

Survival of the Cutthroat Finch (*Amadina fasciata*) under desert conditions without water.—The Cutthroat Finch, native to the southern fringe of the Sahara Desert, is commonly available from cage bird dealers in the United States. My specimens were exported from Dakar, Senegal, but the exact location of their capture is unknown.

In my laboratory these birds remain in excellent condition for an indefinite period of time without drinking any water. It is generally understood that survival without intake of free water or succulent materials involves the very efficient use of the metabolic water produced in intracellular oxidations. This capability has been reported for other small granivorous birds such as the Budgerigar (*Melopsittacus undulatus*) and the Zebra Finch (*Taeniopygia castanotis*). For details see the articles by T. Cade and J. Dybas (*Auk*, 79: 345, 1962) and Cade, C. Tobin, and A. Gold (*Physiol. Zool.*, 38: 9, 1965). Cade (*Ostrich*, 36: 131, 1965) also confined individuals of the Scaly-feathered Finch (*Sporopipes frontalis*) in outdoor cages under wintertime desert conditions in southern Africa and found that birds deprived of water could gain weight during periods of cool, relatively humid weather. However no one seems to have demonstrated thus far that any small granivorous bird can survive without free water while exposed to high summer temperatures.

During August, 1966 two male and two female Cutthroat Finches remained in good condition for 15 days without water at a location in the desert in Riverside County, California. The birds were exposed to the high temperatures of the test site and provided with water *ad libitum* for 2 weeks prior to the beginning of the test. The birds were confined outdoors in a cage measuring 28 × 40 × 30 cm. The cage was kept on a table inside a temporary enclosure of wire netting for protection against small predators. The table was close to the north wall of a house, and was thus shaded from direct sunlight from approximately 0800 to 1700 hours.

The birds were weighed to the nearest 0.1 g before dawn and again after nightfall. Temperatures and relative humidities were recorded continuously by a Bristol recording thermo-humidigraph on the table beside the cage. Relative humidities reached minima of 12 to 20 per cent in the afternoon and maxima of 44 to 63 per cent in the morning. The mean daily maximum temperature during the test period was 39°C. The highest temperature recorded was 43°C. Temperatures exceeded 40° on 8 of the 15 days, and failed to exceed 35° on only one day. The 11th day was unusually cool with a maximum of only 31°C, followed by an unusual morning minimum of 18°C. Other morning temperatures ranged from 20°C to 24.5°C.

The birds were provided with a standard commercial finch mixture consisting mainly of small millet. Bird gravel and cuttlebone were constantly available. Samples of the seed mixture exposed overnight at the site assayed 10 per cent water by weight. While it is conceivable that an occasional insect intruder from the area may have been consumed, I did not observe such activity and it could have made only an extremely minute contribution to the total food intake. No trace of dew was observed at any time during the test period.

While the birds spent much of the time during the hotter part of each day in a quiescent state, often with their eyes closed, they frequently responded alertly to the calls of their companions and fed vigorously. Singing occurred on almost every day of the test period. While this was usually a feature of the increased activity associated with the early morning hours, it was noted a few times during the hottest part of the afternoon. For example at 1400 hours on the 14th day, both male birds sang repeatedly when a Mourning Dove (*Zenaidura macroura*) perched above their cage.

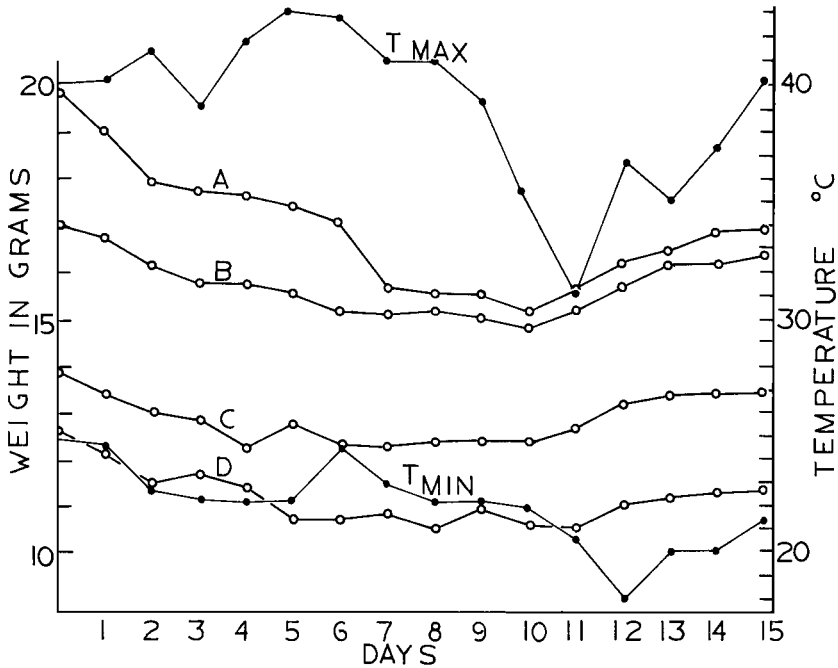


Figure 1. Minimum (pre-dawn) body weights of four Cutthroat Finches (A-D) for the 15 day test period. Shaded circles indicate maximum afternoon temperatures and minimum (usually pre-dawn) temperatures for each day.

They gave the typical display song of their species, which is accompanied by an upward stretching of the body and fluffing of the feathers.

Figure 1 records the morning (minimum) weights of the birds during the 15 days without water. The small size of birds C and D apparently did not affect their ability to cope with water deprivation. Bird B was of average size for the species. Bird A was unusually heavy, and probably was obese at the beginning of the test.

After it became apparent that the birds were able to maintain a safe level of body weight and consistently gain in weight during each period of daylight, I began to record weights at more frequent intervals. The birds were placed in separate cages constructed of light-weight, half-inch aviary mesh. Each cage ($15 \times 10 \times 15$ cm) was equipped with one light wooden perch. The cages were placed side by side in a tray containing the dry food mixture so that the birds were able to eat at will through the open mesh bottoms. The close proximity of the cages induced the composure which these gregarious birds show only when in the immediate presence of their fellows. For weighing, cages were lifted from the tray, brushed to remove any adherent material, and placed directly on the pan of the balance. A check of the empty cages after three days showed a change in weight of less than 0.1 g.

Hourly weighings during the period of daylight disturbed the birds very little and resulted in an interesting record of weight variation. Figure 2 shows one such record

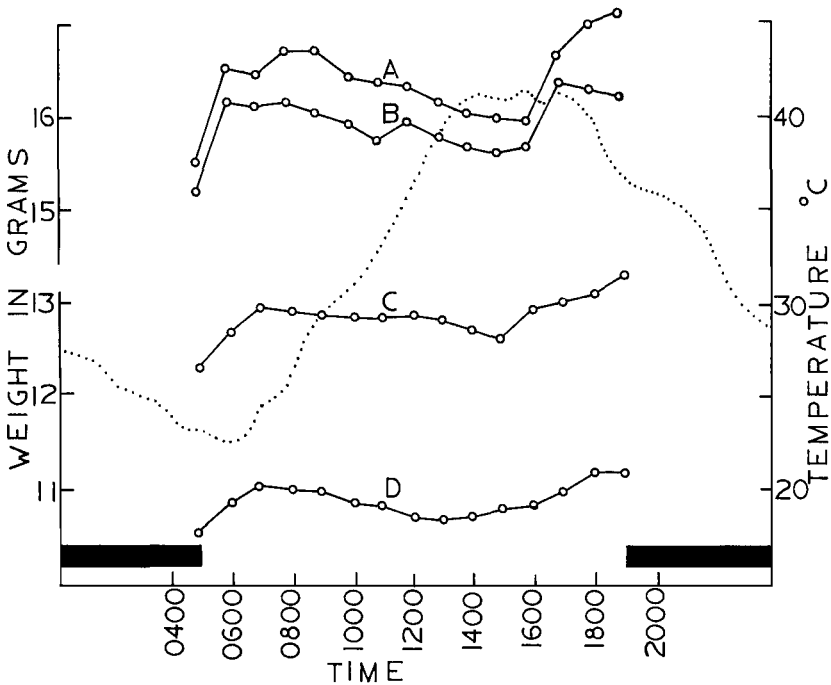


Figure 2. Hourly record of body weights of four Cutthroat Finches (A-D) during their eighth day without water. The dotted line indicates air temperatures.

and is typical of all those obtained over 9 days. Feeding began at approximately 0450 hours and stopped just prior to 1900 hours. The sharp rise at the beginning of the light period, the gradual decline with increasing temperature stress, and the strong rise in late afternoon are features of all the records. These curves verify my conclusions based on observation, i.e. that the birds avoid a severe drop in weight during the time of maximum stress by intermittent feeding and that they are capable of ingesting and processing large quantities of dry food during the late afternoon—precisely that part of the day in which any adverse physiological effects induced by heat and aridity would presumably be at a maximum. These records, plus the actual fact of survival, seem to indicate that the level of the maximum daytime temperature is not so critical as would have been supposed, at least in the case of this one species of small desert bird.

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