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DESCRIPTION OF THE IMMATURE STAGES OF Ixodes (I.) sinaloa Kohls and Clifford (Acarina: Ixodidae), FROM RODENTS IN MEXICO AND NICARAGUA

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ABSTRACT.
The nymph and larva of Ixodes (I.) sinaloa are described. This species was previously recorded from 10 female specimens from Sinaloa and Nayarit States, Mexico. Recently, in addition to females, immature stages have been taken on rodents in Nicaragua and Jalisco State, Mexico. Known hosts and localities are: Liomys pictus escuinapae (Sinaloa State), Liomys pictus plantinarensis (Jalisco State), Oryzomys palustris mexicanus (Nayarit State), Liomys salvini vulcani, Oryzomys a. alfaroi, Peromyscus mexicanus saxatilis and Reithrodontomys sumichrasti modestus (all Nicaragua).

The only record of Ixodes (I.) sinaloa in the literature is the original description (Kohls and Clifford, 1966) based on 10 females from Sinaloa and Nayarit States, Mexico. Herein are described the nymph and larva of I. sinaloa from 14 collections from Nicaragua. Three additional collections of females are reported from Mexico and Nicaragua. Material listed under Distribution and Hosts was forwarded to us by Dr. J. Knox Jones of the Museum of Natural History, The University of Kansas, and was collected under Contract (DA-49-193-MD-2215) between the University of Kansas and the U. S. Army Medical Research and Development Committee. We are indebted to Dr. Jones for making this material available to us.

DESCRIPTION.

Nymph (figs. 1 and 2). Measurements (in millimeters) were taken on 5 unengorged specimens (3 specimens used for chaetotactic counts).

Body from 0.99 to 1.15 long, excluding the capitulum, by 0.46 to 0.70 wide. Dorsum of body with 25-30 pairs of setae, excluding the scutum, venter with 46-57 pairs. Scutum 0.60 to 0.75 long by 0.43 to 0.55 wide, narrowly rounded posteriorly. Cervical grooves distinct, narrow, first converging, then diverging, terminating near the posterolateral margins; scapulae short,


rounded; surface smooth, punctations sparse, shallow; with 18 to 22 moderately long setae. *Spiracular plate* 0.125 to 0.162 long by 0.112 to 0.125 wide, 2 rows of moderately large goblets.

*Capitulum* length from palpal apices to cornua apices 0.387 to 0.462, width at the level of the cornua 0.200 to 0.250. Posterior margin between cornua very slightly convex. Cornua moderate in length about as long as wide projecting posteriorly. *Palpi* long, 0.312 to 0.375, slender, widest at junction of segments 2 and 3; width 0.075 to 0.088. The average length of segment 3 slightly longer, 0.152, than segment 2, 0.147. Palpal segment 1 ventrally with a distinct, pointed, posterolaterally projecting spur. Palpal setae: 1 with 1, 2 with 10, 3 with 12. Ventrally the basis is constricted posterior to the auriculae. Transverse suture absent; posterior margin straight; auriculae long, thin, pointed, curved horns. *Hypostome*: dentition 3/3 for most of length then 2/2 to base; corona of several minute denticles; average length of toothed portion 0.232; shape as figured.

Figs. 1, 2: *Ixodes sinaloa* Kohls and Clifford, nymph, Nicaragua. 1, 2. dorsal and ventral views.

*Legs*: Moderate in size and length. Coxa I with long triangular inner spur extending over anterior 1/4 of coxa II. Coxa II-IV lack internal spurs. External spurs on all coxae short and progressively smaller from I-IV. Setae on coxa I and II 6 to 7, coxa III 7 to 8, coxa IV 3 to 4. Trochanters without spurs.

*Larva* (figs. 3-5). Terminology for larval chaetotaxy is that of CLIFFORD and ANASTOS (1960). Measurements from 4 specimens.
Body: Oval, widest near midlength; from 0.59 to 0.72 long excluding the capitulum by 0.38 to 0.54 wide. Sensilla sagitiformia absent. Setae: 2 pairs central dorsal. Cd1 0.046 to 0.065, Cd2 0.032 to 0.051; 7 pairs marginal dorsal, Md1 0.038 to 0.078, Md7 0.049 to 0.057; 1 pair supplementaries; 3 pairs sternals, St1 0.062 to 0.065; 2 pairs preanals, Pa1 0.041 to 0.054; 4 pairs premarginals; 4 pairs marginal ventrals, Mv1 0.032 to 0.046. Anal groove does not appear to encircle anus anteriorly.

Capitulum: Outline as illustrated; averaging 0.176 long from tip of hypostome to posterior margin of basis by 0.153 wide at level of cornua; basis capituli dorsally with posterior margin straight. Ventrally, basis moderately constricted behind the bluntly pointed, posteriorly directed auriculae. Palpi from 0.168 to 0.172 long, 0.044 to 0.048 wide; segment 4 with about 12 small setae; segment 3 with 1 seta ventrally and 5 dorsally; segment 2 with 2 setae ventrally and 4 dorsally; segment 1 lacking setae and ventrally lacking the distinct pointed spur characteristic of both the nymph and female. Two pairs posthy- postomal etae, PH1 average 0.017; PH2 average 0.013; distance between setae of PH1 average 0.056, between setae of PH2 0.028. Hypostome arises from a median extension of the basis capituli; blunt anteriorly; length of toothed portion from 0.084 to 0.096, width 0.048 to 0.052; dentition 3/3 near apex, then 2/2 to base 8 denticles in file 1, 7 in file 2, 3 in file 3. Corona with 2 encircling rows of about 6 fine denticles each.
Legs: Coxa I with a long triangular internal spur extending slightly beyond the anterior margin of coxa II; external spur short and bluntly triangular; coxa II with an internal ridge and a slight rounded surface elevation replacing internal and external spurs respectively; coxa III lacking spurs. Coxal setae: 3 each on I and III, 2 on II. Tarsus I 0.204 to 0.224 long by 0.080 to 0.084 wide; setae: 2 prehalleral pairs, 3 posthalleral pairs, and 3 groups of 4 each ventrally and externally.

Species relationships.

As previously noted (Kohls and Clifford, 1966) the female of Ixodes sinaloa strongly resembles I. eadsi Kohls and Clifford, 1964, a parasite of Liomys irroratus and small rodents of other genera in southern Texas. This is also true of the nymph and larva of I. sinaloa. The presence of a sharply pointed, posterior spur on the ventral surface of palp I separates both the female and nymph of I. sinaloa from I. eadsi. The nymph of I. sinaloa also resembles I. tovari Cooley, 1945; I. fuscipes Koch, 1844; I. spinipalpis Hadwen and Nuttall (in Nuttall, 1916); I. dentatus Marx (in Neumann, 1899); I. neotomae Cooley, 1944; and I. pomerantzi Kohls, 1956, in having long, thin, curved auriculae. However, the large, sharply pointed spine on the ventral surface of palp I is present only in I. sinaloa.

The larva of I. sinaloa can only be compared with I. dentatus, I. spinipalpis and I. eadsi, where larval descriptions and specimens are available. The larvae of I. neotomae, I. pomerantzi and I. tovari are undescribed. The larval description of I. fuscipes by Neumann (1899) under I. spinosus and by Nuttall et al. (1911) are not given in sufficient detail for a comparison to be made with I. sinaloa.

The larvae of I. sinaloa and I. eadsi are best distinguished by the shape of the auriculae which are bluntly pointed and posteriorly directed in I. sinaloa, while in I. eadsi they are prominent triangular extensions and directed posterolaterally. Further, palpal segments 2 and 3 of I. sinaloa have 12 setae and in I. eadsi there are 13. The larva of I. sinaloa is easily distinguished from I. dentatus by the presence of auriculae, an external spur on coxa I, and 2 central dorsal setae as opposed to 3 central dorsals in I. dentatus. The presence of auriculae also easily separates I. sinaloa from I. spinipalpis.

Distribution and Hosts. Nicaragua collections from Oryzomys alfaroi alfaroi, 2 km. E. Esquipulas, 960 m., Matagalpa, 14 Mar. 1968, J. R. Choate: 3 N., 3 L. (RML 54,803); 1 N. (RML 54,810); 2 N. data as above except J. Knox Jones (RML 54,805); 2 N., 5 L. (RML 54,806); 2 N., 5 L. data as above except J. D. Smith (RML 54,813); 1 N. (RML 54,808); 1 N. data as above except from Peromyscus mexicanus saxatilis and J. D. Smith (RML 54,812); 1 N. (RML 54,813); 2 N. data as above except H. H. Genoways (RML 54,804); 1 N. data as above except J. Knox Jones (RML 54,807); 1 N., 2 L. data as above except J. R. Choate (RML 54,809). Collections from Liomys salvini vulcani 1 km. N.E. Esquipulas, 420 m. Matagalpa, 16 Mar. 1968, H. H. Genoways: 1 ♀ (RML 54,814); 1 N. (RML 54,815), 1 N. data as above except J. Knox Jones (RML 56,556); collection from Reithrodontomys sumichrasti modestus, Santa Maria de Ostuna, 1,250 m., 11 Apr. 1968, J. R. Choate: 1 N. (RML 54,816). Mexico collections from Liomys pictus platinarsis, 4 km. W. Tuxpan, 1,380 m., Jalisco, 8 Aug. 1969, H. H. Genoways: 1 ♀ (RML 54,800); 1 ♀ (RML 54,802).
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