

sea water for three days and then introduced enough clean rain-washed sand to leave a small wet bank up the side of the jar. The grub moved exceedingly slowly and very little and finally pupated in the damp sand bank. There was no indication as to the family it belonged to because it was a curved cylinder, equally blunt at both ends and was covered with a dense coat of moss-like debris. Later on I discovered the last larval skin and had to soak it in caustic potash before this debris came away, revealing a typical tabanid larval exuviae. Certainly when alive, the larva looked absolutely unlike that of a typical tabanid; I had no idea what it was. After about a month there emerged a dull brown fly, which has been identified by Dr. C. B. Philip as "*Hybonitra n. sp.?*"

As far as I can determine, this is the first record of a marine tabanid whose larva developed at a point on the sea shore ~~un~~covered by sea water except at low tide.

From a table of sea water determination from 12 stations in Coal Harbour and Burrard Inlet, I cite two records taken from the area where this larva was found in Coal Harbour.

Date	Hour	Depth	Temp. °C	Chlorinity	pH	Tide
Aug. 11	7.30 p.m.	Surface	14.75	13.54	8.15	1st ebb
Aug. 7	10.30	Surface		14.28	7.85	Full ebb

Now the highest chlorinity (salinity) of any station in local waters registered 14.47 whereas that of Siwash Rock area, where the Fraser River water comes in, ran down to 2.94; so these readings for Coal Harbour, of 13.54 and 14.28, showed a high degree of saltiness in the area where the larva was taken, proving an adaptation to, or a necessity for, real marine conditions, and precluding the chance occurrence of a solitary individual in this habitat.

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#### References

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 Standard textbooks of entomology.

### HOST IMMUNITY TO TICKS (Acarina)

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Recent papers on acquired immunity to ticks by William Trager (1, 2 and 3), recalled to the writer a similar experiment that he performed at the Dominion Entomological Laboratory at Kamloops during the autumn of 1936. The results were not published at that time, as the experiment was merely preliminary to further work planned. However, in view of the re-

cent publications of Trager's papers embodying as they do, observations of a similar nature, it is thought that a report of the writer's experiment will be of value.

The initial experiment was conducted with the view of substantiating the popular opinion held by ranchers, that local animals develop immunity to ticks, and are less liable to suffer from their attacks than stock brought in from outside areas. It was desired to prove whether this belief had any basis in fact, and to demonstrate whether or not an immunity that would tend to retard or inhibit the feeding of nymphal ticks could be induced experimentally in laboratory animals.

Two young guinea pigs of equal age and weight were selected and each infested with an equal number (approximately 100) of flat nymphs of *Dermacentor andersoni* Stiles, all of similar stock. Of these about 20 fed on each pig, thus showing an even susceptibility for each animal.

Pig A was then given four weekly subcutaneous injections, each being a 2 cc. emulsion of 20 half-engorged nymphal ticks that had been just previously removed from a guinea pig host. No local or general reaction followed the injections.

On the fifth week both pigs were again subjected to equal infestations of nymphal ticks. At the end of the week, after all ticks had dropped, counts were made. The untreated pig yielded 11 engorged nymphs, the inoculated pig only one.

At the end of the experiment, precipitation tests were made with serum from each animal. A 2 cc. saline emulsion of 20 half-engorged nymphs in dilutions as low as 1 to 5, however, failed to give any precipitate.

A more recent experiment, using fitches and *Ixodes texanus* Banks, shows that these animals will also develop a marked immunity to ticks. Two fitches of a litter which had never been infested with ticks, were covered with the larval progeny of four *I. texanus* females. The infestation was made on October 2. The first ticks to fully engorge started dropping on October 5. The peak of dropping was on the 7th and 8th, while the last few came off on the 11th.

The same pair of fitches were re-infested on the 11th with the progeny of two more females of the same stock. The animals were examined daily until October 30. Of the several thousand ticks placed on them during this second infestation, only about a dozen succeeded in dropping. It is apparent from this experiment, that the fitches developed their immunity within approximately ten days after the start of infestation. Trager (1) notes that guinea pigs develop an immunity to *Dermacentor variabilis* Say within two weeks of the initial infestation, and that this immunity will last for at least three months.

#### References

1. Trager, Wm., 1939. Acquired immunity to ticks. *Jour. Parasit.*, 25: 57-81.
2. Trager, Wm., 1939. Further observations on acquired immunity to the tick *Dermacentor variabilis* Say. *Jour. Parasit.*, 25:137-139.
3. Trager, Wm., 1940. A note on the problem of acquired immunity to argasid ticks. *Jour. Parasit.*, 26:71-74.