

AVIAN MORTALITY¹

By OLIVER L. AUSTIN, M.D.

So few observations and opinions pertinent to the causes of death of birds have been published that some investigations on the subject were undertaken this summer at the Austin Ornithological Research Station. Complete gross autopsies were done on most of the casualties; X-ray films were taken of evident fractures and dislocations; sections for microscopic examination were cut from organs suspected to be diseased, also smears and cultures made for bacteriological study. The data obtained are preserved in the station records and are available to those who desire to peruse them. The following paragraphs epitomize our findings and consequent partially confirmed opinions.

Trauma resulting from their own activities or from violence emanating from other organisms and forces is the outstanding cause of death in birds. Bird movements are so swift that collision with more or less fixed objects determines a destructive force greater than that engendered under similar circumstances by slower moving though heavier organisms. A Maryland Yellow-throat sustained a rupture of the liver with intra-abdominal hemorrhage from flying into a light bird-net. The bird that strikes a telephone-wire while in flight or a lighthouse during the night, or is stopped by an automobile, usually succumbs promptly; dogs and men, while more or less seriously injured by mishaps of equal severity, as a rule survive.

When birds which have died subsequent to the infliction of observed violence or to gross injuries of unknown origin were examined, it was seen, frequently, that the degree of trauma would not have been sufficient to cause death in man. In such instances the presence of concurrent and adjuvanting acute or chronic disease was eliminated by autopsy. Fractures of the humerus or femur and dislocations of the shoulder were found to have been lethal. The lower an organism is in the scale of evolutionary development and the less specialized it is, the less disastrously it reacts to injury. Birds are more highly specialized than is man, their physiological processes proceed at a markedly higher speed, their metabolic rate is far more rapid. Under these conditions, shock with consequent inhibition of vital processes becomes more decisive. A parallel is the collision of a walking man and a speeding automobile with a stone wall.

¹Contribution Number 2 from the Austin Ornithological Research Station.

Injured birds, as a rule, either succumb promptly or make speedy recoveries. An exception is seen in the case of water-birds, which die slowly of starvation when crippling prevents their obtaining food. Rarely does hand feeding avail with these, although a number of sick shore-birds were reconditioned by feeding with minced clams. Two factors enter into the recoveries—first, the high metabolic rate and high-g geared physiological processes which encourage prompt repair; second, the remarkable degree of development of the average bird's adaptability. Sparrows of several species, a Chickadee, and a Red-winged Blackbird found with injuries calling for the amputation of one limb apparently fared as well when released as did their unmaimed relatives. These one-legged birds were prompt in returning to feed in grained traps, while others released with broken wings soon were removed from nets into which they had flown. A Junco, a Song Sparrow, a Chipping Sparrow, and a White-throated Sparrow, each with a fractured radius, made habitats of clumps of bushes close to individual traps. There they lived constantly until recovered. In from three to five days they were able to fly a few feet; after from ten to fourteen days all flew well.

It is thought that confinement in cages with surgical and nursing care did not shorten convalescence, the restlessness consequent to unfamiliar environment and repeated efforts to escape interdicting essential physical rest. On the contrary, healing processes advanced more rapidly without the institution of procedures accepted as distinctly serviceable in the treatment of humans. This was not due to unskillfulness but rather to some instinct which impels birds, unaided, to protect their wounds adequately. Injuries to soft parts do not become infected so commonly as do similar human wounds, although exposure to pathogenic organisms is commensurate for both. It is to be determined whether a bird's ability to produce antibodies is not on a par with its metabolism. Possibly birds have some habit analogous to a dog's insuring drainage and checking infection by frequently licking a wound.

Demonstrated internal injuries were found in an enormous percentage of birds evidencing no external marks of trauma. Such birds have been thought, commonly, to have died of "fright," "senility," or "heart-failure." Fractured ribs with intrathoracic hemorrhage, perforation of the pleural cavity by an impalpably broken coracoid, intra-abdominal bleeding consequent to injuries of the solid viscera, and, most commonly intracranial hemorrhages are adequate pathology for consequent fatalities. Each of these lesions has been found present

in birds dying suddenly and, from a scientific standpoint, otherwise inexplicably.

The common occurrence of head injuries has been little suspected. Greater or lesser hemorrhages, extra and subdural, intracerebellar and intracerebral, also intraspinal, were of overwhelming frequency of occurrence. Excepting in birds found dead or seen to experience great violence, coincident fractures of the cranial bones were exceedingly rare. This has no counterpart in human or other mammalian morbidity. Exceedingly little violence is necessary to the rupture of a blood-vessel. In man the condition known as cerebral concussion implies minute hemorrhages and is consequent to even trivial blows. Cranial injury is, unfortunately, more frequent in birds than in man for obvious reasons. The difficulty of avoiding obstacles during the first moments of flight has been observed. The behavior of birds while in a trap with unheeding efforts to escape is of inevitable consequence. More etiological than all else, however, is the relative thinness of the crania of birds and their greater elasticity, conditions which transmit force sufficient to rupture vessels in underlying tissues without causing concurrent injuries to the bones themselves. In three instances distinct depressions in the cerebra with adjacent hemorrhages were observed with no corresponding fracture of the cranial vault. Given intracranial lesions of the aforescribed nature with their involvement of vital centers, sudden muscular exertion or a circulatory overstimulation incident to fright or handling is sufficient to cause instant death. The immediate onset of *rigor mortis* often noted is not only the logical outcome of, but also confirmatory evidence of the occurrence and reasonable accountability of, such pathology.

An interesting corollary is the death from insolation of trapped birds which occurred last year during the dog-days, until a determination of this as the cause for these fatalities led to the institution of methods of efficient prophylaxis. Thousands of incubating Common Terns appeared to suffer no great inconvenience from prolonged sitting on sand of which the measured temperature was between 120 and 130 degrees Fahrenheit. Their newly hatched chicks commonly survived identically rigorous exposure. On the other hand, apparently normal sparrows of hardy species succumbed after short confinement in traps where the temperature while high, did not approximate that resisted by the Terns.

The casualties which occurred at the station, while adequate for the acquisition of sufficient data to warrant the concepts

herein expressed, represent but a minute fractional percentage of the twenty-nine thousand times birds were handled this year. Certainly the percentage of violent deaths in both our resident and transitory populations from causes not incident to our trapping is to the left of the decimal point. In any event, if our findings are correct, knowledge of the etiology, as in human affairs, affords the exclusively proper basis for efficient prophylaxis. Thus we shall have been able to accomplish one of the fundamental purposes of our undertaking here—bird conservation.

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ON THE STATUS OF JUNCOS IN THE EAST HAVING WHITE WING-BARS

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DURING the last thirteen years there has appeared in ornithological literature a number of scattered reports of the occurrence of the White-winged Junco (*aikeni*) in the East, and, as there are several unpublished reports that juncos with white wing-bars have been seen and trapped at banding stations (especially in New England), it seems desirable to publish in a single paper such observations as have been reported in order to furnish a convenient basis for future efforts to determine the status of such abnormally colored birds, that is, whether all or any of the reported occurrences of *aikeni* in the East are valid or are merely those of common Slate-colored Juncos having narrow fringes of white terminating the greater or middle coverts, or both coverts. It is of course well known that such fringes occur occasionally on *hyemalis* and are usually regarded as albinistic in nature and that they also occur more plentifully on *oreganus*.

The literature on the common junco contains numerous references to white on the wings, all agreeing, with the exception of Allen and Brewster, that there is a variation in the whiteness of these wing-markings. Baird, Brewer, and Ridgway¹ write under *aikeni*, "That the white bands on the wings do not constitute a character sufficiently important to be considered of specific value is proved by the fact that in many specimens of *J. oregonus*, and occasionally in *J. hyemalis*, there

¹*History of North American Birds*, Vol. I, p. 584.