

eggs were laid, the male's fat reserves had become completely diminished (Johnson et al. 1971). These situations we call reversed incubation schedules. They were successful only if the male could feed and return to relieve the female in less than a week. Otherwise, her fat reserves became diminished and she deserted. When males incubated first, the female normally was away from the rookery for almost 2 weeks. Although for the two seasons there was little difference in the number of reversed incubation schedules attempted, significantly more attempts were successful in 1969-70 (table 1). The ice moved out often enough in that year to allow the males to travel rapidly between rookery and feeding grounds. Once a pair successfully completed a reversed incubation schedule, they were as successful in hatching their eggs as pairs maintaining a normal schedule.

DISCUSSION

Several factors in addition to lowered egg and chick losses contributed to high productivity in 1969-70. Not only was there a greater proportion of successful pairs, but a greater proportion of the population attempted breeding and a greater proportion of breeding pairs laid large clutches. High winds and accompanying blowing snow had no apparent detrimental effects although direct mortality of eggs and chicks might be expected. Thus reports by Yeats (1968) for Cape Royds that egg and chick mortality result from an above normal number of days having winds above 32 km/hr do not seem to apply to Cape Crozier. On the contrary, at Cape Crozier, Adélies are aided by offshore winds as strong as 160 to 190 km/hr. Only as in 1967-68 (Sladen et al. 1968) when winds were of higher velocity (i.e., 225 km/hr) and when they came at critical times such as peak egg laying did they cause losses. Indeed, winds above 210 km/hr make it difficult for Adélies to maintain their footing.

Furthermore, factors just discussed that contributed to high productivity played their part before the pack-ice break-out. Thus reports by Stonehouse (1963) for Cape Royds that early spring break-out results in high productivity are also less applicable to Cape Crozier. Early break-out and high productivity at Cape Crozier seem to be co-results of windy weather rather than being in a cause-effect relationship.

Adélie Penguins have evolved the ability to store large amounts of fat, in part at least, to begin breeding early in spring when ice cover on the sea is usually extensive. Stored fat allows extended travel over sea-ice and long periods in the rookery without having to take time to walk to sea to feed. In the

high latitudes, where breeding seasons are usually short, the saving of time is important. High productivity during stormy years results because open sea and quick travel allow Adélies to use fat reserves and food for production of eggs and for fasting during territory establishment, courtship, and incubation rather than for travel itself. In a sense, the wind increases the availability of food resources.

Perhaps one reason Adélies have been so successful in colonizing Cape Crozier is because of its offshore winds during spring. The presence of extensive snow-free land area must also be a major factor. It is estimated that 300,000 Adélies breed at Cape Crozier (Emison 1968). On the other hand, at Cape Royds, which is protected from southerly winds by high mountains, there are only 4000 Adélies even though much nesting area is available (Stonehouse 1963). Perhaps if food were more accessible for Cape Royds Adélies, the breeding population there would be larger.

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RICHARDSON'S ZACATECAS COLLECTION, I

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In 1888 and 1889, W. B. Richardson collected extensively for Salvin and Godman in western México. Some of these bird skins have been studied and published upon several times, but others still remain

unrecorded in the literature, yet safe in the drawers of the British Museum. Publication has been meager in the case of species treated in the earlier volumes of the *Catalog of Birds of the British Museum* or of the *Biologia Centrali-Americana* by Salvin and Godman (1879-1904), which were published before 1890. Richardson apparently kept no journal, but an approximate itinerary for the state of Zacatecas was constructed from his labels. Richardson's labels in 1888 ordinarily included sex, locality, and month, but in 1889 he usually added the day of the month. When he wrote exact dates on his labels, Richardson consistently wrote in this order: day, month, year.

However, at least one author misread some of these as month, day, year and thereby put a number of wrong migration dates into the literature.

In 1888, Richardson collected in Zacatecas mainly at Jerez and Sierra Jerez (a mountain just north of the city) in August and September but also traveled widely in the western part of the state. Most of his localities, as they appeared 70 years later, were described by Webster (1958). He collected a few birds at Zacatecas City in February, April, May, July, August, and September, at Jerez (= Ciudad Garcia on recent maps) in May and in the Sierra Valparaiso in July, early August, and early September. In 1889, Richardson collected at Zacatecas 2-9 February; Jerez, the middle of February; Zacatecas City, 25-27 March and 2 June; 3 July and 27 July to 8 August in the Sierra Valparaiso; 6-17 August and 13 September at Zacatecas City; sometime in September in the Sierra Valparaiso. The overlap in August and the large number of birds collected in early February and late March at Zacatecas City; at Bolaños, Jalisco, in late February through early March; and late July-early August in the Sierra Valparaiso suggests to me that Richardson had a hard-working assistant from 2 February to 17 August 1889, but not at other times.

The following list includes only those species for which my study of Richardson's collection provides new or revised information. As yet I have examined only two-thirds of the collection; the unexamined third includes, for instance, all of the flycatchers. I have appended extracts from my own field notes from Zacatecas (1950-64) where they clarify the status of a species. Actually, I have seen all but three (Red-shouldered Hawk, Atlapetes, and Longspur) of these species in the state. All measurements are in millimeters; wing measurements are of the chord. Colors were compared directly with the Palmer and Reilly (1956) standard. An asterisk indicates that the species has not previously been recorded from the state.

Chaulelasmus streperus. Gadwall. Three specimens were collected at Zacatecas City, 4 February 1889. Salvadori (1895:226) misread the date.

Anas crecca carolinensis. Green-winged Teal. Richardson collected three specimens at Zacatecas City, 2 and 4 February 1889, but Salvadori (1895:252) misread one of the dates.

Spatula clypeata. Shoveler. Four specimens were collected at Zacatecas City, 2 February 1889. Salvadori (1895:213) misread the date.

Aythya affinis. Lesser Scaup. Richardson took two females on 6 February 1889 at Zacatecas City. Salvadori (1895:363) misread the date.

**Accipiter cooperi*. Cooper's Hawk. Richardson took an immature male in the Sierra Valparaiso in September 1888. Comparison with 34 immatures from Canada, the United States, México, Guatemala, and Costa Rica does not support the idea of racial variation in the species (cf. van Rossem 1945:53-54).

Buteo jamaicensis. Red-tailed Hawk. Zacatecas specimens examined and their classification are (taxonomy follows Friedmann 1950:211ff): (a) Pale phase *B. j. calurus*—female adult, 4 February 1889; male adult, 26 March 1889; two immature males, 26 March 1889. (b) Red phase *B. j. calurus*—male adult, 4 February 1889. (c) *B. j. calurus* × *B. j. kriderii* or *B. j. calurus* × *B. j. kriderii* × *B. j. costaricensis*—immature female, 26 March 1889; adult female Laguna Valderama, 24 June 1957

(California Academy of Sciences, collected by author).

The first eight specimens were collected at Zacatecas City by Richardson. The 32 Mexican and 21 Central American specimens in addition to the above in the British Museum collection are preponderately winter-taken and several of the Mexican ones lack localities. Most of the Mexican specimens I have seen in other museums are winter-taken. Therefore, a statement of breeding ranges would be premature.

Buteo lineatus texanus. Red-shouldered Hawk. The immature female taken by Richardson, 6 February 1889, at Zacatecas was recorded by Salvin and Godman, op. cit., 1900:66), but this is apparently the first subspecific identification unless Friedmann (1950:290) examined a specimen. The winglength (336) rules out *elegans*; the color (moderately brown upper parts; venter and thigh streaking moderate as to darkness and density) indicates *texanus* probably, *alleni* possibly.

Parabuteo unicinctus superior. Harris' Hawk. Adult males, 25, 26, 27 March; adult females, 25 and 26 March; immature female, 17 August; all taken at Zacatecas City in 1889. The winglengths—males 333, 344, 354; females 362, 378, 382—agree with the northwestern race *superior* van Rossem. However, I am unable to see any real basis for a subspecific difference in color among 43 specimens (19 from Texas, 9 from southern and eastern México, 2 from Central America, and 13 from northwestern México). Of course, no specimens were compared from California or Arizona, where the race is best developed. I do not know the source of the statement by Friedmann et al. (1950:58) that "A Zacatecas specimen is intermediate."

I have found the species scarce in the desert and cactus-acacia grassland in Zacatecas, and have the following observations only: one near Concepcion del Oro, 7 January 1964; near San Jose in 1964, one on 8 January and two on 14 June; one 6 miles W of Fresnillo, 10 February 1964; one at Rio Florido (18 miles N of Fresnillo), 18 July 1952.

Buteo albicaudatus hypospodius. White-tailed Hawk. Richardson took an immature male at Zacatecas City, 12 August 1889, and an unsexed adult in August, with the year omitted from the label. Comparison of these at the British Museum and of the series in the University of Michigan collection reveals geographic variation which has not been previously recorded, but not quite enough for subspecific description. In adults, seven Mexican specimens average darker dorsally and less barred ventrally than ten from Texas. In immatures, 14 Mexican specimens average blacker dorsally and more extensively streaked ventrally than eight from Texas. Best separation is on dorsum of immatures, where 93% of Mexican specimens are blacker than 87% of Texas specimens. (South American specimens of *B. a. albicaudatus* are too prominently different from *hypospodius* to merit comparison.) Geographic variation in size is negligible. Friedmann (1950:233) stated that there is a light and a dark phase in this race. I find that variation is continuous from dark to light and that degree of ventral streaking is not linked closely to dorsal darkness. In the field in Zacatecas, I have seen the species at all seasons, but only on the grasslands and in small numbers.

Limnodromus griseus. Short-billed Dowitcher. An immature of unrecorded sex was collected at Jerez in September 1888. The only other specimens of the species from México which I have examined are

11 winter-plumaged, unsexed specimens from Cozumel Island. None has the long bill of female *L. scolopaceus* nor the dark tail of that species. The Zacatecas bird (culmen 57) is probably of the subspecies *L. g. griseus*, because of the darker back and more streaked and paler underparts, but the distinction from *L. g. hendersoni* (cf. Conover 1941) is undependable in this plumage. The Cozumel specimens are, of course, quite unidentifiable to subspecies.

**Limnodromus scolopaceus*. Long-billed Dowitcher. Richardson collected four adults at Zacatecas City, 10 and 12 August 1889. I can also identify the male taken on the "Plains of San Luis Potosí" (in the state of San Luis Potosí) in July 1888, by Richardson, as of this species.

Chordeiles minor henryi. Common Nighthawk. Richardson collected an immature female at Jerez in September 1888. Hartert (1892:613) somehow recorded this as "May," which was so repeated by Friedmann et al. (1950:152) and others. I have seen the species regularly in all parts of the state in summer, but in small numbers.

Dendroica nigrescens halsei. Black-throated Gray Warbler. I have never seen this species in Zacatecas except in September and January, and was therefore surprised to find a series of early August birds in Richardson's collection. All were taken in the Sierra Valparaíso: three males in immature plumage on 2, 3, and 4 August 1889; an adult male in September 1888; immature females on 3 August 1889 and in September 1888; adult female on 4 August 1889. Apparently they represent a very early migration. The nearest certain breeding area is northwestern Chihuahua (Marshall 1957:109). As I have previously stated (Webster 1958), the two races are perfectly distinguishable as ends of a cline. However, many, if not most, specimens are intermediate because they are from breeding areas in between. Of these seven specimens, the four males are clearly *halsei* on color, the females, not certain; the four males (wings 66-67, mean 66.5) are *halsei* also on size, as is the September female (wing 64); the other two females are equivocal (wings 61).

**Spiza americana*. Dickcissel. An unsexed bird in immature male plumage was taken at Jerez in September 1888. My only sight records from Zacatecas were made in 1955, when Allan Phillips and I recorded several every day in open areas in the western part of the state from 8-28 September. Richardson also took a male at Aguascalientes, Aguascalientes, in August 1888; it, too, is in immature plumage and provides a new state record.

**Atlapetes pileatus dilutus*. Rufous-capped Atlapetes. Richardson took a male 28 July 1889, in the Sierra Valparaíso.

Orturus superciliosus palliatus. Striped Sparrow. Richardson collected three in the Sierra Valparaíso. These were compared with a series of 59 from Chihuahua (van Rossem's entire type series of six, including the type), Durango, Jalisco, Nayarit, San Luis Potosí, Estado de México, Distrito Federal, Puebla, and Veracruz. Several years ago I compared the combined 34 specimens from Durango, Zacatecas, Michoacán, Estado de México, Morelos, Puebla, Distrito Federal, and Oaxaca in the collections of the Museum of Vertebrate Zoology and the California Academy of Sciences. I conclude: (a) van Rossem

(1938) exaggerated the paleness of the northern form, because only four of his type series of six from Chihuahua show it; the other two cannot be picked out ventrally from a series from southern México. A tendency to paleness, both ventrally and dorsally, is found in at least some specimens as far south as Zacatecas and Jalisco. (b) The back is ruddier, or browner and ruddier, less dark and blackish, in Michoacán, San Luis Potosí (Sierra San Luis Potosí), Nayarit (Sierra de Nayarit), and north, than in eastern and southern México. (c) The race *palliatus* is recognizable, with the range including the localities of specimens I have examined from Chihuahua, Durango, Zacatecas, Jalisco, Nayarit, San Luis Potosí, and Michoacán. Specimens from Estado de México, Distrito Federal, Puebla, Morelos, Veracruz, and Oaxaca (Rio Molino) represent the darker, blacker race *superciliosus*. The species is common in pine-oak forests in summer.

**Calcarius ornatus*. Chestnut-collared Longspur. Richardson collected four males and nine females at Zacatecas City, 2 and 4 February 1889.

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