common, and restricted to the cultivated valleys. It is said to be most numerous about places where bees are kept.

25. **Myiarchus crinitus.** CRESTED FLYCATCHER.—Of universal dispersion throughout the region; common.

26. **Sayornis phœbe.** PHŒBE.—About the town of Chester, I have never met with the Phœbe during the month of June. In my wagon tour across the country it was first encountered, June 5, at Fair Forest, five miles west of Spartanburgh. On the same day its loud cries were heard at the South Fork of Tiger River, also in Spartanburgh County. June 4, 1888, a pair were found established at a small mill-pond midway between the villages of Easley and Pickens. At Mt. Pinnacle, it is common in the vicinage of water, ranging up to about 2500 feet. Back on the heights, sheltered situations in the walls of rock are frequently selected as nesting places. Young birds, just ready to leave the nest, were seen as late as June 23 in 1887.

27. **Contopus virens.** WOOD PEWEE.—Conspicuously common everywhere in the woods.

28. **Empidonax acadicus.** ACADIAN FLYCATCHER.—Most widely dispersed at the lower levels. Along the larger streams it reaches a higher elevation than elsewhere in the mountains. On the north fork of the Oolenoy, near the High-low Gap, it was common at 2500 feet, the highest point at which the species was observed.

(To be continued.)

ON THE WINTER DISTRIBUTION OF THE BOBOLINK (*DOLICHONYX ORYZIVORUS*) WITH REMARKS ON ITS ROUTES OF MIGRATION.

BY FRANK M. CHAPMAN.

AMONG our summer resident land birds the Bobolink is in its migrations remarkable for two things; first, the extent of its wanderings during the winter; second, the comparatively late date at which its spring migration is completed. These are both well-known facts, and I shall here simply endeavor to bring forward and arrange the records on which they are based, adding some new data furnished by an examination of the material in the American Museum of Natural History. It is to be regretted that a large proportion of the extra-limital records consist merely of mention of the bird's name and the locality of its

capture without giving the data of its occurrence, thus rendering impossible a satisfactory study of its migration or an accurate knowledge of the area it inhabits during the winter.

In the neighborhood of New York City the Bobolink commences its southern migration in July, great numbers flocking at this season in the wild rice (*Zizania aquatica*) marshes, and here many remain until early October, at which date their less tardy comrades have already reached the island of Jamaica. From Dr. Merriam's report* we learn that our bird, now a Ricebird, appears in the rice fields of South Carolina and Georgia from August 15 to 21, and here, apparently content with their surroundings, they remain for several weeks without making further advance. In Cuba Gundlach† records their arrival in September in immense flocks, which remain only for a short time and then continue their journey southward.

Now appears an interesting question concerning their further line of flight. Three routes are open to them; (1) they may go to the westward, following the Cuban coast, thence, crossing to Cozumel and Yucatan, pursue their migration along the Central American coast to Panama, etc.; (2) they may go to the eastward through Hayti, San Domingo, and Porto Rico, and thence southward through the Windward Islands; or (3) they may strike out boldly and take the more direct course, crossing the sea to Jamaica and then in one extended flight reach the mainland of northern South America. An examination of the published records of the bird's occurrence shows that all three routes are followed to a greater or less extent, but it is apparent that comparatively few birds go as far east as the Windward Chain, while perhaps as many go through Jamaica as pass down the Central American coast. The records, however, from the last-named region are too brief to permit of satisfactory conclusions being drawn from them, and I merely present them as they stand. From Cozumel the Bobolink is recorded by Salvin,‡ who also states§ that many examples were taken by Gaumer in Yucatan and on the islands off the east coast of Honduras. From Hon-

* Dept. of Agriculture, 1886. Report of the Ornithologist and Mammalogist, pp. 248-249.

† Journal für Ornithologie, 1874, p. 129.

‡ Ibis, 1885, p. 191.

§ Biologia Centrali-Americana, Aves, p. 448.

duras we also have another record by the same author,* to which I will refer later, and we find the species included by Zeledon† in his list of the birds of Costa Rica. Swainson's‡ record from the highlands of Mexico, which probably refers to the western race, *D. o. albinucha*, completes the Mexican and Central American records with which I am familiar.

Turning now to the second route, leading through the Windward Islands, we find that from Hayti, San Domingo, or Porto Rico we have as yet no notice of the bird's appearance. Our first record, therefore, is from the small island of Sombrero in the Virgin group, where Lawrence§ records it, and in the Catalogue of the British Museum‖ a specimen is cited from Nevis; both records are without data, but there is a specimen in the American Museum labelled, "Sombrero, Sep. 17, 1862, Julien," on which the first was probably based. From Guadeloupe and Martinique the bird is given by L'Herminier,¶ and this completes the Windward Island records until we come to the last of the chain, Grenada. From this island we have some very welcome and valuable information by Wells,** who during three years' observations had met with the species on only one occasion, when he captured one from a flock of five birds. Reference to this specimen in the American Museum collection shows it to have been taken October 1, 1885.

Passing now to a consideration of the data from the third, or last route mentioned, we find that great numbers of birds select this more direct line of migration. After leaving the island of Cuba the birds' first resting place would be the Caymans, distant about one hundred and seventy-five miles. Mr. Cory writes me that his record of their occurrence on Little Cayman†† is based on two specimens, a male taken April 29, and a female taken April 30, and while it is probable that they also visit these islands in the fall, we may presume that the greater numbers follow the Cuban coast to at least Cape Cruz, or to a point directly north of

* Ibis, 1866, p. 194.
† Proc. U. S. Nat. Mus., VIII, 1885, p. 107.
‡ Phil. Mag., New Ser., I, p. 435.
§ Ann. N. Y. Lyc., 1864, p. 99.
‖ Cat. Brit. Mus., XI, p. 332.
¶ *Cf.* Lawrence, Proc. U. S. Nat. Mus., I, 1878, p. 450.
** Ibid., IX, 1886, p. 616.
†† Auk, VI, 1889, p. 31.

Jamaica, distant now only eighty miles, nearer indeed than are the Caymans from this island.

The Jamaican records are, in comparison to many of those already cited, detailed and exceedingly satisfactory; Gosse* reports the arrival in October of vast numbers of Bobolinks which remain until early November. They feed on the seeds of the 'guinea grass,' are called 'Butter-birds,' and their flesh is highly esteemed. March's † notes coincide with those of Gosse, but he says the birds remain only for a few days. There is a specimen in the American Museum taken by this collector labelled "Spanish Town, ♂ Sep. 25, 1865." A further Jamaican record of a female taken in October, is given by Sclater.‡

After leaving Jamaica the route, considered as a regular highway of migration, is perhaps the most interesting and remarkable of any chosen by our migratory land birds, for at no other time during their entire journey from north to south, or *vice versa*, are they necessarily so far from land, unless driven from their course by storms or adverse winds. The South American coast is now distant four hundred miles, the way unmarked by islet, shoal, or reef. This is to the south; to the southwest, leading to the Costa Rican coast, are two or three small reefs or islands which may tempt some of our birds to follow this course while others take the more direct route to South America. Nor can we doubt their ability to perform without resting this more extended flight, for Darwin§ found a Bobolink in the Galapagoes, distant nearly six hundred miles from the nearest mainland. Further, the records from northern South America apparently indicate that some birds appear directly upon the coast instead of entering this country by way of Panama or Trinidad. Commencing at the westward these records are as follows: In the British Museum Catalogue‖ specimens are cited from Chepo and Paraiso on Panama; Sclater¶ mentions a specimen from Sta. Martha, and referring again to the British Museum Catalogue, we find specimens mentioned from Caracas and Cayenne. Salvin**

* Birds of Jamaica, 1847, p. 229.
† Proc. Phil. Acad. Sc., 1863, p. 299.
‡ P. Z. S., 1861, p. 74.
§ Voyage of the Beagle, 1841, Vol. III, p. 106.
‖ Cat. Brit. Mus., XI, p. 332.
¶ Cat. Am. Birds, 1862, p. 134.
** Ibis, 1885, p. 218.

gives the bird from British Guiana and this, with the Cayenne record, seems to form the eastern limit of its range, there being, as far as I know, no records for eastern Brazil or the lower Amazon, while Darwin's record, already referred to, of a specimen taken in October, 1835, on James Island in the Galapagoes, is the only one with which I am familiar from west of the Andes. Indeed our bird's further wanderings seem now to be largely confined to the eastern slope of this range of mountains and the head waters of the Amazon, until it reaches what may be its true winter quarters in southern or southwestern Brazil. Proceeding with our records, we find a specimen mentioned by Sclater* from Merida, about forty miles from the coast in Venezuela; there is a specimen in the British Museum† from Bogota, and Sclater and Salvin‡ mention its occurrence at Antioquia. Sclater§ also gives it from the Rio Napo, and there are two specimens from this locality in the American Museum collection, both adult males in spring plumage. Cassin‖ cites a specimen from the Rio Negro, and in the British Museum Catalogue a specimen is mentioned from the Rio Javari in eastern Ecuador. All these records are absolutely without data and we may therefore welcome an exceedingly important and interesting note by Berlepsch,¶ who records the capture by Garlepp, of an adult male in fresh and unworn plumage, at Tonantins on the upper Amazon, on May 6, 1884, and also, in the same locality, of a second specimen in female plumage but without a label. From Paucotambo, in southern Peru, we have a record by Sclater,** and the same author, in his Catalogue,†† mentions a specimen from Bolivia. In the American Museum there is an adult male, taken March 1, 1886, by Smith at Corumba Matto Grasso, while Natterer‡‡ observed it in the same Province in November. This collector also found it on the Madeira in November; at Maribitanas noted a single one on April 4, and on the 13th saw a great flock of these birds in black plumage.

* P. Z. S., 1870, p. 781.
† Cat. Brit. Mus., XI, p. 332.
‡ P.Z.S., 1879, p. 509.
§ Ibid., 1858, p. 72.
‖ Proc. Phil. Acad. Sc., 1866, p. 16.
¶ Journal für Ornithologie, 1889, p. 99.
** P.Z.S., 1876, p. 16.
†† Cat. Birds, 1862, p. 134.
‡‡ *Cf.* Pelzeln, Orn. Brazil, iii, p. 199.

Cassin's* mention of a specimen taken by Page on the La Plata, marks the southern limit of our bird's distribution and concludes the South American records with which I am acquainted. On the return migration we have comparatively few data to assist us; those relating to South America, which I have already presented, apparently indicate that the journey is commenced early in April, but that some individuals linger until May, and on the 20th of that month Salvin, as before mentioned, found a pair on the coast of Honduras. Gosse† says they return to Jamaica in April, but stay only a short time, and this record renders it probable that the line of flight chosen in the fall is simply retraced in the spring. Gundlach‡ reports their arrival in Cuba in May, and says they remain only a few days, just how many is not stated, but he elsewhere says§ they are present when the last of the "Sylvicolidæ" depart.

We might now suppose that the southern coast of Florida would prove the sole entering port to the eastern United States; probably the larger number of birds do choose this route, but others pass northwards through the Bahamas, where they are true transients, scarcely pausing to rest in their journey. In the American Museum there is a male, collected on Andros Island by C. J. Maynard, April 25, and labelled by this collector as the "first of the migration." At Nassau on New Providence, Bryant‖ first notes their appearance May 6, when he saw a number of flocks flying to the westward, and on May 7 the country was filled with them, all being males. Numerous flocks continued to arrive May 8; on the 9th many females were killed; on the 10th only a few were observed, and May 11, they had entirely disappeared.

It now only remains to call attention to the bird's stay in localities far south of their southern breeding limits where, tempted by an abundance of food, they linger to an unusually late date. At Gainesville, Florida,¶ I found both sexes in great numbers, feeding in the oat-fields as late as May 25, and we are familiar with

* Proc. Phil. Acad. Sc., 1866, p. 16.
† Birds Jamaica, 1847, p. 229.
‡ Journal für Ornithologie, 1874, p. 129.
§ Ibid., 1872, p. 419.
‖ Proc. Bost. Soc., VII, 1859, p. 119.
¶ Auk, V, 1888, p. 272.

Dr. Merriam's* records from the rice fields of South Carolina and Georgia, which the birds frequent until May 29, a date at which we generally consider the migration to be nearly completed and when their earlier comrades are already well established in their summer housekeeping.

OBSERVATIONS ON THE AVIFAUNA OF PORTIONS OF ARIZONA.

BY EDGAR A. MEARNS, M. D.

THESE observations are confined to the alpine regions of Arizona, which I explored during a residence of over four years in the Territory.

The mountain system of Arizona is a continuation of both the Rocky Mountain chain and the Sierra Nevada. In 43° 30′, north latitude, the Wind River range of the Rocky Mountains divides about the remote sources of the Great Colorado River. One branch trends southward, and passing around the sources of the Platte, the Arkansas, and the Rio Grande, is merged in the Guadaloupe Mountains, and at last loses itself in the great prairie plains of the southwest. The other branch, turning to the west and south forms the Wasatch range, the eastern rim of the Utah Basin, and, widening out to the level of the great plateau, reaches the cañon of the Colorado, near 112° of longitude.

A branch of the Sierra Nevada deflects from that range east of Owens River, and, with a general trend to the southeast, passes by the head of the Virgin River, becomes merged in the plateau, and unites with the Wasatch at the Grand Cañon of the Colorado. These united ranges form the mountain system of Arizona, and south of the Colorado River break up into parallel ridges, isolated groups, detached spurs and peaks, which are again united in one massive chain in the Mother of Mountains in northern Mexico.

The San Francisco peak, volcanic in its origin, may be considered the apex of the Arizona mountain plateau, and the

*Dept. of Agriculture, 1886. Report of the Ornithologist and Mammalogist, pp. 248-249.