Fulvous Tree Duck at Fort Bragg, Mendocino County, California.—On the morning of December 8, 1962, a group of seven Fulvous Tree Ducks (*Dendrocygna bicolor*) was seen flying easterly along the north edge of Laguna Point at MacKerricher State Park near Fort Bragg, Mendocino County, California. The group circled once before flying inland a short distance to alight on Cleone Lake. A group of Fulvous Tree Ducks, probably the same individuals seen earlier, was observed for several days in the following week by Rangers D. G. Andrews and M. C. Wilson.

Although this tree duck has occurred occasionally north to Washington and Vancouver Island, British Columbia (A.O.U. Check-list, 1957:69), according to Grinnell and Miller (Pac. Coast Avif. No. 27, 1944:73) records are generally lacking for northwestern coastal California.—JOHN R. ARNOLD, *Division of Natural Science, Sonoma State College, Cotati, California, January 17, 1963.*

Botulism and Myiasis as Mortality Factors in Falcons.—Information in the literature pertaining to natural disease as a mortality factor in the Peregrine Falcon (*Falco peregrinus*) is virtually nonexistent. Cade (Univ. Calif. Publ. Zool., 36, 1961:188–189) lists trichomoniasis, aspergillosis, and coccidiosis as occurring in captive falcons; however, only trichomoniasis is known to occur naturally in wild Peregrines. Bond (Condor, 48, 1946:112) pointed out that botulism is a cause of death not mentioned by Hickey in his survey of the Peregrine population in eastern North America. Earlier, Bond (Condor, 41, 1939:55), while discussing the Tule Lake region of northern California, commented that during a botulism outbreak young Peregrines were affected with a disease much like botulism: "although *Clostridium botulinum,* type C, was not recovered from the carcasses, the symptoms were entirely typical." E. R. Kalmbach (U. S. Dept. Agr. Tech. Bull., No. 411, 1934), in his analysis of western duck sickness, lists birds known to have been affected by botulism and includes both the Prairie Falcon (*Falco mexicanus*), which showed *C. botulinum,* type C, in a liver culture, and the Peregrine. The latter species was mentioned in reference to a bird from Utah that "was in a helpless condition and exhibited all the characteristic symptoms of duck sickness."

Botulism is common in certain years on the marshes surrounding Great Salt Lake in north-central Utah, and in the course of several years additional observations have been made on Peregrine Falcons found suffering from botulism on these marshes. The majority of the birds were found by Calvin Wilson of the Tracy Aviary, Salt Lake City, but other aviculturists around Salt Lake City also picked up several of the birds mentioned. The Peregrines listed here were found from late July to early October. Most of the falcons were treated by either "flushing out" the bird with clear uncontaminated water or with a commercial product called B. K. Disinfectant, a solute with a calcium hypochlorite base, mixed one tablespoon per quart of water.

In 1943, when botulism was prevalent in specific areas, three adult female Peregrines were picked up in a weakened condition, cured, and released. Two adult females were found dead. Two additional adults, judged to be females because of their size, appeared to have early symptoms of botulism, but they could not be captured inasmuch as they were not sufficiently weakened. Between 1945 and 1951, one adult female was found and cured. Between 1951 and 1954, four adult females and one juvenal female were picked up. One of the adults died, the rest were cured. In 1956 a botulistic bird of unknown age and sex was picked up by students from the Utah State University. During 1957 an extremely dark juvenal female was found and cured. In late August of 1958 a very dark juvenile, judged to be a female because of its size, demonstrated the early symptoms of botulism; it could not be captured.

The only falcon definitely known to be a male was an adult found by Charles Springer of Salt Lake City in August, 1936. The bird was cured, banded, and released. M. R. Cheesman of Salt Lake City, recalling from memory, reports that he picked up several falcons between 1930 and 1950. Several of his friends interested in this problem have agreed that he found no less than ten falcons.

If we include the unverified ten Peregrines found by Cheesman, there is a total of 27 sick birds, a large number in view of the paucity of previously published reports of this species suffering from botulism. The large number of adult birds found sick in contrast to the number of sick juveniles does not corroborate Bond's (Condor, 48, 1946:112) findings that led him to state that "adults present in the same area and skillful enough to take healthy prey apparently did not suffer [from botulism]." Bond (Condor, 41, 1939:55) earlier reported Marsh Hawks (*Circus cyaneus*) feeding on diseased carcasses without apparent effect. In 1961 and 1962, three Marsh Hawks were brought to

me, one adult female and a juvenal male and female, all suffering from botulism. Kalmbach (*op. cit.*: 37–38) mentions several Marsh Hawks stricken with the disease, one of which fed on the carcass of a diseased teal.

The greater number of females than males affected may be significant in terms of indications of sex ratio, even though the sample is small. Ratcliffe (Ibis, 104, 1962:32) gives some evidence that there is a "floating" nonbreeding population of individual Peregrines and Treleaven (Brit. Birds, 54, 1961:139) further asserts that there is a surplus of nonbreeding females.

Since Peregrines have never been observed feeding on botulistic birds, it is assumed that they contract the disease either by feeding on a sick bird or by acquiring the disease directly from infected water. Falcons, particularly young and inexperienced individuals, are known to take large numbers of crippled or easily caught birds. Peregrines also feed occasionally on carrion, and dead birds are abundant in the marshes during an epidemic. Beebe (Condor, 62, 1960:180) noted a Peregrine feeding on a coot (*Fulica americana*) that had been dead several days.

In support of the second view, Peregrines are constantly bathing and drinking. Their close affinity to water is reflected in the geographic distribution of the bird itself. Because much of Utah is arid, the large expanses of marshes in northern Utah would be an attraction for bathing activities, especially for migrants.

Botulism may reduce the breeding population of Peregrines, particularly in Utah. It has been theorized that trichomoniasis, acquired from infected columbiforms, has been a major factor in the alarming decrease of Peregrines in the eastern United States (Dr. Heinz Meng, personal communication). Dr. Meng has found a large percentage of the nestling falcons during the past few years with trichomoniasis.

As already noted, nearly all the falcons found were adults. In 1952, there were to my knowledge five active eyries in north-central Utah, all in the mountains facing the marshes where the falcons obtained the majority of their food. At one eyrie, young nonflying Avocets (*Recurvirostra americana*) were brought in quite often. These Avocets could be obtained at a distance of not less than 15 miles from the eyrie, indicating the importance of the marshes. Of these five eyries, one was active as recently as 1957. Since then, no adults have been seen at any of the eyries during annual checks. To be sure, puzzling declines in numbers of Peregrines have occurred in areas where botulism could scarcely be involved and some of this decline is undoubtedly due to disturbance by man. However, botulism is suspected as being important in the cases mentioned above. Unfortunately, it was impossible to determine whether the Peregrines affected by botulism were from the local population or from more northern localities.

A high mortality due to myiasis was noted during the nesting season of 1962 in the Prairie Falcon population in northwestern Utah. In nine eyries, there were 26 dead young. The young were all about two weeks old with tails about one inch long. At three of the eyries, dead young were found on the ground below. The young falcons were infected in the nares, eyes, and ears with maggots of the blue bottle fly (*Calliphora* sp.), and adult flies were abundant in the eyries. This same type of fly has been known to blow Prairie Falcon eggs that were apparently still in the process of pipping. The actions of the adult falcons as we approached the eyries were stereotyped. The adults would utter several low, drawn-out screams, fly away and then return silently a few minutes later to survey our actions. These same actions were noted at seven additional eyries in the same area and led us to believe that the young in these eyries had suffered a similar mortality.

The year of 1962 was wet, especially at elevations above 5500 feet, which fact may have been responsible for a high mortality rate in such a small area. All the affected eyries were located between 6300 and 6500 feet and standing water was found below or near many of them. The amount of moisture may have created humidity conditions favorable for the laying of fly eggs on the young falcons, especially on areas devoid of feathers. Sargent (Auk, 55, 1938:82–84) drew similar conclusions, and this idea is supported by the fact that unaffected young were found in a deep, dry pothole as opposed to the exposed ledges of the other eyries. Furthermore, Marsh Hawks, which habitually nest in damp situations, have recently been shown to be affected regularly with myiasis.

Roger Claud of Salt Lake City contributed considerable data for this report. I also wish to thank Dr. Dean Amadon and Dr. William H. Behle, who offered several suggestions.—CLAYTON M. WHITE, *Department of Zoology, University of Utah, Salt Lake City, Utah, January 15, 1963.*