TWO LARVAL STADIA OF *DEMODEX CANIS* LEYDIG (ACARINA : TROMBIDIFORMES) [1]

BY

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During investigations on the biology of *Demodex canis* Leydig 1859, two morphologically distinct six-legged immature forms or stages were observed. It is generally stated in the literature that the nymphal and adult stages of *Demodex* have four pairs of legs while the larvae possess three pairs of legs or appendages. These criteria are in accordance with the monographic work of HIRST (1919) and SOKOLOVSKII (1952) on *D. canis*. Apparently the only criterion, other than the number of legs, for the larval stage is that the larva directly succeeds the ovum. Herein, the smaller form is designated as the protolarva of *Demodex canis* Leydig, as represented in figure 1, and the larger form as the deutolarva (figure 2). The basis for the new word combination " deutolarva " for the second form is the number of legs. Deutolarva appears to be less confusing than referring to the stage as a six-legged nymph.

DESCRIPTIONS.

Protolarva (figure 1).

Three pairs of very short and weakly sclerotized legs or appendages are present. These appendages appear to consist chiefly of a distal plate and a more or less conical basal segment. Each distal plate bears a single tridentate tubercle. The tubercles are less than two microns in length and are representend by figures 3 and 4. HIRST (1919) referred to the distal podal plate as the epimeron, but it seems best to abandon this entomological term in acarology.

Medio-ventral podosomal discs are not present.

A short bifid spine is present on the dorsum of the basal pedipalpal segment.

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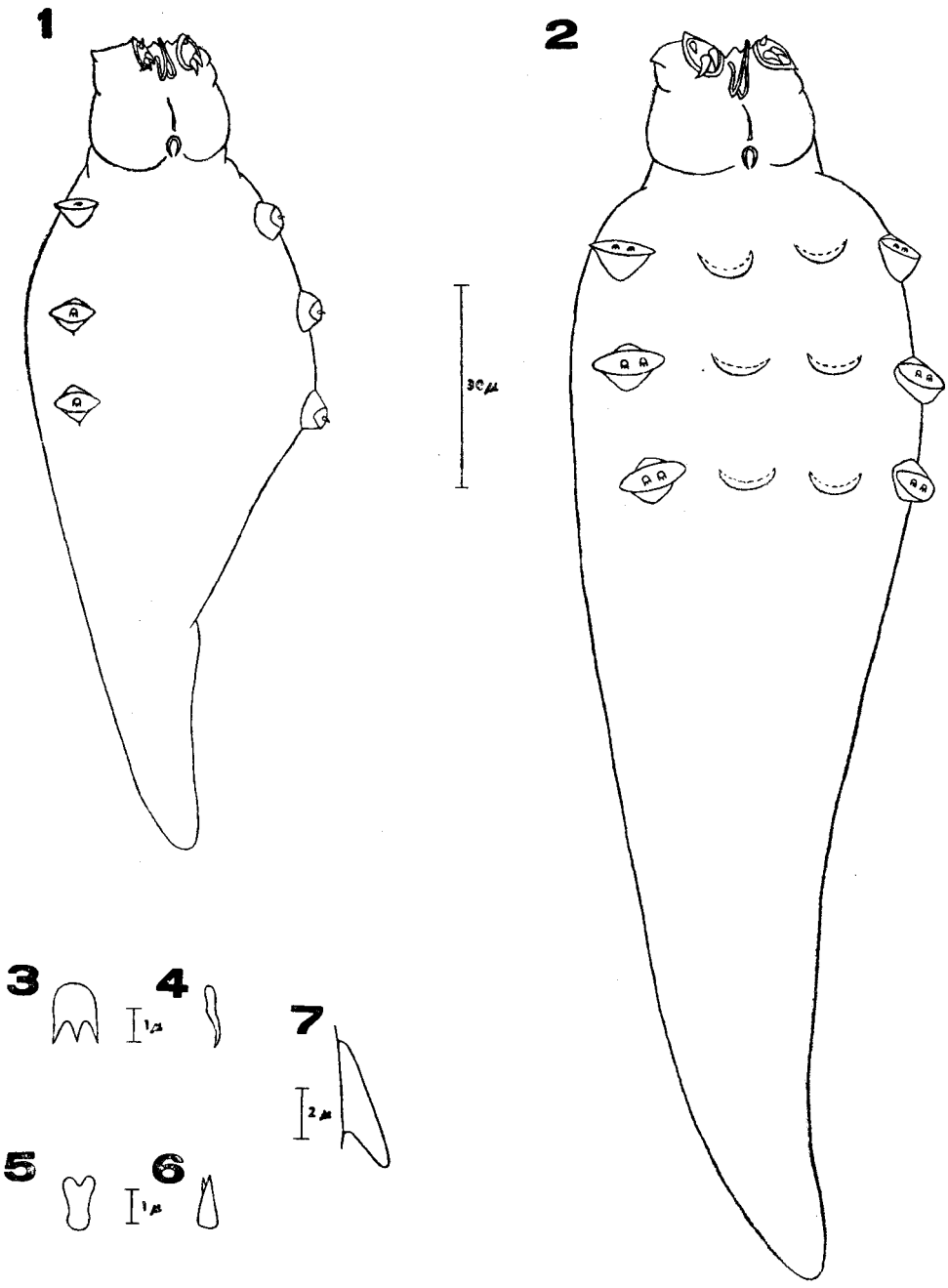

FIG. 1-7. — Larvae of *Demodex canis* Leydig : 1. protolarva ; 2. deutolarva ; 3. tubercle of distal podal plate, ventral view ; 4. tubercle, lateral view ; 5. dorsal spine of basal pedipalpal segment, anterior view ; 6. dorsal spine, larteal view ; 7. ventral podosomal disc, sagittal section.

The spines are less than two microns in length and are represented by figures 5 and 6. The distal segment or plate of the pedipalp bears three short and sharply pointed spines as illustrated in figure 1.

The length, width and shape of the mites vary considerably. Some of the size variability is undoubtedly due to the stage of development ; *i.e.*, whether recently emerged from an ovum or nearing the deutolarval stage. Also, some variance in size is the result of different mounting media and pressures by the cover glasses on the specimens. Figure 1 represents a protolarva that has recently emerged from an ovum. About 120 microns was the average length of six specimens measured. The shortest specimen was 115 microns while the longest measured 130. The average width, measured between the tubercles of the second appendages, was 36 microns and the range was 33 to 37. The distance between the tubercles of appendage I and appendage III varied from 24 to 31 microns.

The protolarva has fine annular striations on the opisthosoma and extending over the dorsal podosomal region. The striations are less pronounced than in the deutolarval, nymphal and adult stages.

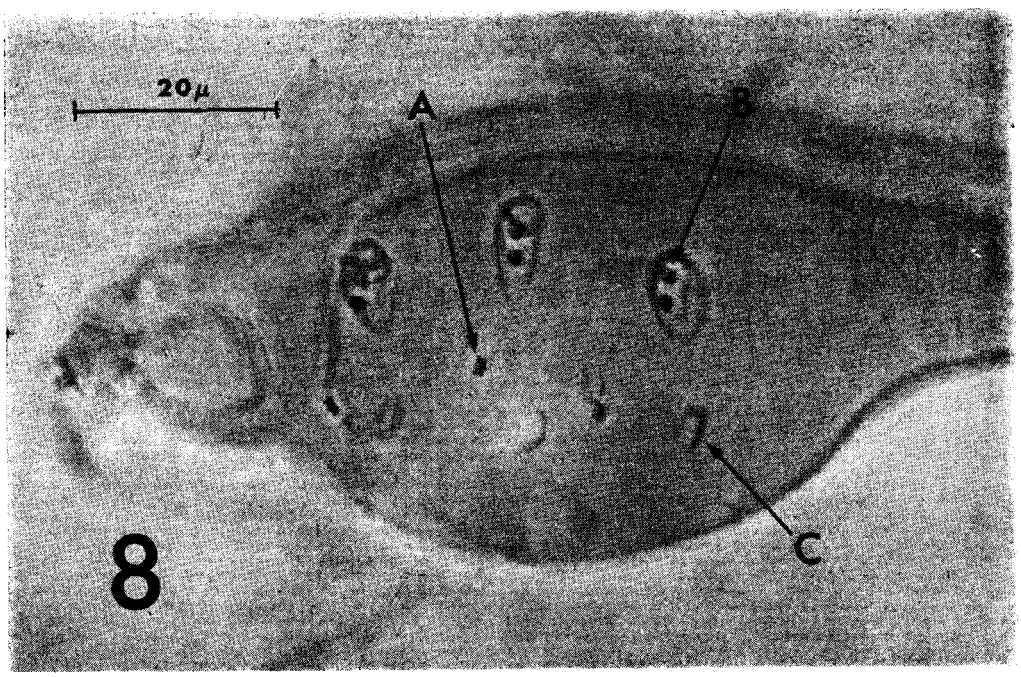

FIG. 8. — Protolarva of *Demodex canis* Leydig shortly before molting with deutolarval integument within. Phasecontrast photomicrograph. A, tubercle, leg II of protolarva ; B, tubercles, leg III of deutolarval integument within the protolarva ; C, ventral podosomal disc III of deutolarva.

Deutolarva (figure 2).

This stage differs morphologically from the protolarva primarily in two respects. The basal podal plates of the three pairs of appendages bear two tridentate tubercles each. The pairs of tubercles are of the same shape and magnitude as the single tubercles found on the protolarva.

Three pairs of semicircular podosomal discs, projected posteriorly, are found on the medio-ventral podosoma. One pair of podosomal discs is located between each of the three pairs of appendages (figure 2). Figure 7 represents a lateral view of a sagittal section through a podosomal disc.

The gnathosoma is quite similar to that of the protolarva. No measurable differences were detected between the pedipalpal spines of the protolarva and the deutolarva.

The size and shape of the deutolarvae are quite variable and are of little taxonomic value. Figure 2 represents a deutolarva that would soon molt into a protonymph. The total length ranged from 140 to 180 microns in eight specimens. The distance between the innermost tubercles of appendages II ranged from 34 to 39 microns. The distance from the tubercles of appendages I to III varied from 29 to 36 microns.

Discussion.

Mégnin (1877) gave measurements for a first larva (apodous) and a second larva (hexapodous) of *D. canis*. For *D. folliculorum*, Mégnin reported measurements for two types of apodous larvae and a hexapodous larva. Unfortunately, the drawings representing the larval stages lacked detail and were little more than outlines of body shapes.

The beautifully illustrated monograph of Hirst (1919) contained primarily descriptions of adult *Demodex*. This paper did not have an illustration or a description of a larval *D. canis*. However, Hirst included a detailed drawing of a larval *D. folliculorum* with two tridentate tubercles on each of the six legs. Also, he depicted an appendage of a larval *D. folliculorum* with a single tubercle. On page 21 Hirst stated, in reference to *D. folliculorum* : " Smaller specimens of this slender larval form apparently sometimes have only a single median tubercle on the epimeron instead of two. " Thus, Hirst may have observed two larval stages of *D. folliculorum* similar to the protolarva and deutolarva of *D. canis* described herein.

Sokolovskii (1952) described biological cycles for *D. canis* with a larval stage consisting of three phases. The phases were designated as *Aetus originis*, *Aetus statural*, and *Aetus stabilitatis*. The three phases were apparently based on the gross appearance of the internal organs. The larvae were stated to have three pairs of legs, but no mention was made of tubercles on the legs or of ventral podosomal discs. Sokolovskii stated that sexual dimorphism was not evident in the

larval stages and made no mention of two types of larvae with morphologically distinct integuments.

I have observed two types of six-legged immature forms in skin samples from dogs, *Canis familiaris* L. Upon discovery of the two types of larvae, three explanations seemed possible. First, there was the possibility of sexual dimorphism in the larval stage. Second, it was possible that two species of *Demodex* were present on the host dogs. Lastly, there was the possibility of two larval stages ; *i.e.*, protolarva and deutolarva. After discovery of eight protolarvae, each of which had a deutolarval form within, the first and second possibilities were abandoned. Figure 8 is a photomicrograph of a protolarval integument with a deutolarva within. It appears that indeed there are two larval stadia and that the first (protolarval) produces the second stage (deutolarval). Protolarval forms could be distinguished within 79 of 278 ova in one sample. At no time was a deutolarval form observed within an ovum. Numerous protonymphs were observed to be casting deutolarval skins and several deutolarvae were observed containing protonymphs within their integuments. No protolarvae were observed molting directly to the protonymphal stage ; whereas, eight protolarvae were observed to contain the deutolarval stage. Specimens of protolarvae, deutolarvae, and molting protolarvae will be deposited in the United States National Museum.

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