

DESCRIPTIONS OF SEVEN NEW SPECIES OF RED SPIDERS.

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Six species of *Tetranychus* and one of *Tetranychina* are herein described for the first time. Two of these from South America and five from North America are of some economic importance. One discolors the leaves of American holly, one injures at times the appearance of the beautiful western white oak, and one saps the vitality of the large huckleberry of the Cascade region.

TETRANYCHUS PERUIANUS, new species.

Color, translucent yellowish green. Eyes (in mounted material) clear, directly over front margin of coxae II. Dorsal bristles, 24 in number, not arising from tubercles, for the most part very short and weak, distributed on dorsal aspect of body in about the usual arrangement. Body of female rhombic-ovate, widest across hind margin of cephalothorax, which is slightly emarginate in front; male cuneate-pentagonal, widest across hind margin of cephalothorax, which is truncate in front, abdomen tapering to acute point posteriorly. Mandibular plate considerably more than twice as long as broad, margins subparallel, with a very distinct anterior emargination. "Thumb" of palpus very short in proportion to its width, bearing at its tip a relatively large, subconical "finger," whose base is half as wide as tip of "thumb," length of "thumb" and terminal "finger" together equaling width of "thumb." On its rather truncate tip, on opposite sides of the "finger," are two stout spines or pseudo-fingers (not much thicker than hairs); on upper side, about one-third to base, is a small "finger," and between this and base are two short hairs, the distal-most one of which appears to arise adjacent to the small "finger." The claw on the penultimate joint reaches far beyond the middle of the "thumb;" a hair arises laterally from the center of the "thumb," and another from a similar position on the penultimate joint. The legs are unusually short, in the female distinctly less than the width of the body, in the male barely exceeding the width of body. Femur I considerably less than twice as long as wide, about half again as long as tarsus I. Tibia I just equaling patella I, which

barely equals trochanter I. Tip of tarsus bears a stout, sickle-shaped claw, which is unclenched to its tip; arising from the under face of this claw, near its base, are six weak spines, which are less than one-fourth the length of the main claw. The usual series of four capitate hairs arise by the sides of the base of the claw from the tip of the short onychium. The egg is unknown to the writer.

Type.—Cat. No. 20164, U.S.N.M.

The type material was collected by Mr. E. W. Rust "along the line of the Ferrocarril Central del Peru near La Legua (between Lima and Callao), Peru, South America, January, 1913, from the under-side of willow (*Salix*, species) leaves." The species is somewhat intermediate between *T. bicolor* Banks and *T. yothersi* McGregor, but is in no wise closely allied to either species.

Notes.—An ample series of measurements of mounted material in fair condition have yielded the following averages for adults of both sexes.

Sex.	Length (not including palpi).	Width.	Foreleg.
	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Female.....	0.299	0.205	0.173
Male.....	0.237	0.168	0.177

The relative lengths of the leg joints are as follows: Coxa 9, trochanter 10, femur 16, patella 9.5, tibia 9.5, tarsus 10.

Mr. Rust states that the presence of this species causes the willow leaves to turn yellow and drop, but did not appear to greatly injure the trees. He says that the individuals live in restricted colonies under small, compact webs which almost completely conceal them. These webs, according to Mr. Rust, resemble very much the webs under which many true spiders deposit their eggs. No predaceous species were observed in the mite colonies.

TETRANYCHUS RUSTI, new species.

Color ranging from yellowish or greenish to red. Eyes (in mounted material) translucent, directly over coxae II and between subfrontal and posterior cephalothoracic bristles. The dorsal epidermal appendages are not distributed to conform with the usual arrangement for this genus, but a series of 26 shortish, nontapering, sparsely serrate, rod-like appendages are distributed on the dorsal aspect of the body as follows: One at either side of mandibular plate anteriorly, one just anterior to each eye, one just posterior to each eye, six forming a fringe at hind margin of body, three along each side of abdomen, a series of four along the anterior margin of abdomen, one on either side of median axis in line with coxae III, and one on either side of

median line near hind margin of abdomen. Body of female ovate, widest across front region of abdomen, slightly obese for the size of legs; cephalothorax rather evenly rounded anteriorly with a slight truncate border overlying the palpi; male elongate-sagitate in outline, legs conspicuously long for size of body. Mandibular plate slightly over half as wide as long, tapering gradually forward, with almost no emargination anteriorly. "Thumb" of palpus subcylindrical, beelling considerably at base, upper surface indented near central point; tip of "thumb" bearing three "fingers," one at inferior angle conical and three times as long as thick, one at superior angle slender and eight times as long as thick; a slender "finger" between these at inner angle which in size is intermediate between them. A reduced "finger" and a slender spine arise side by side from the indentation of the upper side of "thumb"; a hair arises latero-ventrally from near base of "thumb." The claw of the penultimate joint reaches to the subbasal "finger." Legs of female are of average length, barely less than that of body; those of male are slightly more than half again as long as body. Femur nearly five times as long as thick, from three-quarters again to twice as long as tarsus. Tibia about a quarter again as long as patella, which is two and a half times as long as trochanter. Relative length of joints are as follows: Coxa, 6; trochanter, 4; femur, 15; patella, 10.3; tibia, 12.7; tarsus, 8.5. Tip of tarsus not provided with a claw. The usual series of four capitate hairs arise from the end of the onychium.

Type.—Cat. No. 20170, U.S.N.M.

The type material from Mira Flores Station, Departamento of Piura, Hacienda "San Jacinto," Peru, South America, October 15, 1912, on papaya (*Carica papaya*). Collected by Mr. E. W. Rust. Allied to *T. latus* of Europe, but closest to *T. banksi* McGregor, from which it may be distinguished as follows:

T. banksi: Body widest across middle of cephalothorax; length of body of male barely exceeding width; 18 spatulate-serrate hairs comprise the dorsal series of epidermal appendages; palpal "thumb" with a single terminal "finger;" mandibular plate distinctly emarginate.

T. rusti: Body widest across anterior region of abdomen; length of body of male two-thirds again as long as wide; 26 slightly serrate rod-like hairs comprise the dorsal series of epidermal appendages; palpal "thumb" with three terminal "fingers;" mandibular plate not clearly emarginate.

Notes.—Mr. Rust writes that—

A bad infestation injures the large, tender leaves of the papaya in much the same way that cotton is injured by *T. bimaculatus*. Very abundant, feeding on the upper sides of medium-aged leaves, but very little web was seen. In short the species in life behaves and appears so much like *T. bimaculatus* that I supposed from a superficial examination that they were one and the same. In color, like *T. bimaculatus*, ranging from yellowish and greenish to red. No predaceous species were noted.

An ample series of measurements of individuals of this species have yielded the following averages:

Sex.	Length (exclusive of palpi).	Width.	Foreleg.
	<i>mm.</i>	<i>mm.</i>	<i>mm.</i>
Female.....	0.325	0.245	0.302
Male.....	.282	.175	.405

TETRANYCHUS MONTICOLUS, new species.

Body of a rather uniform pale amber color. Eyes pale; one cornea on each side close behind the subfrontal bristle, behind which are the carrot-colored eye spots. Legs and palpi rather paler than body. Dorsal bristles colorless, distinctly plumose, 26 in four rows, the longest about five-ninths the width of body. Body pyriform-elliptic, usually widest between legs II and III. Mandibular plate nearly three times as long as broad, narrowed considerably anteriorly to a well-rounded, unemarginated tip. "Thumb" of palpus two-thirds as long as broad, bearing on its truncate tip a subconical "finger," whose base is only two-fifths as wide as the tip of the "thumb." On its upper distal corner are two pin-shaped pseudo-fingers, in length somewhat exceeding the terminal "finger," on upper side, about a third the distance to base, is a very small "finger;" and immediately proximad to this is a short hair. Another similiar hair occurs on the upper side just at base; a hair arises on the ventral aspect of the "thumb." The claw of the penultimate joint does not reach quite to the dorsal "finger." The legs are short, not much over two-thirds the length of body (exclusive of palpi). Femur a little more than twice as long as wide, not quite as long as tarsus; tibia a little longer than patella, which is five-sevenths again as long as the trochanter. Relative length of joints is as follows: Coxa, 8; trochanter, 7; femur, 20; patella, 12; tibia, 14; tarsus, 22. Tip of tarsus bears a claw which is bent near its middle and cleft into six slightly curved spurs. The customary four capitate hairs arise, two on either side by base of claw, tarsal claw of male differing from that of female in that its six divisions are much shorter and more abruptly acuminate. The collar trachea is rather novel; it runs downward and backward from the pore, then turns suddenly upward and backward to form an angle of about 130°, and then the superior arm bends abruptly forward and upward, paralleling the inferior arm. The superior arm is much shorter and of somewhat smaller caliber than the inferior arm. The penis is of unusual type. The short inner lobe is rod-like for most of its length and then expands suddenly to form the prominent basilar lobe; the outer shaft arises as a rod-like structure not materially stouter than the inner lobe, and for one-third its length is directed

about continuous with the inner lobe, but bends slightly downward, then extending backward as a straight, slender spur, terminating in a very sharp point.

Type.—Cat. No. 20165, U.S.N.M.

The type material is from the south slope of Mount Hood, Oregon, above Government Camp, at an altitude of 6,000 feet, August 23, 1915, from underside of leaves of large-berried huckleberry (*Vaccinium*, species). Considerable discoloration and dropping of leaves accompanies the mite's activities. The species is rather close to *T. oregonensis*, described herein, but is readily distinguished from the latter through the marked differences in the form of the penis and collar trachea. As far as we know this establishes a record for altitude for a red spider species.

TETRANYCHUS OREGONENSIS, new species.

Color, straw-color or pale yellowish amber; lateral spots lacking or very inconspicuous. Eyes pale, a single one on either side near base of subfrontal bristles. Legs and palpi paler than body. Dorsal bristles, 26, in four rows, plumose, pale, longest bristle (subfrontal) equal to half the breadth of body. Body elliptic-ovate, 0.304 mm. long by 0.142 mm. wide; vertical thickness of body greatly reduced. "Thumb" of palpus very short, nearly half again as wide as long, bearing at its tip a fairly ample "finger," whose base, however, is slightly more than one-third the width of "thumb" at tip. On its upper distal corner are two pseudo-fingers; on upper side hardly midway to base is a very small "finger" or sensilla, and between this and base are two short hairs; a hair arises latero-ventrally from the center of the "thumb." The claw on the penultimate joint reaches to the dorsal "finger." The spur on the second joint of the male palpus is rather long and tack-like. The legs are rather short, about three-fourths the length of body. Femur hardly twice as long as wide, equaling the tarsus; tibia one-fourth longer than patella, which barely surpasses the trochanter in length. Relative length of joints as follows: Trochanter, 10; femur, 21; patella, 11; tibia, 14; tarsus, 21. Tip of tarsus bears a claw, which is strongly bent below its middle; the portion beyond this point is cleft into six nearly straight claw divisions, the two inner of which are somewhat stronger than the others. The usual series of four capitate hairs arise by the sides of the claw base. Collar trachea of novel type; runs backward and downward as a straight even-calibred tube, and then bends sharply upward into a short wide chamber, the two arms making an angle with one another of less than 90°. In the one rather poor male specimen the penis shaft appears to taper gradually to a strong, unbarbed hook.

Type.—Cat. No. 20166, U.S.N.M.

The type material is from Portland, Oregon, September 2, 1915, from wild cherry (*Prunus*, species), collected by the author. The species is nearest *T. monticolus*, herein described, from which it is readily separable through the collar trachea and penis characters.

TETRANYCHUS WILLAMETTEI, new species.

Color, pale lemon-yellow. Eyes single on each side. Legs and palpi, pale color. Dorsal bristles not arising from tubercles. Body of female elliptical, four-fifths again as long as broad, widest between legs III; length, 0.25 mm.; breadth, 0.14 mm. Bristles, about 22, in four dorsal rows, the longest about half the width of the body. Mandibular plate with parallel sides, $2\frac{3}{4}$ as long as broad, rounded at tip with no emargination visible. "Thumb" of palpus of very unusual form—semispherical or subconical, bearing at its tip a very slender, long "finger"; on its upper side near apex are two pin-shaped pseudo-fingers, and on same side about midway to base is a "finger" shorter and even thinner than terminal "finger;" between this and base are two slender hairs a trifle longer than subbasal "finger"; a slender hair arises latero-ventrally one-third the distance from tip to base of "thumb." The claw on the penultimate joint does not reach to subbasal "finger." The legs are rather short; forelegs about four-fifths the length of body. Femur about two and one-half times as long as thick, barely longer than the tarsus; tibia, and patella equal. Tip of tarsus bears a claw which is rather strongly bent near base and only slightly arched for the rest of its length; it appears to be uncleft for over half its length, and then divided into six closely appressed spines. The usual series of four capitate (tenent) hairs arise in pairs by the sides of the claw base. The collar trachea, opening medially in a pore, runs first downward and backward, then upward and backward, and then upward and slightly forward. It is of nearly even caliber throughout, but gradually enlarges a trifle toward the hind end. Viewed as a whole it is very nearly sickle-shaped. The penis is simple in structure, the shaft being very gradually attenuated to an extremely sharp point; it is very slightly bent just distad to the middle, but is generally straight.

Type.—Cat. No. 20169, U.S.N.M.

The type material is from Oregon City, Oregon, August 22, 1915, from the leaves of the white oak (*Quercus lobata*), collected by the author. The presence of this species on oaks is revealed from a distance through the rusty appearance. The species appears to be quite aberrant, but finds its nearest ally, perhaps, in *Neotetranychus rubi* of Trägårdh.

TETRANYCHUS ILICIS, new species.

Color, from ferruginous to reddish-brown, with a pale pink area embracing central portion of the cephalothorax; darker than most red spider species. Eyes conspicuous, carmine. Dorsal bristles

colorless, arising from rather prominent tubercles, densely clothed with distally pointing barbules; subfrontal bristle one-fourth again as long as frontal one. Body rotund-elliptical; male much less rotund, narrowed backward. Bristles about 22 in four rows, in length averaging about five-sevenths the width of body. Mandibular plate three-fourths again as long as wide, narrowed somewhat anteriorly to a rounded tip, which is distinctly emarginate in the female. Palpi pale pink, like cephalothorax. "Thumb" of palpus not greatly shortened axially, the thickness at middle being about nine-tenths of its length, bearing at its tip a slightly clavate "finger," whose base is less than half as wide as the tip of the "thumb;" on its upper distal corner are two spine-like pseudo-fingers; on upper side almost midway to base is a greatly reduced "finger," about one-fourth as thick as the terminal "finger," and between this and base are two short stout hairs rather similar to the pseudo-fingers. A hair, similar to the upper basal one, arises laterally from the center of the "thumb." The claw of the penultimate joint reaches just beyond the dorsal "finger." The legs are pale amber-color, not quite as long as width of body. Femur three and one-half times as long as wide, somewhat exceeding tarsus. Tibia nearly a third longer than patella, which is nearly twice the length of the trochanter. Tip of tarsus bears a stout claw, which is sickle-shaped; six weak spines arise perpendicularly from the claw a short distance from its base. The usual series of four capitate hairs are present, two on each side fusing to form a swollen pedicel which are set on the onychium on either side of the main claw base. Relative lengths of leg joints as follows: Coxa, 15; trochanter, 7; femur, 26; patella, 12; tibia, 15; tarsus, 23. The collar trachea, opening medially in a pore, runs downward in an almost straight line and just above the ventral end bends sharply backward and expands into an elliptical chamber, which is twice the caliber of the linear portion.

Penis appears to be about intermediate between the *T. telarius* type (as figured by Ewing) and that of *T. monticolus* (herein figured); the inner lobe appears to be longer than the shaft proper, rodlike, and somewhat slender; a well-developed basilar lobe occurs dorsally; the shaft is comparatively short and thick and bends abruptly downward and slightly forward to form the stout hook, which terminates in a rather straight, unbarbed, very sharp spur. The egg is slightly depressed globose and bears a stalk which about equals the height of the egg.

Type.—Cat. No. 20167, U.S.N.M.

The type material is from Batesburg, South Carolina, January 6, 1916, from the upper and under sides of American holly leaves (*Ilex opaca*), collected by Mr. F. L. McDonough and the author. The species is in the group comprising *T. pilosus* Canestrini and Fanzago,

T. ununguis Jacobs, both of Europe, and *T. yothersi* McGregor, of America. The present species also bears some likeness to Trägårdh's genus *Schizotetranychus* in the presence of two main divisions of the tarsal claw.

TETRANYCHINA MACDONOUGHII, new species.

Color, bright ferruginous to orange red. Dorsal cuticular appendages, 26, arising from very prominent tubercles, arranged as follows: Two frontals, 2 subfrontals, 5 on each side along the lateral margins of the abdomen, 8 grouped on the hind region of abdomen, and 4 near the center of abdomen. Each appendage is rather filiform, appressed plumose, slightly thicker at tip than at base, tinged with red. Body elliptical, widest equatorially; cephalothorax truncate in front; abdomen rounded behind. Mandibular plate with sides arching to a narrow, unemarginated tip. Palpi stout, bearing in all eight spines; "Thumb" of palpus three times as long as thick, bearing two spines at tip, two dorsally and one ventrally; claw of penultimate joint reaching two-thirds distance to tip of "thumb." Legs I of female almost two and a half times the length of body; tibia I a trifle over one-third the length of entire leg; tarsi I slightly swollen immediately behind tip; tarsus on its tip bears a single claw, which is nearly straight for two-thirds its length and is then bent to form a short hook; the claw is plumose, bearing 11 pairs of capitate spines. Arising from the onychium by the sides of the claw base (much as in the case of *Tetranychus*) are the four tenent hairs, the two on each side united at base into a swollen pedicel. Comparative length of segments of leg I of female as follows: trochanter, 4; femur, 35; patella, 5; tibia, 36; tarsus, 16. Leg I of male three times the length of body.

Type.—Cat. No. 20168, U.S.N.M.

The type material was collected by Mr. F. L. McDonough at Quincy, Florida, June 5, 1915, on the underside of leaves of *Oxalis stricta*. The species is probably closest to *Tetranychina* (*Neophillobius*) *harti* of Ewing, but is easily separable from the latter as follows:

T. macdonoughi: Body, 0.43 mm. by 0.35 mm.; dorsal bristles enlarged toward end; differently distributed (from that of *T. harti*): tarsi I somewhat swollen at end; palpus bears eight bristles.

T. harti: Body, 0.64 mm. by 0.44 mm.; dorsal bristles acuminate to tip; none of leg joints swollen; palpus bears six bristles.

Mr. McDonough says that the species is gregarious, living in small colonies, just as is the case with red spiders, and that the effect on the leaves is exactly similar to the work of red spiders.

EXPLANATION OF PLATES.

[Drawings by the author.]

PLATE 101.

Tetranychus peruvianus.

FIG. 1. Female, dorsal view.

2. Male, dorsal view (bristles not shown).
3. Left eye, seen from above.
4. Mandibular plate, showing normal extrusion from cephalothorax.
5. Left foreleg, seen from above.
6. Extremity of left palpus (viewed from outside), showing "thumb," "fingers," claw, and other appendages.
7. Tarsal appendages (lateral view), showing onychium, claw, and tenent hairs.

Figures 3, 4, 6, and 7 were drawn with oil-immersion lens and camera lucida. In figures 1 and 2 the legs are shown foreshortened through lack of uncontracted specimens.

PLATE 102.

Tetranychus rusti.

FIG. 1. Male, dorsal view, bristles not drawn.

2. Mandibular plate, showing also stylets and spina.
3. Profile view of typical dorsal appendage.
4. Tarsal appendages (lateral view), showing onychium, terminal protruberances, and tenent hairs.
5. Extremity of left palpus (viewed from inside), showing "thumb," "fingers," claw, and other appendages.
6. Female, dorsal view.

Figures 2, 3, 4, and 5 were drawn with oil-immersion lens and camera lucida.

PLATE 103.

Tetranychus monticolus.

FIG. 1. Penis, lateral view.

2. Collar trachea, from right side.
3. Tarsal appendages of leg II of female (lateral view), showing onychium, claw, and tenent hairs.
4. Tarsal appendages of male (lateral view).
5. End of right palpus (viewed from outside), showing "thumb," "fingers," claw, and other appendages.
6. Frontal and subfrontal bristles and eye of right side (viewed dorsally).

Figures 1, 2, 3, 4, and 5 were drawn with oil-immersion lens and camera lucida.

PLATE 104.

Tetranychus oregonensis.

FIG. 1. Collar trachea, from right side.

2. Right leg I, from outside.
3. Profile view of adult female.
4. Extremity of right palpus (viewed from outside), showing "thumb," "fingers," claw, and hairs.
5. Tarsal appendages (lateral view) showing onychium, claw, and tenent hairs.

Figures 1, 4, and 5 were drawn with oil-immersion lens and camera lucida.

PLATE 105.

Tretranychus willamettei.

- FIG. 1. Penis, lateral view (owing to the opaqueness of body the innermost portion of penis was not clearly revealed).
2. Right eye and basal portion of subfrontal bristle, from above.
 3. Tarsal extremity, dorsal view.
 4. Collar trachea (viewed from right side).
 5. Tarsal appendages (lateral view), showing onychium, claw, and tenent hairs.
 6. Extremity of right palpus (viewed from outside) showing "thumb," "fingers," claw, and hairs.

Figures 1, 2, 3, 4, 5, and 6 drawn with oil-immersion lens and camera lucida.

PLATE 106.

Tetranychus ilicis.

- FIG. 1. Right leg I, ventral view.
2. Tarsal appendages (lateral view), showing onychium, claw, and tenent hairs (on Chinaberry from Florida).
 3. Frontal and subfrontal bristles (frontal bristle shown only in part).
 4. Tarsal appendages (lateral view), showing onychium, claw, and tenent hairs (on holly—*Ilex opaca*).
 5. Three of dorsal bristles, showing attachment in tubercles.
 6. Extremity of right palpus (viewed from outside), showing "thumb," "fingers," claw, and hairs.
 7. Collar trachea, from right side.

Figures 2, 4, 6, and 7 drawn with oil-immersion lens and camera lucida.

PLATE 107.

Tetranychina macdonoughi.

- FIG. 1. Right palpus from outside, showing "thumb," "thumb" spines, claw, and other appendages (lateral view).
2. Extremity of tarsus, showing claw and its plumose arrangement, onychium, and tenent hairs.
 3. Female (dorsal view), showing leg stumps and dorsal appendages.
 4. Extremity of tarsus (ventral view), showing onychium, plumose claw, and tenent hairs.
 5. Female (lateral view), showing left foreleg, dorsal and ventral appendages.

Figures 1, 2, and 4 drawn with oil-immersion lens and camera lucida.



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