove.

#### *Neon pixii*, new species

##### Figures 21-24

Base color of integument grayish with pale yellowish cast, the pattern dusky to black. Carapace with typical dark pattern evident but usual pale areas invaded by dusky. Sides of carapace dusky, with black lines and a rather indistinct marginal black seam. Sternum, mouth parts, and legs

mainly dusky in base color. First leg with blackish femora, dusky metatarsi, but tibiae quite pale and the tarsi whitish. Posterior legs with similar but less distinct dusky rings. Abdomen of female grayish, the dorsum with a distinct pattern of dusky chevrons, the venter gray, with four pale stripes from median groove to spinnerets. Dorsum of abdomen in male with similar pattern but largely covered by a pale yellowish scutum.

Male from Black Hills, South Dakota: Total length, 1.65 mm. Carapace 0.80 mm. long, 0.63 mm. wide. Abdomen 0.87 mm. long, 0.70 mm. wide.

Carapace with a sparse covering of gray hairs and a few longer setae, a forwardly projecting pair of setae at middle of clypeus being particularly evident. Structure of carapace typical. Eyes of first row subcontiguous, the median (0.18 mm.) much larger than the lateral (0.13 mm.). Quadrangle of lateral eyes much broader (0.61 mm.) than long (0.45 mm.). Sternum cordate, 0.33 mm. long, 0.29 mm. wide, bluntly rounded behind where the posterior coxae are separated by two-thirds of their width. Cheliceral tooth of lower margin small but distinct. Legs with a sparse covering of grayish hairs and typically spined. First leg less than twice the length of the carapace.

	I	II	III	IV
Femur	0.41 mm.	0.36 mm.	0.34 mm.	0.45 mm.
Patella	0.23	0.20	0.19	0.22
Tibia	0.30	0.22	0.21	0.32
Metatarsus	0.21	0.17	0.20	0.31
Tarsus	0.20	0.17	0.17	0.23
Total	1.35 mm.	1.12 mm.	1.11 mm.	1.53 mm.

Abdomen suboval, bluntly pointed behind, clothed sparsely with grayish hairs.

Palpus as illustrated in figures 21, 22, and 24. Embolus thin, originating at base of bulb on prolateral side, where it forms two and one-half spiral turns, and curving around side margin to apex where it forms a spiral curl and lies on a white area of the cymbium.

Female from Nevada County, California: Total length, 2.05 mm. Carapace 0.93 mm. long, 0.76 mm. wide. Abdomen 1.10 mm. long, 0.90 mm. wide.

Coloration and structure in very close agreement with those of the male. Quadrangle of lateral eyes broader (0.93 mm.) than long (0.57 mm.). First leg: femur, 0.54 mm., patella, 0.30 mm., tibia, 0.37 mm., metatarsus, 0.26 mm., and tarsus, 0.20 mm.; total 1.67 mm. Patella and



tibia of fourth leg, 0.67 mm. First leg less than twice the length of the carapace.

Epigynum as illustrated in figure 23, presenting externally two oval foveae, very large for the size of the spider, which together are a little wider than the sternum. Space between caudal edge of foveae and genital groove only half of the length of former.

TYPE LOCALITY: Male holotype from near Blue Bell, in the Black Hills, Custer County, South Dakota, June 19, 1954. The single specimen was taken from a dry cliff in a ponderosa pine woods, at an altitude of 4900 feet, by Lorna and Herbert Levi.

DISTRIBUTION: Western United States from South Dakota and Utah westward to the Sierras and coastal areas of California.

RECORDS: *California*: Nevada County: Chicago Park, July 26, 1950 (A. E. Cott and S. F. Bailey), female allotype. Marin County: Mill Valley, June, 1951 (D. E. Hardy), male paratype. *Utah*: Foothills near Salt Lake City. *Oregon*: Service Creek, July 10, 1953 (V. Roth), female paratype.

This very interesting spider seems to be a close ally of *Neon rayi* Simon and *N. pusio* Simon of France and central Europe. All have the embolus coiled at base and apex. The thin tibial apophysis and distinctive epigynum of *Neon pixii*, new species, readily separate the American species from its European relatives. A relatively wide distribution for *Neon pixii* is indicated even by the sparse material recorded above.

