

PROCEEDINGS
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SOME NEW NORTH AMERICAN IXODIDAE WITH
NOTES ON OTHER SPECIES.

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In studying the collections of ticks that have accumulated in the collection of the Dallas Laboratory several new species have been discovered, and in order that the biological notes on these forms to be published later may not contain descriptions of new species these descriptions are presented here.

I wish to express my sincere thanks to Mr. Nathan Banks for the many helpful suggestions given and for his kindness in placing at my disposal the collection of the Bureau of Entomology and of the National Museum, and the collection of the late Doctor Marx, as well as specimens from his private collection. My thanks are also due to Doctor L. O. Howard and Mr. W. D. Hunter for courtesies extended in the course of my work and to Messrs. G. N. Woleott and H. P. Wood, the former for making the drawings used in illustrating this paper, the latter for assistance in the rearing of specimens received at the laboratory in the immature stages and in the care of all collected material received by him.

***Ixodes cookei* var. *rugosus* n. var.**

Female.—Capitulum (Fig. 1), length $760\ \mu$ (from tip of hypostome to a line drawn between tips of postero-lateral angles of basis capituli); basis capituli dark reddish brown, borders almost black, rather wide ($560\ \mu$); postero-lateral angles not prominent, basal border incurved at center; surface, especially around porose areas, roughened; porose areas large, somewhat triangular, reaching very near to posterior margin of basis

capituli; slightly broader than long and separated by about half their length; the space between them with a pronounced rather irregular groove; palpi 574μ long, rather broad and heavy, entire surface roughened; third segment slightly longer than broad.

Scutum, length 1.44 mm., width 1.41 mm.; reddish brown, broadest slightly in front of the middle, broadly rounded behind; lateral carinae present but not well defined, extending back a little behind widest part of shield but not reaching the shield margin; cervical grooves moderately distinct, extending back to middle of scutum; surface of scutum closely covered with large deep punctures, more scattered toward tip, in regions of cervical grooves and lateral carinae they are somewhat confluent, forming rugose areas.

Legs light reddish brown, translucent, rather long and stout, all tarsi abruptly narrowed near tips, all coxae with a short posterior apical tooth and with a trace of a tooth at the anterior apical angle; coxae I with a long spine at base, slightly shorter than in *I. cookei*.

Stigmal plates rather small, transversely oval, $330\mu \times 287\mu$ and $344\mu \times 273\mu$; about 108 goblets per plate, irregular in size, some rather large, not closely crowded together, six rows between the macula and marginal cells at the widest point; macula nearly circular, located slightly antero-ventrally from center; marginal cells large, nearly circular.

Body pale yellow (slightly engorged), finely striate and with a few very short pale hairs; postero-median groove shallow, running from near posterior margin to a point opposite anus; accessory grooves deep and broad, running from near posterior margin nearly to shield, almost straight behind, irregular in front; anal frame about two and a half times as long as broad, sides nearly parallel, somewhat pointed in front of anus.

Male.—Capitulum (Fig. 2), length 502μ (from tip of chelicerae (closed) to line connecting postero-lateral corners of basis capituli); basis capituli very dark brown, posterior and lateral edges black, greatest width at base of palpi (358μ) only slightly narrowed toward basal margin where the width is 301μ ; the postero-lateral angles are not produced; the basal margin only very slightly concave; dorsal surface of basis capituli distinctly rugose and with a few punctures; ventrally it has a semi-circular ridge curving backward from near the base of each palpus, behind this it is distinctly narrowed; palpi very short and broad ($330\mu \times 187\mu$); third segment but very little shorter than the second.

Scutum, length 2.75 mm., width 1.54; very dark brown, some parts almost black; sides nearly parallel, broadly rounded behind, less so at anterior end; the entire surface, with the exception of a few small areas along the median line, closely covered with large punctures, at anterior end these are somewhat confluent, producing rugosity; a few very short pale hairs near edges of scutum; cervical grooves deep and short; accessory grooves shallow; a series of broad depressions at intervals from the anterior ends of accessory grooves to near the cervical angles where surface of scutum is decidedly uneven.

Legs moderately long and stout, reddish brown, somewhat punctate; coxae I with a basal spine of medium length, shorter than in *I. cookei*; all coxae with minute apical teeth.

Stigmal plates nearly round, $330\ \mu$ wide by $301\ \mu$ long; about 135 goblets, of medium size, closer together and more uniform in size than in female; about seven rows between macula and marginal cells at widest point; macula broadly oval, located ventro-anteriorly from center; a distinct depression running around macula on antero-ventral side; marginal cells circular, smaller than in female.

Body with marginal strip on dorsum, somewhat lighter than scutum; finely punctate and with many very short yellow hairs; venter dark brown somewhat mottled with light brown, punctate over its entire surface; the chitinized plates exceedingly closely covered with very large punctures and with a few very short hairs; edges of post-genital plate rugose; anal groove straight (transverse) in front of anus; length of this portion of groove $215\ \mu$, length of anal frame $932\ \mu$; sides of anal frame slightly curved and strongly divergent behind anus.

Type, Cat. No. 13,973, U. S. National Museum.

Type host.—Dog.

Type locality—Tiller, Oregon.

Described from a female and male of a lot of two females and six nymphs (one of which was engorged and molted to a male) collected March 28, 1910, by Mr. S. S. Stevens. Dallas Acc. No. 1316.

The collection of the Bureau of Entomology at Dallas, Texas, contains the following lots of specimens, taken on dogs, which are referred to this variety:

Two ♀, Beatrice, Cal., March 2, 1910 (J. Sawyer); 1 ♀ and 2 nymphs, Henlock, Oregon, March 28, 1910 (Chas. Desmond); 4 ♀, 1 nymph, 1 larva, March 27, 1910; 5 ♀, 4 nymphs, May 5, 1910; 1 ♀, May 23, 1910; 1 ♀, July 1, 1910; 1 ♀, 1 nymph, November 29, 1910; 10 nymphs, December 9, 1910; all from Pysht, Washington, collected by Mr. Guy Decker; 1 ♀, 9 nymphs, Slightly, Washington, September 21, 1910 (B. A. Bruce); the series of females shows but slight variations from the type. In some, the punctures over the entire scutum are more or less confluent, making the surface longitudinally rugose. In some, the capitulum and palpi are more distinctly roughened than in the type.

The females of this variety are separated from those of *I. cookei* proper by the porose areas being as long as broad, more triangular in outline, and somewhat closer together; also by the roughened capitulum and shield. The latter is rather less narrowed behind the middle than in *cookei*.

The male is easily distinguished from the males of *cookei* and other species by the large punctures which closely cover almost the entire body and scutum. As compared with *I. cookei*, the male is darker in color, sides of body more nearly parallel, basal spines on coxae I shorter, and stigmal plates slightly smaller.

***Ixodes banksi* n. sp.**

Female.—Capitulum (Fig. 3), length 689 μ (from tip of hypostome to posterior edge of basis capituli on dorsum); basis capituli narrow, greatest width (452 μ) at base of palpi where the basis capituli is somewhat extended to form a socket for their reception; dark yellowish brown, posterior margin almost black, postero-lateral angles scarcely visible; ventrally, basis capituli shows two broad flat processes at the base of each palpus; porose areas rather large, well defined, about as long as broad, extending close to posterior margin, separated by about one-half their length; between them is a narrow groove or depressed line; palpi lighter in color than basis capituli; length 474 μ , greatest width 158 μ ; third segment slightly longer than broad; second segment nearly twice as long as third; first segment rather long and without prominent ventro-lateral process.

Scutum (Fig. 4), length 1.14 mm., width 1.01 mm., reddish brown, moderately narrowed behind, postero-lateral margins not concave; lateral carinae present but not strong; cervical grooves moderately distinct beginning some distance behind cervical angles, first converging then diverging so as to form an angle at the point where they are nearest together; surface irregularly covered with punctures of different sizes, mostly rather large; also with a few yellow hairs.

Legs amber in color, long and rather slender; tarsi not abruptly narrowed at tips; all coxae (Fig. 5) with a distinct blunt spine at apex; coxae I with a rather long and moderately slender basal spine; coxae II with a trace of a basal spine.

Stigmal plates (Fig. 6) exceedingly large, slightly broader than long (509 μ x 466 μ); about 440 goblets per plate, small and very closely crowded together, even near macula, around which there is but a small area without goblets; about 15 rows of goblets between macula and marginal cells at widest point; marginal cells small and close together, only slightly flattened laterally; macula oval, located comparatively close to the antero-ventral border, slightly elevated above area immediately surrounding it, which area is concave.

Body dark reddish brown, finely striate and minutely punctate, well covered with moderately short, yellow hairs; marginal groove distinct, running from near the lateral angles of shield well around curve of body at posterior end; postero-median groove broad and shallow, extending from near posterior margin half way to posterior end of scutum; accessory grooves deep and broad, curved, slightly longer than the postero-median; venter with hairs as on dorsum; anal groove deep; anal frame slightly pointed in front of anus, sides nearly parallel; entire frame one-fourth as wide as long.

Type, No. 13,974 U. S. National Museum.

Type host.—Muskrat (*Fiber zibethicus* Linn.).

Type locality.—Mammoth Springs, Arkansas.

A female described from a lot of 15 females and 7 nymphs collected June 14, 1910, by Mr. A. H. Howell (Dallas Accession No. 1833); named

for Mr. Nathan Banks, the principal contributor to our systematic knowledge of the ticks of North America.

This species would run to *I. cookei* or *I. sculptus* in Mr. Banks' table in his Revision. However, it is easily separated from those species by the much larger stigmatal plates and somewhat shorter basal spine on coxae I. The dimensions of the stigmatal plates of *I. cookei* vary from $330\ \mu \times 287\ \mu$ to $467\ \mu \times 412\ \mu$. There are six or seven rows containing 120 to 150 goblets. The dimensions of the stigmatal plates of *I. sculptus* are much smaller than in *I. cookei* and the number of goblets fewer. The shape of the basis capituli and porose areas is markedly different from *I. sculptus* and the lateral carinae are not distinct and incurved as in that species. The basis capituli is much narrower than in *I. cookei* and the postero-lateral angles are less prominent than in that species.

The specimens at hand are very uniform in most characters; the width of the basis capituli varies from $416\ \mu$ to $439\ \mu$, and the size of the stigmatal plates from $502\ \mu \times 445\ \mu$ to $560\ \mu \times 504\ \mu$, and the number of goblets from about 440 to 500 per plate. The length of the first tarsi varies from $574\ \mu$ to $653\ \mu$. Some of the females in the lot were about one-third engorged; the bodies of these are light yellow and elongate.

***Ixodes kingi* n. sp.**

Female.—Capitulum (Fig. 7), length $789\ \mu$ (from tip of hypostome to line connecting postero-lateral angles of basis capituli); basis capituli dark reddish brown, of medium size, width $574\ \mu$; postero-lateral angles prominent; porose areas small, slightly broader than long, separated by nearly their width; outline well defined, pits large and deep; palpi very short and broad ($488\ \mu \times 244\ \mu$), the greatest width occurring at the apex of the second segment; this segment is only slightly narrowed back to its basal articulation where it is abruptly constricted; first segment broad and deeply cut out dorso-laterally and bears a prominent, broadly rounded projection on its anterior margin ventro-laterally; ventrally the basis capituli is smooth and somewhat narrowed posteriorly.

Scutum (Fig. 8), length 1.34 mm., width 1.2 mm., reddish brown, darkest anteriorly, greatest width at about one-third of the distance from anterior angles, distinctly narrowed behind, the postero-lateral margin being slightly concave; lateral carinae strong, running nearly to margin, slightly behind middle of scutum; scutum distinctly depressed for the entire length of the lateral carinae immediately mediad of those carinae; surface of scutum densely and rather evenly covered with coarse punctures.

Legs amber in color, short and rather slender; tarsi abruptly narrowed near apex; all coxae (Fig. 10) with a distinct apical tooth; coxae I with a moderately long, stout basal spine.

Stigmatal plates (Fig. 9) rather small, $287\ \mu \times 244\ \mu$, transversely oval, about 96 goblets per plate, medium sized, not crowded together; a considerable area postero-ventrally from macula without goblets; goblets

arranged in irregular concentric rows; five rows between the macula and marginal cells at the widest point and two rows at the narrowest; marginal cells much smaller than goblets, close together and somewhat rectangular; macula oval, slightly elevated above smooth area surrounding it; this area is depressed slightly below the goblet covered portion.

Body pale yellow, punctate, rather densely covered with moderately short pale yellow hairs; genital aperture opposite coxae III; anal groove broadly round in front of anus and divergent behind it; anal frame about one-half as broad as long.

Male.—Capitulum (Fig. 11), length $517\ \mu$ (from tip of hypostome to a line connecting postero-lateral angles of basis capituli); basis capituli dark brown, greatest width at base of palpi ($416\ \mu$) slightly narrowed from this point to posterior angles which are $301\ \mu$ from center to center; these angles prominent; on the ventral side of the basis capituli is a nearly semi-circular ridge curving backward from near the base of each palpus where it is very prominent; palpi very short and broad (length $351\ \mu$, width $194\ \mu$); the third segment broader than long, the second nearly as broad as long.

Scutum, length 2.58 mm., width 1.28 mm., brownish yellow, darker in front over an area corresponding to the shield in the female, sides nearly parallel, broadly rounded behind; surface shiny with a very few short pale hairs, closely covered with large deep punctures at anterior end, these become small and more scattered posteriorly to the middle of the shield where they disappear; the posterior half of the scutum has a few exceedingly minute punctures; lateral carinae strong, running from angles of capitular emargination to edge of scutum one-fifth of its length back; as in the female, shield is depressed immediately mediad of the lateral carinae; cervical grooves indistinct, shorter than lateral carinae, only distinctly visible toward their posterior ends.

Legs (Fig. 12) moderately short and rather slender, yellowish brown; tarsi III and IV gradually tapering at tip, others rather abruptly narrowed; all coxae with a distinct apical tooth and coxae I with a short stout spine (about $86\ \mu$ long).

Stigmal plates longitudinally oval ($287\ \mu \times 251\ \mu$); 90 goblets per plate, medium sized and rather more scattered than in female; arranged in concentric rows, five rows at the widest and two at the narrowest point between the macula and marginal cells; a much smaller area is left without goblets around the macula than in the female; marginal cells about one-half the size of the goblets and somewhat rectangular; macula oval, situated ventro-anteriorly from center.

Body (Fig. 12), marginal strip around scutum extends forward to opposite second pair of legs, pale yellow, punctate and with numerous short pale hairs; venter yellow, plates highly chitinized and without punctures except the lateral ones (which have the stigmal plate located at their anterior end), the punctures on these lateral plates are moderately large and close together along their outer halves, the inner halves are free from punctures except a few ventrally from the stigmal plates; anal groove straight (transverse) in front of anus, the length of this

portion of the groove being $215\ \mu$; behind the anus the anal groove is nearly straight and strongly divergent; length of anal frame $789\ \mu$.

Type, Cat. No. 13,975, U. S. National Museum.

Type host.—Badger (*Taxidea taxus* Schreber).

Type locality.—Meetcete, Wyoming.

A female and male described from a lot of 16 females, 13 males, 9 nymphs and 14 larvae collected July 10, 1909, by Mr. W. V. King (Dallas Accession No. 621) for whom this species is named.

The collection of the Bureau of Entomology contains 1 ♀ on *Thomomys*, Walker Pass, Cal., July 1, 1891 (Dr. A. K. Fisher); 2 ♀ on prairie dog, Sherwood, Texas, November 2, 1906 (F. C. Pratt); 1 ♂, 1 ♀ on badger, 1 ♀ on wolf, 1 ♀ on skunk, Sabinal, Texas (F. C. Pratt and C. T. Atkinson); 5 ♂, 5 ♀ on badger, Fairview, New Mexico, October 2, 1909 (E. A. Goldman); 6 ♂, 13 ♀ on dog, Cedarview, Utah (W. F. Fishback); 2 ♀ on mink, Randlett, Utah (E. P. Ford); 7 ♀ on dog, Sunnyside, Idaho (E. H. Raymond); 1 ♀ on *Thomomys c. ocius* and 1 ♀ on *Perodipus richardsoni*, both from Sun, Wyoming (M. Cary); 1 ♀, Sheridan, Wyoming (Cecil Lowman); 1 ♂, 2 ♀, Lost Cabin, Wyoming (Dr. P. H. Shallenberger); 1 ♂, 13 ♀ on dog, Hyattsville, Wyoming (J. R. Matthews); 1 ♀, Mt. Shaw, Montana; four lots, one of which contained both sexes, on dog, Garneill, Montana (H. McLaughlin); 1 ♀ on a Spermophile, Garneill, Montana (H. McLaughlin); two lots of 1 ♀ each on dog, Chautau, Montana (G. M. Carson); two lots of 1 ♀ each on dog, Conrad, Montana; 1 ♀, Townsend, Montana (W. D. Neild); 1 ♀ on *Marmota flaviventris*, Florence, Montana (W. V. King).

The first two lots (from Walker Pass, Cal., and Sherwood, Texas) were placed by Mr. Banks with *Ixodes pratti* Banks (A Revision of the Ixodoidea, 1908, p. 28). I have examined the type of *I. pratti* and find it to be distinct from the specimens from Walker Pass, Cal., and Sherwood, Texas. The tooth beneath the rostrum at the base of each palpus is sufficient to separate the species. The first coxae spine is shorter in *pratti* and no postero-lateral angles are present on the basis capituli. Mr. Banks' drawings of *I. pratti* appear to have been made in part from the specimen from Sherwood, Texas (*I. kingi*) as the drawing of the capitulum does not agree with the type. The female from Sherwood was probably drawn on account of the poor condition of the type.

Ixodes kingi is most closely related to *I. cookei*, but is readily distinguished from that species by the following characters: shorter, more slender legs; smaller capitulum; much smaller and more widely separated porose areas; distinct lateral carinae; shield more narrowed behind; spine at base of coxae I less than one-half the length of that in *I. cookei*; stigmal plate much smaller than in *cookei*.

In a large number of females of *I. kingi* the stigmal plate averages $294\ \mu \times 258\ \mu$ while in a number of females of *cookei*, the stigmal plate averages $418\ \mu \times 360\ \mu$. In *kingi* the goblets are more widely separated and do not exceed five rows at the widest place, the total number not exceeding 96, while in *I. cookei* there are seven or eight rows and at least 122 goblets per plate.

The engorged females are almost globular, the length and width differing but very little. In this respect this species is unlike other members of this genus.

The males may be distinguished from those of *cookei* by the basal spine on coxae I being much shorter (less than one-half the length); the entire tick smaller; sides of shield parallel; absence of punctures on posterior half of shield; presence of well-defined lateral carinae; shorter and broader palpi; shorter, smaller legs; smaller stigmatal plates; absence of punctures on the ventral plates; width of anal frame in front of the anus much greater.

Nearly all of the other specimens at hand have rather shorter and more slender legs and shorter basal spine on coxae I than the type and paratypes. The scutum, in a number of specimens, is somewhat smaller than the type. The lateral carinae are distinct in all specimens.

***Ixodes angustus* Neum.**

This species is abundant in various parts of the Northwest. The specimens at hand show no decided variation, although some have the porose areas less triangular and the scutum rather shorter and broader than typical. It is worthy of note that out of thirteen lots of adults of this species collected from hosts, only one contained male specimens. The thirteen lots contained forty females and two males. Certain data relating to specimens obtained by the Bureau in connection with the work conducted on the Rocky Mountain spotted fever tick may be of interest on account of their bearing on host relationship, distribution and seasonal occurrence of the species. The material is contained in the collection of the Bureau of Entomology at Dallas, Texas. During 1909 the following collections were made: 2 ♀, 3 nymphs and 3 larvae from *Ochotona princeps*, Meeteetse, Wyoming, July 7 (W. V. King); 1 ♀ from *Neotoma orolestes*, Casper, Wyoming, August 30 (M. Cary); 2 ♀ from *Eutamias townsendi*, Detroit, Oregon, October 3 (V. Bailey); 6 ♀ and 3 nymphs from *Sciurus mollipilosus*, Empire, Oregon, October 12 (V. Bailey); 14 ♀ from *Sciurus mollipilosus*, Empire, Oregon, October 16 (D. D. Streeter). The following collections were made during 1910: 2 ♀ from (*Sciurus h. douglassi*) Mt. Lehman, B. C., March 12 (Dr. Seymour Hadwen); 3 ♀ and 3 nymphs from (*Sciurus h. douglassi*) Silver Lake, Washington, April 7 (B. A. Bruce); 1 ♀ from *Sciurus sp.* Pysht, Washington, March 23 (Guy Decker); 2 ♀ from rabbit, Mora, Washington, June 13 (A. W. Smith); 2 nymphs from *Citellus columbianus*, Florence, Montana, June 16 (W. V. King); 1 ♀, 20 nymphs and 62 larvae from *Ochotona princeps*, Florence, Montana, June 16 (W. V. King); 1 ♀ from *Sciurus h. richardsoni*, Lo Lo Hot Springs, Montana, June 23 (W. V. King); 2 ♀, 7 nymphs and 2 larvae from *Ochotona princeps*, Lo Lo, Montana, June 29, (W. V. King); 1 ♀ from cat, Pysht, Washington, July 6 (Guy Decker); 2 ♂, 4 ♀ and 4 nymphs from rabbit, Pysht, Washington, August 30 (Guy Decker); 1 nymph from dog, Pysht, Washington, August 31 (Guy Decker).

It should be stated that the determinations of the immature stages are not absolutely certain owing to the difficulty of positively identifying the immature stages of Ixodes. In a few instances nymphs were bred to adult, and in the other cases I feel reasonably sure of the correctness of the determinations.

Ixodes angustus var. **woodi** n. var.

Female.—Capitulum (Fig. 13), length 680μ (from tip of hypostome to a line drawn between postero-lateral angles of basis capituli), basis capituli dark brown, greatest width 416μ ; postero-lateral angles rather less prominent than in *I. angustus* proper; the basal border of capitulum slightly concave; porose areas small and not well defined, nearly semi-circular with the flat side along the strong carinae which run toward the rostrum from the postero-lateral angles of the basis capituli; length of porose areas along these carinae is distinctly greater than their width; widely separated, the distance between them being nearly equal to their length; ventrally the basis capituli is very long, comparatively narrow, and smooth; distinctly longer and more narrow than in typical *I. angustus*; palpi similar to *angustus*, but the anterior portion of the first segment is distinctly produced ventro-laterally; hypostome less pointed at tip than in *angustus* proper.

Scutum, length 1.44 mm., width 1.07 mm., very similar to *angustus*, but rather more coarsely punctured and slightly more narrowed behind.

Legs as in *angustus*, but heavier; all tarsi are rather abruptly narrowed near tips; coxae I with a moderately long basal spine (longer than in *I. angustus*) and a large blunt apical spine; other coxae with distinct broad apical spines, smallest on posterior coxae.

Stigmal plates very small ($179\mu \times 158\mu$), transversely oval, about 49 goblets per plate, medium sized; four rows at widest and one row at narrowest point between macula and marginal cells.

Body with numerous, moderately short, pale hairs; anal frame widest near posterior margin, narrowed anteriorly to a blunt point in front of anus.

Type, Cat. No. 13,976, U. S. National Museum.

Type host.—Baird's wood rat (*Neotoma micropus* Baird).

Type locality.—Sabinal, Texas.

A female described from a lot containing two females and three nymphs collected May 18, 1910, by Messrs. F. C. Pratt and C. T. Atkinson (Dallas Accession No. 1641).

Named for my associate, Mr. H. P. Wood.

The collection of the Bureau of Entomology at Dallas, Texas, contains the following material which I have referred to this variety: 2 nymphs, 2 larvae, February 7, 1910; 2 ♀ May 10, 1910; 2 ♀ May 20, 1910; 3 nymphs May 31, 1910. All collected at Sabinal, Texas, on *Neotoma micropus* Baird, by Messrs. F. C. Pratt and C. T. Atkinson.

No males were collected.

***Ixodes sculptus* Neum.**

But a few specimens of this species have been collected and these come from widely separated localities.

The very narrow basis capituli, the incurved lateral carinae and small stigmal plates, differentiate it from the *Ixodes cookei* group. The somewhat elongate scutum, narrow capitulum, rather slender palpi and small stigmal plates indicate a relationship with *I. angustus*.

In the type specimen the greatest width of the basis capituli (at base of palpi) is $467\ \mu$. The width between the centers of the postero-lateral angles, which are distinct and incurved, is $373\ \mu$. The area bearing the porose areas is distinctly elevated above the lateral portions where the palpi articulate. This gives the appearance of still greater narrowness. The length of the capitulum from tip of palpi to postero-lateral angles is $747\ \mu$. The stigmal plates are transversely oval and measure about $233\ \mu \times 187\ \mu$.

Mr. Banks' collection contains two partially engorged females collected by Prof. J. M. Aldrich at Brookings, South Dakota, which agree very closely with the type. In these two specimens the maximum widths of the basis capituli are $420\ \mu$ and $439\ \mu$ and the widths between the centers of the postero-lateral angles $327\ \mu$ and $355\ \mu$ respectively. In one of these specimens the stigmal plate measures $261\ \mu \times 233\ \mu$. The scutum of each is finely punctate and the lateral carinae strong and incurved at tips. But one of the specimens shows the depression between the porose areas. On account of the fact that many specimens of *cookei* have a more or less distinct scar between the porose areas, this character is of limited systematic value.

The collection of the Bureau of Entomology at Dallas, Texas, contains 1 ♀ from *Citellus columbianus*, Bozeman, Montana, March 20, 1910 (Prof. R. A. Cooley); 1 ♀, 4 nymphs and 5 larvae from wild cat, Wichita Mts., Oklahoma, December 21, 1909 (Frank Rush); 1 ♀ from striped ground squirrel, Luther, Wyoming, September 24, 1910 (C. O. Lyon); 1 ♀ from rock squirrel (*Citellus variegatus couchi* Baird) Devils River, Texas, May 4, 1907 (F. C. Bishopp).

The specimen from Montana agrees with the type very well, but the lateral carinae are not strong and are but little incurved at their tips. The greatest width of the basis capituli is $445\ \mu$; the width between centers of postero-lateral angles is $337\ \mu$. Stigmal plates have about 36 goblets each and measure $201\ \mu \times 144\ \mu$. The female from Oklahoma has the capitulum pulled off, hence the determination is doubtful. The scutum and legs agree closely with the type. However, the stigmal plates are larger ($373\ \mu \times 316\ \mu$ and $395\ \mu \times 316\ \mu$) and have many more goblets. The specimen from Wyoming is typical of the species, although the basal spine on coxae I is slightly shorter than the type. The greatest width of the basis capituli is $457\ \mu$ and the width between the centers of the postero-lateral angles $373\ \mu$. The stigmal plates are very small, measuring $177\ \mu \times 168\ \mu$. The female from Texas is from the same lot which Mr. Banks examined and placed under *I. sculptus* in his Revision. This

specimen varies more from the type than the others herein listed. The greatest width of the basis capituli is $660\ \mu$ and the width between the centers of the postero-lateral angles is $502\ \mu$. The porose areas are rather smaller than in the type and do not reach to the posterior border of the basis capituli. The legs are longer and stouter than in the type. The stigmal plates measure about $316\ \mu \times 273\ \mu$.

Haemaphysalis chordeilis Packard.

In the course of the studies of the life histories of ticks being conducted by the Bureau of Entomology three lots of ticks were collected which contain males of this species. In three instances we have reared to adult males, specimens collected as nymphs. The three above mentioned collections which contained males were made by Mr. J. D. Mitchell in Victoria County, Texas. The collections were made on meadow larks on the following dates; November 12, 1909 (1♂, 4 ♀), November 25, 1909 (5 ♂, 4 nymphs, 23 larvae), March 23, 1910 (1 ♂).

Since the male of this species has not been described, the following characterization is given:

Capitulum from $416\ \mu$ to $488\ \mu$ long (from tip of palpi to tip of postero-lateral angles of basis capituli); basis capituli from $287\ \mu$ to $344\ \mu$ wide, amber in color, rectangular, postero-lateral angles short but well defined, center of dorsal surface with a number of punctures; palpi amber in color, length from $258\ \mu$ to $316\ \mu$; first and fourth segments very small; second segment produced laterally and ventrally to form a prominent but not acute angle; a few scattered yellowish bristles on palpi; the infra-internal edges bear a number of feather-like bristles; hypostome rather blunt with five rows of moderately small teeth.

Scutum covers all of dorsum but a narrow marginal strip, light gray in color, shading into amber anteriorly; glabrous, shining rather thickly and coarsely punctured, some specimens showing a small rugose area at antero-lateral angles; foveae nearly black opposite or slightly posterior to fourth pair of legs; cervical grooves deep anteriorly, first converging, then diverging and disappearing posteriorly; postero-median groove distinct, deepest at posterior end; accessory grooves shallow and broad; marginal groove deep, extending from a point opposite the second pair of legs to the fourth festoon.

Legs yellowish brown, translucent, with numerous light yellow hairs; trochanters I with prominent blade-like process projecting backward; tarsi all tapering rather abruptly to end; coxae slightly darker than legs, with numerous yellow hairs; coxae I, II and III with very short, blunt basal spurs; coxae IV with a rather long, blunt spur.

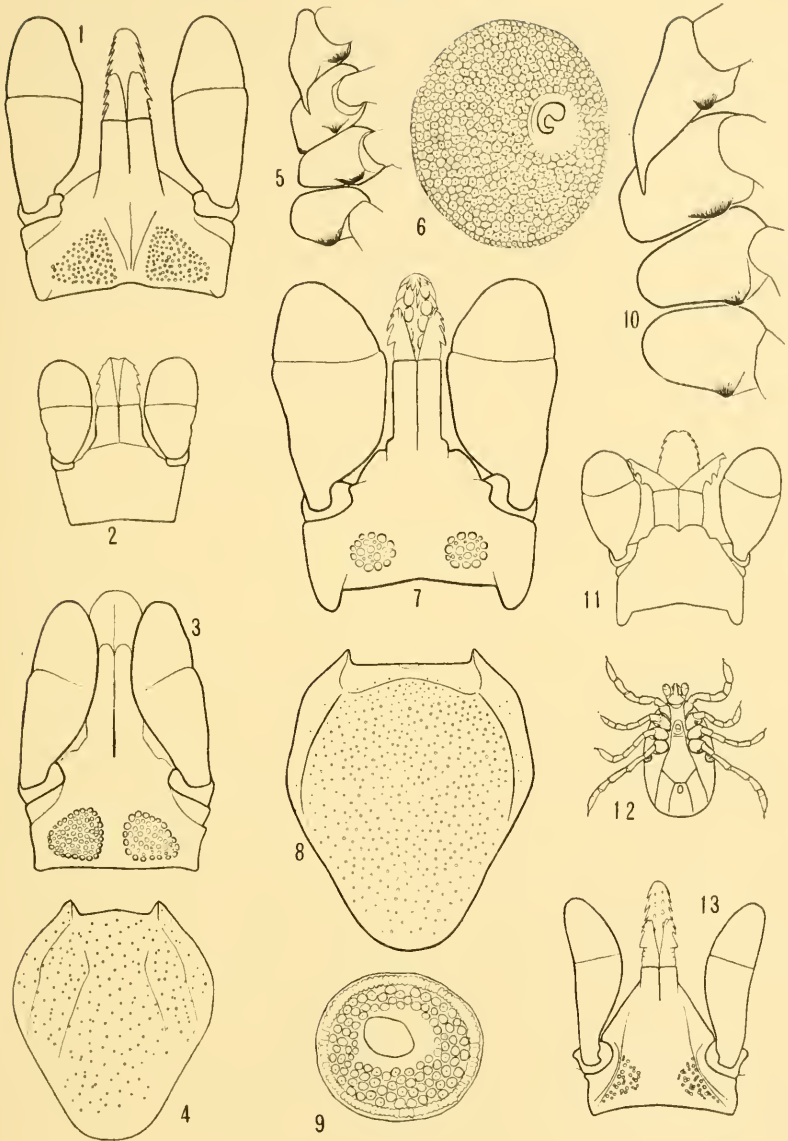
Stigmal plates broadly oval, sides nearly parallel for some distance; with a short, broad dorso-posteriad prolongation; size from $358\ \mu$ long \times $287\ \mu$ wide to $373\ \mu$ long \times $230\ \mu$ wide (width includes prolongation); macula small, situated toward antero-internal angle, rather closely covered with many moderately small goblets of nearly uniform size.

Body ellipsoidal in contour, widest posteriorly; marginal strip of dor-

sum milk color; this color also occurs along the festoon grooves; festoons brownish slate color with punctures similar to those on scutum; venter gray blue; festoons brownish with yellow centers; genital groove distinct, almost parallel anteriorly, diverging behind posterior coxae and extending to a point on the marginal furrow between the second and third festoons; post-anal groove straight, forming a Y at its anterior extremity, the forks of which extend forward on either side of the anus. Total length of specimens from 2.8 mm. to 2.9 mm., width from 1.5 mm. to 1.6 mm.

Described from several living males collected in Victoria County, Texas. Dallas Accession Nos. 886 and 1012.

The specimens at hand show a slight variation in the shape of the stigmatal plates and basis capituli.



EXPLANATION OF PLATE

Ixodes cooki var. *rugosus*, Fig. 1, capitulum of female; Fig. 2, capitulum of male.
Ixodes banksi, Fig. 3, capitulum of female; Fig. 4, scutum of female; Fig. 5, coxae of female;
 Fig. 6, stigmatal plate of female.
Ixodes kingi, Fig. 7, capitulum of female; Fig. 8, scutum of female; Fig. 9, stigmatal plate of
 female; Fig. 10, coxae of female; Fig. 11, capitulum of male; Fig. 12, ventral of male.
Ixodes angustus var. *woodi*, Fig. 13, capitulum of female.

Drawn by G. N. WOLCOTT. (Original.)