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The Distribution of *Heterodoxus spiniger* (Enderlein)

By

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Plomley and Thompson (1937) drew attention to the interesting distribution of *Heterodoxus* on non-marsupial hosts; the present paper consists of the records of distribution and other information relating to the problem. In collecting this information, I have been helped by numerous workers; it would be quite impossible to list them all, but I wish to take this opportunity of thanking them all for their kind co-operation.

HOST SPECIFICITY

In view of the relationship of the parasite, there can be little doubt that the true hosts of *Heterodoxus spiniger* are Australian marsupials (kangaroos and wallabies); it may be possible to limit the host to a single species or group of very closely-allied species when more extensive collections are available. Host specificity is perhaps more definite in the Mallophaga than in any other group of ectoparasitic arthropods. A species is normally found to be a parasite only of a single host species or group of very closely allied host species. At present we know nothing of the factors controlling host-specificity, but considering the apparent opportunities for the transference of a parasite from one host to another, it is surprising that the establishment of a louse species on a host other than its 'phylogenetic' host does not occur more often. The occurrence and establishment of a parasite on such another host is a phenomenon to which the term *straggling* is applied.

The numerous records of the occurrence of *Heterodoxus spiniger* on the domestic dog show that it is a well-established parasite of this animal, but its haphazard geographical distribution emphasizes that it is a straggler. The records suggest that the straggling has occurred not in the distant past but recently, and that the parasite is becoming more firmly established and more common on its new host rather than waning. The louse does not seem to have been found on non-marsupial hosts until about 1900, while *Trichodectes canis* was described over a hundred years ago. There are no records of *T. canis* having been taken together with *Heterodoxus* off the same dog. I have, however, received specimens of the sucking louse *Linognathus setosus* (Olfers) and the flea *Ctenocephalides canis* (Curtis) taken in company with *H. spiniger* from a dog in Tasmania. It appears that in some parts of the world, e.g. South Africa, *H. spiniger* is the 'normal' parasite of dogs, while *T. canis* is unknown. The occurrence of *H. spinger* on an ocelot, *Herpailurus salinarum* Thomas, in Argentina is difficult to explain (Werneck

(1936)). Dr. Werneck tells me that there was quite a flourishing colony of the parasite on the animal when it was killed. Its occurrence on the coyote and jackal may be due to the association of the domestic dog with these closely allied forms. Cummings (1913) has recorded *Heterodoxus* from a crow (*Corone australis* = *Corvus coronoides* V. & H.), but the record is probably one of chance straggling, when the bird settled on a dead marsupial or dog to feed.

New Records

Plomley (1940) has recorded a number of instances of the finding of *Heterodoxus spiniger* on dogs. The following additional records refer to hitherto unpublished instances of the finding of *Heterodoxus* sp. on dogs.

N. California, 1937 (*M. A. Stewart*). California, Madera County, 5. iv. 1932 (*W. L. Jellison*). Oklahoma, Stillwater, 1925. Kansas, Manhattan, 10. ii. 1912 (*J. W. Scott*). Arizona, Phoenix, 1928. Venezuela, Zaraza, 1935. British Guiana, Georgetown, 27. x. 1922. Ecuador, 1930. Haiti, Momance, 1913. Burma, Rangoon, 1931. Uganda, Kampala, iii. 1932 (*G. H. E. Hopkins*). Natal, iii. 1917. Sierra Leone, 3. x. 1925. Union of South Africa, Pretoria (*Dr. Rene du Toit*).

The record from the Canal Zone is of particular interest as a complete count was made of the parasites. The host was a dog, and 96 ♂♂, 122 ♀♀ and 39 immature specimens were collected.

The following notes were sent by the collector of the Javanese specimens:—'*H. longitarsus* (Piaget) is a pest in some cases in Java. The dogs have large bald patches on their backs and the parasites make large bloody, purulent wounds[1] in which they live in large numbers. One can find blood in the parasite sometimes. I have often found such'. In another letter the same collector states:—'the dogs with *H. longitarsus* (Piaget) also possess ticks and fleas but no lice. I have collected twenty examples of the parasite from one dog, but I think there were hundreds in the wounds. It is not very pleasant to investigate such dogs.'

Dr. Stewart informs me that some dogs in northern California were recently found to be very heavily infested with *Heterodoxus*. He believes, in the absence of definite data, that this louse is rather common on domestic dogs in northern California. Dr. R. du Toit informs me that *Heterodoxus* is a very common parasite of dogs throughout South Africa.

Until recently the only record of the parasite from India was based on specimens in the Indian Museum collected from domestic dogs in Calcutta and labelled as "*Menopon spiniger*". Additional specimens taken from a dog in Calcutta have recently been received.

On the authority of the Department of Agriculture of the Philippine Islands at Manila, the parasite is unknown in the islands. In the United States National Museum, however, there is a single specimen collected from a man, Phillipine Is., Victorias Oc. Negros, 1930. This record makes the second instance of the occurrence of *Heterodoxus* on man. I think on the evidence of the single specimens recorded in each case that the occurrence of this parasite on man may be regarded as accidental; the close association of man with the dog must always be remembered.

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[1] According to this collector, numerous ticks (*Amblyomma* sp.) were found on the dogs in company with the lice and it must be borne in mind that the lice may have taken up their positions at points where ticks had previously attached themselves.

Absence of the Parasite from Various Parts of the World

In the course of collecting together the distributional data of this parasite, certain workers were kind enough to supply definite evidence of its absence. As these are of interest the areas are listed below, togther with the correspondents' comments.

Mauritius, Ceylon, New Zealand, Fiji Islands, Trinidad, Jamaica (1), Gold Coast (2), Nigeria (3), British Somaliland (4), Canada, Europe, U.S.S.R., Cyprus, China (Shantung), Iran.

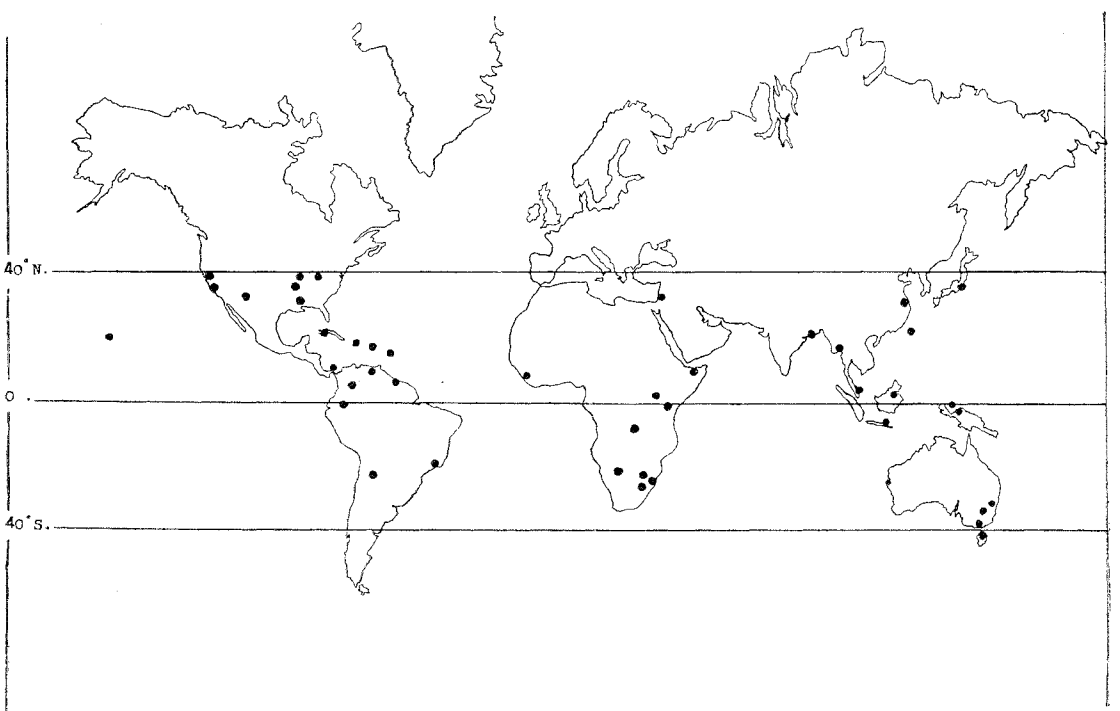
(1) 'I have never found any lice on dogs in Jamaica. The dog in Jamaica has probably been protected by the prohibition against their importation from all countries except the British Isles. This regulation has been in force for 30-35 years.'

(2) 'No lice have ever been found on dogs in the Gold Coast.'

(3) 'No lice seen on dogs during fifteen years in Nigeria.'

(4) '. . . . . in this Mohamedan country there are virtually no dogs except a few European owned animals and I have not so far encountered lice on dogs here.'

In Ceylon, Fiji Islands, and Canada only *T. canis* has been observed; I have recently seen specimens of this louse taken from a dog in New Britain, Kieta District, 16. x. 1937. There is reliable evidence that *T. canis* does not occur in the remainder of the regions listed above.



Map to show records of distribution of *Heterodoxus* on the dog, together with those of distribution on *Herpailurus salimarum*, coyote and jackal. Records from all sources.

Geographical Distribution of the Parasite

On the accompanying map of the world, I have indicated the places from which *Heterodoxus* (almost certainly *H. spiniger* in all instances) has now been reported from non-marsupial hosts, and it is interesting that all the localities are within the area confined between lat. 40°N. and lat. 40°S., or very nearly.

The distribution of a louse is normally controlled by its host but it appears that the controlling factor in the present case may be climatic. If this distribution is as real as it appears from the records to date, it may throw some light on a feature of parasitism concerning which we know very little. It may be that as a result of the parasite having adapted itself to a new and 'non-phylogenetic' host, other factors have come into force. Van Volkenberg (1936) suggests climatic factors to explain the absence from Porto Rico of certain parasites of imported hosts (domestic animals).

Transfer to New Hosts

How this biting louse became a parasite of the domestic dog, is difficult to say. Three possibilities present themselves. First, since the true hosts (i.e. kangaroos and wallabies) of this louse are, I understand, fairly easy animals to keep in zoological gardens, the parasite may have become transferred to dogs as a result of contact with these marsupials, in the various part of the world to which they have been transported (Ewing (1933)). Yet, zoological gardens are very much more common in those regions where the parasite has not yet been recorded!

Secondly, in the past when settlers arrived in Australia with their dogs, the marsupial hosts were much more common than they are to-day, and the dogs may have acquired the lice from hunted marsupials; having established itself on dogs in Australia it became distributed by the dogs when accompanying man on his voyages to other parts of the world. Yet, the parasite does not seem to be common on non-marsupial hosts in Australia, and moreover, few dogs, if any, are exported from Australia!

Thirdly, it is common for ships to carry pet dogs and equally so for ships visiting a foreign port to take away with them some animal peculiar to the country visited; many ships visiting Australia would take away with them a kangaroo or wallaby, these animals being probably the most readily obtainable 'curiosity', and a very well-known one outside Australia. Here then is a possible link between the dog and the marsupial, and it is noteworthy that the parasite has been reported from most of the important seaports between the parallels of 40°N. latitude and 40°S. latitude.

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