

ECTOPARASITIC AND BIRD DISEASES<sup>1</sup>

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DISEASES of birds can be classified in many ways, depending on the purpose at hand. Symptoms, causative agents, and pathology have no doubt received the most attention, but, from the standpoint of possible control measures, the manner of transference from an infected to a non-infected bird is probably the most important consideration. The avenues of infection of the numerous diseases of birds in nature vary as much as in man or any other animals. Conspicuous among these is the transmission of disease by ectoparasites. In this discussion ectoparasites include all animals which exist during at least a part of their life cycle on the body of the bird host. In many cases such an existence is necessary to the life of the parasites.

All bird-banders have probably at some time or other observed ectoparasites on the birds they are handling, but no doubt the significance of these pests is often not fully appreciated. In past issues of *Bird-Banding*, and in other ornithological journals, there have been several papers on the ectoparasites of birds. The destructive activities of *Protocalliphora* are well known. Although a great deal of work has yet to be done to complete the picture, there has already been sufficient research on many of these parasites to give us a fair conception of their importance.

Blood diseases require bloodsucking parasites to transmit the causative agents from one host to another. The most common blood infections are probably the malarias, of which there are two types prevalent in birds, both caused by protozoan parasites. One group belongs to the genus *Plasmodium*, the genus which causes malaria in man. This form is transmitted by mosquitoes, a fact that was discovered with birds before it was known for the human disease. The infection in man is transmitted by the anopheline mosquitoes, that in birds by the culicine. Mosquitoes also may be the transmitting agents of filarial worms in birds, as they are in man.

The other type of malaria in birds is due to infection by the genus *Hæmoproteus*, which has been authentically reported from mammals and which is also known to occur in reptiles and amphibians. This blood-stream infection has been shown to be transmitted by hippoboscid flies in Domestic Pigeons, Eastern Mourning Doves, (*Zenaidura macroura carolinensis*) and California Valley Quail (*Lophortyx californica vallicula*). Further research may show

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these flies to be the transmitting host of this common infection of other birds as well.

Another protozoan parasite often encountered in the blood of birds is *Leucocytozoon*, a cause of severe losses of ducks in certain regions of the country. Although it also occurs in many species of passeriform and other birds, the course of the infection has thus far been studied only in Geese, Ducks, and Domestic Turkeys. Blood-sucking black flies of the genus *Simulium* have been shown to be the vectors in the Ducks and Turkeys, but whether or not these flies are responsible for the spread of the disease in other birds has not been determined.

It has been suggested in a recent paper<sup>1</sup> that hippoboscid flies may be the cause of loss of feathers. In view of the fact that these are bloodsucking flies and not feather-eaters, this implication is open to question. Neither hippoboscid nor black flies have ever been known to cause ill-health in birds from direct loss of blood.

With Protocalliphora the picture is quite different. These flies have not been implicated as the vectors of any infectious disease, but, when present in sufficient numbers in a bird's nest, the larvæ often suck enough blood from the young birds to bring about their death. This has been shown to be true particularly with birds that utilize man-made nesting-boxes, such as Bluebirds (*Sialia s. sialis*) and Tree Swallows (*Iridoprocne bicolor*).

Of interest, also, are two diseases of the digestive tract, ulcerative enteritis and botulism. Flies have been shown, experimentally, to be capable of carrying the causative virus of ulcerative enteritis. Infection in this case is by means of the bird's eating infected flies. However, this fatal disease, which has been reported in epidemic form from Ruffed Grouse and other birds, is more commonly obtained through fecal contamination, the birds contracting the disease directly by ingesting the droppings of infected individuals. Botulism also may be transmitted by flies, infection resulting from the birds' having eaten decayed meat or the maggots of flies which had fed on infected meat.

Ticks have been shown to transmit tularemia from rabbits to Grouse and other game-birds, as well as from one bird to another. Ticks are most common on game and other ground-feeding birds, but many of the perching birds have also been found infested.

Two types of lice occur on birds. One group lives on feathers; the other obtains its subsistence from the blood. A bloodsucking louse which occurs on man is responsible for the transmission of typhus fever. There has been no evidence as yet that the bloodsucking lice of birds disseminate any disease among them. However, as with the mites discussed below, it is well to bear in mind that although very

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<sup>1</sup>Michener, H. and J. R. 1936. Abnormalities in birds. *Condor*, 38 : 105.

little research has been done on these forms they are, being blood-suckers, potential carriers of disease.

Mites also can be divided into two groups—those that live on feathers and those that get their nourishment from the blood of the host. The feather-eating lice and mites, though not implicated as vectors of disease, nevertheless in cases of heavy infestation cause much destruction to feathers and are a source of much annoyance and irritation. The mites which live on bird blood have not as yet been proved to be the transmitting hosts of any disease. Closely related mites are known to be the transmitting hosts of *Hepatozoon muris*, which occurs in rodents. A very similar blood parasite causes toxoplasmosis in birds—a common disease of English Sparrows which has been little studied in this country. During the past summer at the Austin Ornithological Research Station the disease has been observed to occur in a Kingbird (*Tyrannus tyrannus*), English Sparrows (*Passer d. domesticus*), and several other Fringillids, and subsequent investigation may reveal more cases.

Fleas, another group of ectoparasites of birds, have not as yet been shown to be implicated in the spread of disease. In man they are the vectors of bubonic or black plague, which has spread in epidemic form in past centuries, causing whole cities to be wiped out by the "Black Death." The causative agent of this disease is a bacterium of the *Pasteurella* group. A bacterium of this same group occurs in birds—causing the equally fatal bird cholera—which often spreads in epidemic form, particularly among birds confined to limited space, such as at breeding farms or in experimental laboratories. I have observed an epidemic of this disease in laboratory canaries being used in malaria studies, where the most likely vector appeared to be mites which were present. Although several other investigators have observed such epidemics and also believe mites are responsible, experimental proof is lacking.

As well as occurring on the birds, many ectoparasites can often be found in their nests. This is particularly true of Protocalliphora larvæ. Hippoboscids may also have the pupal stage in the nest-material, but these would be difficult to find among the débris unless they should occur more abundantly than I have observed. Although I have flushed as many as eighteen flies from a single young Cowbird (*Molothrus a. ater*), such numbers are uncommon. However, fleas and mites are quite abundant in nests. Flea larvæ have been observed in great numbers in the nest débris, and adult fleas also have been found there, as many as forty-two having been obtained from one Bluebird's nest. A large number of nesting-boxes, which had been occupied by Tree Swallows, Bluebirds, and Chickadees (*Penthestes a. atricapillus*), were examined during the past summer and found without exception to be infested with mites. These ectoparasites are hardly larger than the point of a pin, and, unless they are very active, are almost impossible to see with the naked eye.

However, so many mites are seen when a small amount of the dust from the bottom of a nest-box is examined under a microscope that an estimation of billions in each nest seems conservative. The mere emptying of the old nest-material does not get rid of these minute creatures, since they can find security by squeezing into the finest crevices. They are readily killed by kerosene or creosote. Dipping nest-boxes into such a germicide might prove advantageous, particularly when birds are likely to use the nest-box a second time in the same season.

No method of reducing the ectoparasite population of wild birds seems practical. Nevertheless, removing these parasites from the birds whenever observed will undoubtedly relieve the individual greatly. Ruffling the feathers will usually frighten out the flies, but it is a difficult task to capture the lice and mites. Various insect powders can be useful, but these are usually harmful to the eyes. Since the neck and head regions are favorite habitats for the ectoparasites, great care should be exercised in the use of such insecticides.

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## THE MIGRATION OF THE WESTERN BURROWING OWL

(*Speotyto cunicularia hypogaea*)

By J. F. BRENCKLE

THE Western Burrowing Owl is found on the dry plains west of the Mississippi River to the Pacific Ocean, and from Panama and the Gulf of Mexico north to the southern margin of Canada, and east to Minnesota and western Iowa. It is migratory north of Oregon and northern Kansas. On this vast area but five stations have reported banding this bird, but a total of five hundred and seven bandings have been recorded and are here considered.

The banding records of Mr. Emerson Stoner (personal communication) indicate that little or no migratory movement takes place in California. He writes: "I have never considered that our nesting Burrowing Owls migrate, as there seem to be about the same number of birds here throughout the year. All the following were banded in or not over two miles from Benicia, Solano County, California." He has banded twenty-six during the past six years while studying their nesting-habits, and records three repeats, and one recovery.

No. 24451, banded May 9, 1930, was recaptured April 23, 1932, in the same field.  
A514898, banded May 21, 1931, was found dead March 28, 1934, about six miles from place of banding.

A514900, banded April 23, 1932, was recaptured April 23, 1933, in the same field.  
A514907, banded April 23, 1932, was recaptured April 23, 1933, in the same field.