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Technical Report 29
MITES (CHELICERATA: ACARI) PARASITIC ON BIRDS
IN HAWAII VOLCANOES NATIONAL PARK
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DISTRIBUTION OF MOSQUITOES (DIPTERA: CULICIDAE)
ON THE EAST FLANK OF MAUNA LOA VOLCANO, HAWAI'I
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IN HAWAII VOLCANOES NATIONAL PARK

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ABSTRACT

The external parasites of native and exotic birds captured in Hawaii Volcanoes National Park are recorded. Forty-nine species of mites in 13 families were recovered from 10 species of birds. First records of Harpyrhyndidae are given for 'Amakihi and 'Apapane; Cytodites sp. (Cytoditidae) is recorded from the Red-billed Leiothrix for the first time in Hawai'i. Two undescribed species of Cheyletiellidae, 1 undescribed species of Pyroglyphidae, and 19 undescribed feather mites of the superfamily Analgoidea are noted.

RECOMMENDATIONS

Information presented in this report is primarily of a preliminary nature due to the incomplete state of the taxonomy of mites. This data will add to the basic knowledge of the stress placed on the bird populations within the Park. The presence of Ornithonyssus sylviarum in collections made of the House Finch provides a potential vector for viral and other diseases of birds, including various encephalides and Newcastles Disease. House Finches should be eliminated or controlled as much as possible. Further study is indicated on the effects of this species and other Macronyssidae on birds within Hawaii Volcanoes National Park.

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INTRODUCTION

In spite of the intense interest in Hawaiian birds, there have been relatively few records of associated parasitic Acari (spiders and mites). Garrett and Haramoto (1967) listed records of only 27 species of Acari in 10 families parasitic on birds in Hawai'i. Of these, five species in two families (Argasidae and Ixodidae) were reported only from migratory sea birds and most records were from the Northwestern Hawaiian Islands. Ten of the remaining species were reported only from domestic birds (chickens, etc.), nine only from introduced birds, and three from migratory sea birds. The only record from an endemic bird was of the macronyssid Ornithonyssus bursa (Berlese, 1888) from the Hawaiian Crow or 'Alala (Corvus tropicus). Goff (1971) recorded three species of trombiculid mites infesting migratory sea birds in the Northwestern Hawaiian Islands and (1977) described a new species of Toritrombicula from the Pacific Golden Plover (Pluvialis dominica fulva) taken on O'ahu. A cheyletiellid, Bakericheyla chanayi (Berlese & Trouessart, 1889) was reported by Radovsky (1971) from a Shama Thrush (Copsychus malabaricus) in Honolulu. Smith (1973) and Smith and Guest (1973) noted the rhinonyssids, Sternostoma tracheacolum, from a Cordon-bleu (Uraeginthus angolensis) and Red-eared Waxbill (Estrilda troglodytes); and Ptilonyssus sp. from a Japanese White-eye (Zosterops japonica), Red-eared Waxbill, and Lavender Thrush (Estrilda caerulescens) on Diamond Head, O'ahu. At present, information concerning mite parasites on birds in Hawai'i is, at best, fragmentary.

From November 1977 through March 1979 approximately 140 birds were collected and examined for acarine ectoparasites in Hawaii Volcanoes National Park (Fig. 1) in connection with a study of avian malaria under the Cooperative National Park Resources Studies Unit, University of Hawaii. During the course of this study 10 species of birds were collected and examined (five endemic and five exotic).

MATERIALS AND METHODS

Hosts were collected either live by mist netting or dead as "road-kills." Recording for ectoparasite study was by a dated field number. Host identifications were made by Dr. Charles van Riper, Avian Disease Laboratory, Hawaii Volcanoes National Park. Hosts were first examined under a dissecting microscope. Visible ectoparasites were removed with forceps and preserved in 75% ethyl alcohol. Hosts were then washed in a detergent solution. After removing the host, the detergent solution was layered with 95% ethyl alcohol to break surface tension, allowed to settle for 15 minutes, and the supernatant decanted off. The residue was examined under a dissecting microscope and ectoparasites removed

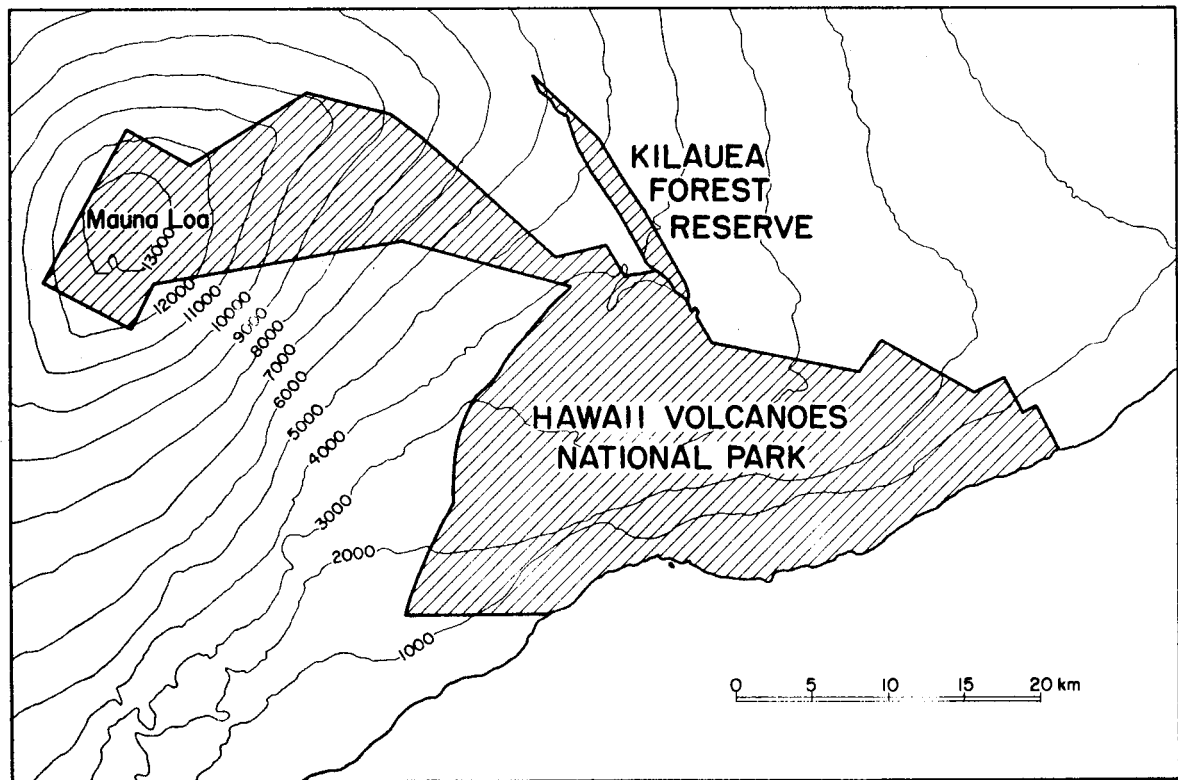
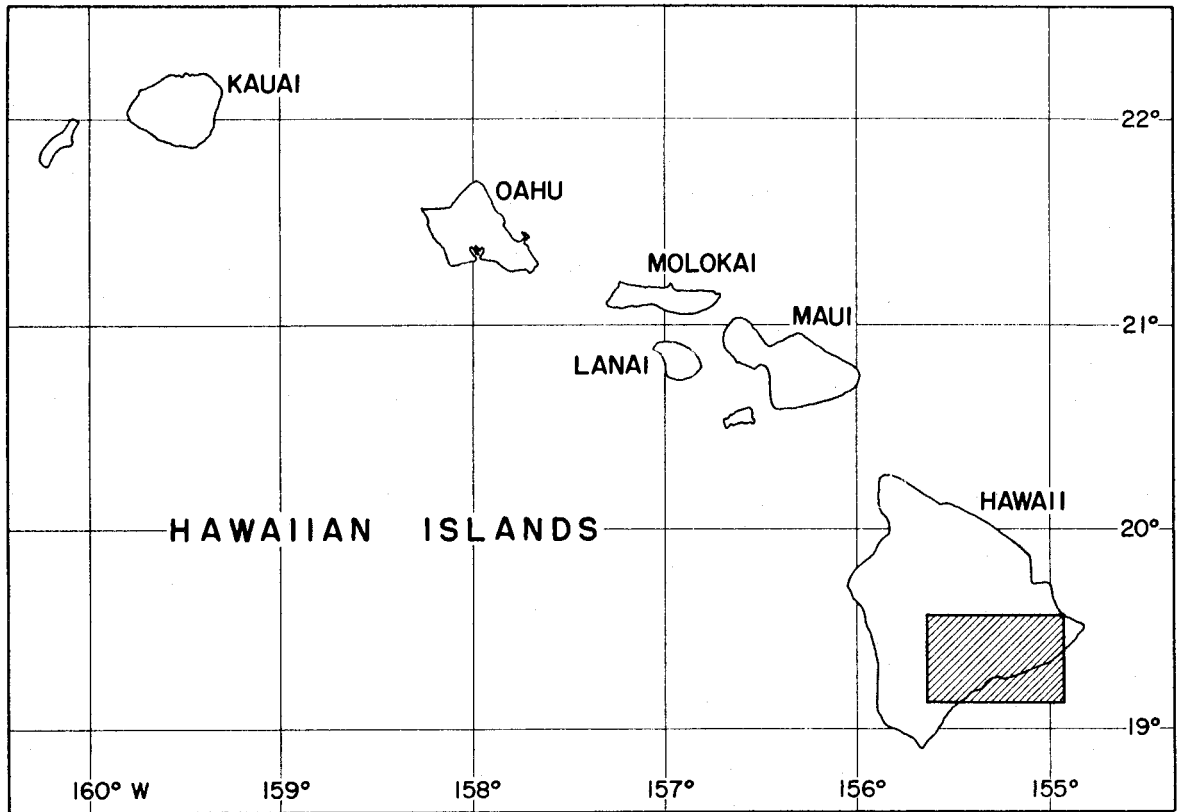


FIGURE 1. Study area, Hawaii Volcanoes National Park.

for preservation in 75% ethyl alcohol. Specimens thus recovered were cleared in Nesbitts' fluid and mounted in a modified Hoyer's medium on microscope slides. Slides were placed in a drying oven for 7 days at 40°C and ringed with Glyptal prior to examination.

Identifications were made using a Wild M70-EB phase contrast microscope. Higher category classification follows Krantz (1978).

RESULTS AND DISCUSSION

A total of 49 species of Acari (mites) in 13 families were recovered from the 10 species of birds represented. Infestation rate for this study was 100%, although considerable variation in composition of parasite populations was noted. Results of collections from exotic bird species are given in Table 1 and for endemic species in Table 2.

Of the 21 species recorded from exotic birds, four species representing two families are in the order Parasitiformes. Species in the genera Ptilonyssus and Paraneonyssus (family Rhinonyssidae) were recovered from the intranasal parasitope or attachment site, as is typical for the family. The Northern Fowl Mite, Ornithonyssus sylviarum (Canestrini & Fanzago, 1877), was recovered from one House Finch. This does not, however, indicate a low incidence for this bloodfeeding mite. Macronyssid mites are primarily nest-dwelling ectoparasites, visiting the host only for feeding and spending the remainder of their life cycle in the nest. Thus, recovery of these mites on the host does not necessarily present a clear picture of relative abundance. O. sylviarum was also recovered from the nests of House Sparrows, Japanese White-eyes, 'Amakihi, and 'Elepaio during this study. Parasitiformes accounted for only five of the 28 species of Acari recovered from endemic species. Rhinonyssids were represented by four species, all undescribed. The other parasitiform family, Laelapidae, was represented by a yet unidentified species of Androlaelaps. Species in this genus are primarily nidicoles (nest dwellers) rather than parasitic although frequently observed on the host and feeding opportunistically on blood and exudates. This pattern is similar to that of the Laelapinae considered ancestral to the parasitic Macronyssidae as noted by Radovsky (1969).

Two of the three suborders of Acariformes, Actinedida and Acaridida, were represented in this study. Parasitic species are not present in the Oribatida although numerous nidicolous forms are known. Two families of Actinedida were recovered from exotic birds: Cheyletiellidae and Harpyrhynchidae. All species of Cheyletiellidae from the Red-billed Leiothrix and Japanese White-eye are undescribed, while Harpyrhynchus pilirostris Berlese & Trouessart, 1889, (Harpyrhynchidae) has been widely reported from House Sparrows (Garrett & Haramoto 1967). The records of Harpyrhynchus spp. from the 'Amakihi and 'Apapane are the first records of this family from endemic Hawaiian birds.

The suborder Acaridida is largely represented by species of feather mites of the superfamily Analgoidea on both exotic and endemic bird species. Garrett and Haramoto (1967) listed only eight species of Analgoidea in three families for Hawaiian Islands, all from introduced species. In the current study preliminary identifications show 31 species in five families, including 19 definitely undescribed species and two new genera. Due to the complexity of feather mite taxonomy, complete identifications are not available at this time. All host individuals examined during this study were infested by one or more species of feather mites and populations frequently exceeded 500 individuals per host. As indicated in Tables 1 and 2, different bird species were infested by mites belonging to the same genera. In each instance, however, a separate species of mite was involved for each bird species, thus accounting for the seemingly repetitive nature of the tables. In spite of the large numbers of mites per bird, damage to hosts by feather mites is minimal. As noted by Krantz (1978), feather mites appear to be saprophagous (feeding on dead material) rather than parasitic, feeding on feather fragments, desquamated (loosened) skin scales, and oil secretions from the host.

Records of Cytodites sp. from the Red-billed Leiothrix constitute the first record of this genus from a bird other than chickens in Hawai'i. The record of Dermatophagoides sp. from the House Sparrow is not unusual; however, these mites are non-parasitic forms. Species of Dermatophagoides commonly inhabit nests and have been implicated as causative agents for House Dust Allergy in humans. Wharton (1976) postulates that mites of the Pyroglyphidae have secondarily reverted to a nidicolous habit after evolving to a state of facultative parasitism, with accompanying loss of a hypopal stage. This may be supported by the parasitic habit of species of Onychalges Gaud & Mouchet, 1959; Paralgopsis Gaud & Mouchet, 1959; and Paramealia Gaud, 1967, which were tentatively placed in the subfamily Dermatophagoidinae by Gaud (1968), but considered here as Analgidae following the interpretations of Fain (1965). Further support may be gleaned from the development of a quiescent protonymphal stage in species of Dermatophagoidinae, functionally replacing the hypopus (Wharton 1976). In this light, the close association of host and nidicole observed for Dermatophagoides sp. in this instance does not appear too unusual.

As shown by the discussion above, this study should be considered to be of a preliminary nature only. Further sampling of other bird species in the area and complete identifications of acarine taxa recovered must be accomplished prior to a detailed discussion of host-parasite relationships.

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TABLE 1. Acari from exotic birds in Hawaii Volcanoes National Park.

Host	Acari
Order Passeriformes	
Fam. Timaliidae	
<u>Leiothrix lutea</u> (Red-billed Leiothrix)	Order Acariformes Suborder Actinedida Fam. Cheyletelliidae: <u>Ornithocheyletia</u> n. sp. <u>Ornithocheyla</u> n. sp.
	Suborder Acaridida Fam. Cytoditidae: <u>Cytodites</u> sp. Fam. Pteronyssidae: n. gen. & n. sp.
Fam. Zosteropidae	
<u>Zosterops japonica</u> (Japanese White-eye)	Order Acariformes Suborder Actinedida Fam. Cheyletelliidae: <u>Ornithocheyla</u> n. sp. Suborder Acaridida Fam. Analgidae: <u>Anhemialges</u> sp. <u>Strelkovarius</u> sp.

TABLE 1--Continued.

Host	Acari
Fam. Ploceidae <u>Carpodacus mexicanus</u> <u>frontalis</u> (House Finch)	Fam. Pteronyssidae: <u>Mouchetia</u> sp. near <u>dolichosikya</u> Gaud, 1961 Fam. Trouessartiidae: <u>Calcealges yunkerii</u> Gaud, 1962 <u>Trouessartia</u> sp.
Order Parasitiformes Fam. Macronyssidae: <u>Ornithonyssus sylviarum</u> (Canestrini & Fanzago, 1877)	
Order Acariformes Suborder Acaridida	
<u>Lonchura punctulata</u> (Rice Bird)	Fam. Proctophyllodidae: <u>Proctophyllades pinnatus</u> (Nitzsch, 1818) Order Parasitiformes Fam. Rhinonyssidae: <u>Paraneonyssus</u> sp. <u>Ptilonyssus</u> sp.

TABLE 1--Continued.

Host	Acari
<u>Passer domesticus</u> (House Sparrow)	Order Acariformes Suborder Acaridida Fam. Analgidae: <u>Onychalges n. sp.</u> Fam. Proctophyllodidae: <u>Pterodectes n. sp.</u> Fam. Trouessartiidae: <u>Trouessartia sp.</u>
<u>Passer domesticus</u> (House Sparrow)	Order Parasitiformes Fam. Rhinonyssidae: <u>Ptilonyssus hirsti</u> (Castro & Pereira, 1947)
<u>Passer domesticus</u> (House Sparrow)	Order Acariformes Suborder Actinedida Fam. Harpyrhynchidae: <u>Harpyrhynchus pilirostris</u> Berlese & Trouessart, 1889
<u>Passer domesticus</u> (House Sparrow)	Suborder Acaridida Fam. Proctophyllodidae: <u>Proctophylloides truncatus</u> Robin, 1877 Fam. Pyroglyphidae: <u>Dermatophagoides sp.</u>

TABLE 2. Acari from endemic birds in Hawaii Volcanoes National Park.

Host	Acari
Order Strigiformes	
Fam. Strigidae	
<u>Asio flammeus sandwichensis</u>	Order Acariformes
(Pueo)	Suborder Acaridida
	Fam. Xolalgidae: n. gen. & n. sp.
Order Passeriformes	
Fam. Turdidae	
<u>Phaeornis obscurus</u>	Order Parasitiformes
Fam. Rhinonyssidae: <u>Ptilonyssus</u> n. sp.	
	Order Acariformes
	Suborder Acaridida
	Fam. Analgidae: <u>Analges</u> n. sp.
	Fam. Proctophylloidae: <u>Proctophylloides</u> n. sp.
	<u>Prerodectes</u> n. sp.
	Fam. Trouessartiidae: <u>Trouessartia</u> n. sp.

TABLE 2--Continued.

Host	Acari
Fam. Drepanididae	
Subfamily Psittirostrinae	
<u>Loxops virens</u>	Order Parasitiformes
('Amakihi)	Fam. Rhinonyssidae: <u>Ptilonyssus</u> n. sp.
	Order Acariformes
	Suborder Actinedida
	Fam. Cheyletidae: <u>Cheyletus</u> sp. near <u>malaccensis</u> Oudemans, 1903
	Fam. Harpyrhynchidae: <u>Harpyrhynchus</u> sp.
	Suborder Acaridida
	Fam. Analgidae: <u>Analges</u> n. sp.
	Fam. Proctophyllodidae: <u>Proctophyllodes</u> n. sp. <u>Pterodectes</u> n. sp.
	Fam. Trouessartiidae: <u>Trouessartia</u> n. sp.
	Fam. Xolalgidae: <u>Ingrassiella</u> n. sp.

TABLE 2--Continued.

Host	Acari
Subfamily Drepanidinae	
<u>Himatione sanguinea</u>	Order Parasitiformes
('Apapane)	Fam. Laelapidae: <u>Androlaelaps</u> sp.
	Fam. Rhinonyssidae: <u>Ptilonyssus</u> n. sp. A
	<u>Ptilonyssus</u> n. sp. B
	Order Acariformes
	Suborder Actinedida
	Fam. Harpyrhynchidae: <u>Harpyrhynchus</u> sp.
	Suborder Acaridida
	Fam. Analgidae: <u>Analges</u> n. sp.
	<u>Anhemialges</u> sp.
	Fam. Proctophylloidae: <u>Proctophylloides</u> n. sp.
	<u>Pterodectes</u> n. sp.
	Fam. Pteronyssidae: <u>Mouchetia</u> sp.
	Fam. Trouessartiidae: <u>Calcealges</u> n. sp.