venous route is effective and that all doses above 10 mg. per kg. produce a delayed shortening of the effect of pilocarpine on the second day. The amount of shortening and particularly the duration of the recovery period are related to the dose but are not definitely proportional to it.

Doses of 5 mg. per kg. of amytal by mouth did not significantly alter the response of the denervated salivary gland of Dog 22 to pilocarpine. However, when this same dose was repeated on 4 successive days a very definite shortening of the duration of the effect of pilocarpine was evident on the fifth day. This result taken in conjunction with the long duration of the recovery period after large doses of amytal indicates that sodium amytal or its decomposition products may remain in the tissues for a considerable length of time.

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A New Tick Vector of Relapsing Fever in California.

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Relapsing fever has been repeatedly reported in California since 1921 (Briggs,[1] Porter, Beck and Stevens,[2] and Coleman[3]). While ticks have been suspected as vectors for some time (Herms and Wheeler,[4] and Coleman[5]), no positive experimental evidence incriminating a particular species has been obtained until recently.

A careful search for ticks has been made repeatedly in various localities in California where cases of relapsing fever had been reported. On August 12, 1931, three specimens of mature *Ornithodorus* ticks were taken in a cottage located at Brockway, Lake Tahoe, California, at an elevation of approximately 6,000 feet, where cases of this disease had occurred about a month previously.

1 Briggs, *J. Am. Med. Assoc.*, 1922, **79**, 941.

2 Porter, Beck, and Stevens, *Am. J. Public Health*, 1932, **22**, 1136.

3 Coleman, *J. Infect. Dis.*, 1933, **53**, 337; and 1934, **54**, 11.

4 Herms and Wheeler, paper presented at a joint meeting of Section N (Medical Sciences), A.A.A.S., and the American Society of Parasitologists, June 20, 1934, in Berkeley, Calif. Manuscript.

5 Coleman, *J. Infect. Dis.*, 1934, **54**, 281.

On examination and comparison with other species of the genus *Ornithodorus* these specimens were believed to be an undescribed species. In September, 1933, several similar specimens of *Ornithodorus* were sent to us from Big Bear Lake, California. In August, 1934, more ticks of the same undescribed species were collected in a relapsing fever cabin at Big Bear Lake in San Bernardino County, elevation about 5,700 feet. Other specimens of this species have been taken in various localities in the following counties: San Bernardino, Eldorado, and Placer, at elevations ranging from 5,000 to 8,000 feet.

Since Beck and her associates[2] had demonstrated spirochaetes in the blood and organs of squirrels and chipmunks both at Big Bear Lake and at Lake Tahoe and thus established the burrowing rodents as possible intermediate hosts, collections of rodent nesting material taken from the cabins were examined thoroughly. Several dozen specimens of ticks of the same species were discovered. Specimens of ticks similarly collected have also been obtained through the courtesy of Dr. E. B. Godfrey, San Bernardino County Health Officer.

The first transmission experiment was conducted at the Hooper Foundation in San Francisco, California. Six specimens of *Ornithodorus* n. sp. which had been taken at Eagle Point, Big Bear Lake, California, were placed on the shaven abdomen of a Macacairus monkey, No. 1038, on September 23, 1934. The ticks were allowed to engorge to repletion and detached of their own accord (19 to 31 minutes). At the site of the bite a bright hemorrhagic area (3 x 5 mm.) appeared and persisted for 48 hours. Sixteen days later, on October 9, 1934, this monkey showed a characteristic rise in temperature and spirochaetes were demonstrated in a blood smear. Subsequent subinoculations into white mice also produced the spirochaetes in the blood of these animals. On October 23, or 14 days later, the monkey had a relapse with a few spirochaetes in the blood.

The next series of transmissions were carried on in the Division of Entomology and Parasitology, University of California. Five specimens of *Ornithodorus* n. sp. in varying stages of development, taken at Big Bear Lake, California, were placed on the abdomen of a series of 4 white mice, and were allowed to engorge (average time of feeding 26 minutes). Four to 7 days later spirochaetes were demonstrated in blood smears. No coxal fluid or fecal material was observed to exude from the ticks while feeding. Subsequent inoculations into other white mice also produced spirochaetes in the blood of these animals.

Ornithodorus hermsi, the proposed name for the new species, differs markedly from the 4 species of *Ornithodorus* reported from California, namely: from *O. turicata* in (a) the absence of clubbed hairs between the mammillae, (b) the coxae I narrowly separated from coxae II, (c) the arrangement and number of teeth on the hypostome, (d) the arrangement and number of protuberances on tarsi I and IV in particular, and (e) the smaller size of the female. This new species differs from *O. talaje* in (a) the absence of large discs on the dorsum, (b) the characteristic sculpturing of the integument, (c) microscopical differences in the structure of the integument, (d) the arrangement of the dentition of the hypostome, (e) the absence of lateral flap-like borders at the margins of the capitulum, (f) the cheliceral teeth, (g) the shape of the anal grooves, and (h) the tarsi of the legs bearing diagnostic protuberances. To those familiar with the other 2 California species, *O. coriaceus* and *O. megnini,* differences need not be listed.

Brumpt[6] has recently designated the spirochaete responsible for the human cases of relapsing fever in Texas and California as *Spirochaeta turicatae* n. sp. Until the susceptibility of the California ticks and their ability to act as vectors for the Texan spirochaete has been experimentally proven and, *vice versa,* the vector ability of *Ornithodorus turicata* for the California *Spirochaeta recurrentis,* it is doubtless premature to consider the identity of the 2 parasites as established. In fact, it is not unlikely that the Colorado[7] and British Columbia[8] relapsing fever infections are transmitted by ticks which differ from the *O. turicata* and *O. hermsi.* Investigations along these lines are in progress.

[6] Brumpt, *C. R. Soc. Biologique,* 1933, **113**, 1369.

[7] Meader, C. N., *U. S. Public Health Rep.,* 1915, **30**, No. 52, 3737; Waring, T. T., *Am. J. Med. Sci.,* 1918, **155**, 819.

[8] Palmer, T. H., and Crawford, D. J. M., *Canadian M. A. J.,* 1933, **28**, 643; Hearle, E., *Canadian M. A. J.,* 1934, **30**, 494.