connects the two birds figured by a finely graduated series of intermediates. These show how, as the birds travel northward, the yellow tips of the feathers slowly drop off, and that where they receive the most protection, as for example on the lower belly and crissum, they persist the longest. At the same time the nape, scapulars and rump are fading and the bill and feet are changing respectively from flesh color to blue-black and brownish black.

In a large series of spring males I have seen none taken before June which did not show remains of the yellow fringe; indeed it is exceptional to find specimens which do not show at least a trace of it.

Birds taken during summer represent the extreme of faded and abraded plumage, and Mr. Ridgway writes me, that in his opinion the western race, *D. o. albinucha*, is based on examples in this condition. He futher says, that at the time *albinucha* was described, seasonal counterparts of the specimens on which the race was based did not exist in the National Museum series of Eastern birds. Thus, the specimen now figured from Rutland, although taken as early as June 4, has the nape slightly paler than a male from Pembina, N. D., taken June 14. Again, a male (Am. Mus. No. 57,792) taken at Bluff City, Utah, May 19, has the nape fully as dark as Eastern specimens taken at the same time.

I believe, therefore, with Mr. Ridgway, that the bird known as *Dolichonyx oryzivorus albinucha* should be considered a synonym of *D. oryzivorus*.

THE FOOD OF HUMMINGBIRDS.

BY FREDERIC A. LUCAS.

IN 'Science' for October 28, 1892, was an article by Dr. Morris Gibbs of Kalamazoo, Mich., entitled 'The Hummingbird's Food,' in which the author stated as the result of his observations, and

the dissection of many specimens of *Trochilus colubris*, both young and old, that he had never found anything to convince him that they lived on insects.

Dr. Gibbs' paper was followed by notes from Mr. Lawrence Bruner, saying that he had observed the Rubythroat taking sap from *Quercus ruber*, and Mr. Frank Bolles, stating that he had seen the same species regularly attending at holes drilled by the Sapsucker (*Sphyrapicus varius*) in red maple, red oak, poplar, white and gray birch, and white ash. Later on Mr. W. N. Clute wrote that in southern New York the favorite flower of the Rubythroat is the swamp thistle (*Cirsium muticum*), and as the honey bee gets pollen, but no honey, from this flower, it would appear that birds visit these flowers for the sake of the insects they contain. Many of these insects were said to be so minute as to escape ordinary observation; and were these taken and larger species left, the impression might be produced that no insects had been eaten. Lastly Mr. Alvah A. Eaton wrote that in California Anna's Hummingbird fed on the sap of the willow (*Salix lariolepis*), drinking at holes made by *Sphyrapicus ruber*, and from wounds made by the grub of a large borer. I have also been told that the Rubythroat has been seen in fall hovering about fallen pears from which the juice had exuded sufficiently to attract numerous 'yellow-jackets.'

In view of the published accounts of Gould, Gosse and others, substantiated by incidental observations of my own, this amount of testimony to the vegetable nature of the Hummingbird's food was a little surprising, and, in the hope of throwing a little light on the subject, the birds themselves were appealed to and the stomach contents of a number examined.

Altogether twenty-nine specimens, representing thirteen species, from sixteen widely separated localities, were examined, and all of these, save four which were quite empty, contained insect remains, usually in large quantities. Young Hummingbirds examined by Dr. Shufeldt and myself contained flies, spiders, and beetles, and any one who examines a nestling will notice that the skin of the neck is distended by the expansion of the œsophagus where this is, or has been, packed with food, so it is pretty safe to say that it is more than doubtful that honey enters into the little ones' bill of fare.

Mr. William Palmer tells me that he has seen the Rubythroat picking small spiders from their webs, and Professor Beal says that he has seen a Hummingbird stealing flies from a spider's web.

It would seem to be safe to assume that the main food of Hummingbirds is small insects, mainly diptera and hymenoptera. Homoptera are usually present, and small spiders form an important article of food, while hemiptera and coleoptera are now and then found. The small size of the insects may be inferred from the fact that one stomach contained remains of not less than fifty individuals, probably more.

Most of the insects found occur in or about flowers, and my own views agree with those of Mr. Clute, that it is usually insects, and not honey, that attract Hummingbirds to flowers, while in support of this is Mr. Palmer's testimony, he having examined blossoms of the trumpet vine and found that those visited by Hummingbirds contained few or no small insects, while the unvisited flowers contained many.

In view, however, of the testimony cited at the beginning of this paper, it would seem unquestionable that Hummingbirds do to some extent feed on the nectar of flowers and the sap of trees. That the Rubythroat in particular is addicted to this food is apparently indicated by the facts that three out of the four totally empty stomachs found were from this species, as well as a large proportion of the partly full stomachs. On the other hand, the three empty stomachs were from one locality, Matamoras, and some local or incidental cause may account for their condition. It is also to be noted that the only correspondent of 'Science' who seems actually to have dissected a Hummingbird is Dr. Gibbs, and the birds seen by other observers may have been in search of the small insects that would be attracted by the sweet sap. And, without wishing to reflect at all on Dr. Gibbs, I should like to have examined some of his specimens myself.

The fact that Hummingbirds in captivity greedily eat syrup is not so convincing as it might be, for captive animals exhibit some curious traits and refuse food to which they are accustomed in a wild state.

I am much inclined to believe with Dr. Shufeldt that Hummingbirds first visited flowers for insects and that the taste for sweets has been incidentally acquired.

Below is a list of the material examined, and I may say in addition that in preparing skeletons of Hummingbirds I have examined a number of specimens, not noted, all of which contained remains of insects. The greater part of these specimens were in the collection of the U. S. National Museum, but most of the examples of *Trochilus colubris* were among the material collected for the Division of Ornithology and Mammalogy, Dept. of Agriculture, and I am indebted to Dr. C. Hart Merriam for the privilege of examining these. I am also indebted to Mr. W. H. Ashmead for kindly determining such of the insects as have been identified.

Lampornis dominicus.—Jeremie, Hayti. Stuffed.

Eulampis chlorolæmus.— *a*. Barbadoes, W. I. Stuffed. Fragments of *Eurytoma*, *Chalcis*, *Cecidomyia*, *Typhlocyba*, *Jassus*.

Eulampis chlorolæmus.— *b*. Barbadoes, W. I. Stuffed with remains of diptera, etc. Eggs of insects? One entire beetle and part of a second, belonging to the genus *Hypothenemus*, of interest as being a bark borer.

Florisuga mellivora.—Nicaragua. Stuffed with fragments of insects.

Trochilus colubris.— ————? Full.

Trochilus colubris.—Washington, D. C., Aug. 8. Fragments of insects.

Trochilus colubris.—Todmorden, Ontario, Aug. 15. Six specimens of gnats, three of *Entedon*, two species *Bythoscopus*.

Trochilus colubris.—Todmorden, Ontario, Aug. 22. Four young tomisoid spiders.

Trochilus colubris.—St. Catherine's, Ontario. A few fragments of insects.

Trochilus colubris.—Montgomery Co., Pa., Aug. 25. A few fragments.

Trochilus colubris.—Hawkinsville, Fla. Many minute fragments of insects.

Trochilus colubris.—Matamoras, Mexico. Three specimens, all empty.

Trochilus colubris.—Washington, D. C., May 10. Many fragments of spiders. A few rounded grains of sand.

Trochilus colubris.—Washington, D. C., May 10. Fragments of diptera, etc. Two spiders.

Trochilus alexandri.—Fort Wingate, N. M. Two specimens, one full, the other partly full, of insect remains. One specimen had swallowed a splinter of wood a quarter of an inch long.

Calypte costæ.—Cape St. Lucas, Lower Cala. Full of insects and spiders. *Phora*, *Telenomus*, *Polygnotus*, *Typhlocyba*.

Stellula calliope.—Fort Wingate, N. M., July 3. Two specimens. One full of insect fragments, principally diptera and hymenoptera. The second partly full of fragments, including one beetle.

Selasphorus platycercus.—Apache City, Arizona, August. Full of fragments of insects.

Selasphorus rufus.—Apache City, Arizona, Aug. 23. Full of insect remains.

Selasphorus rufus.—Fort Huachuca, N. M. Two specimens, both partly full of insects.

Doricha evelynæ.—Rum Cay, W. I. Full of insect remains.

Basilinna xantusi.—Cape St. Lucas, Lower Cala. Stuffed. *Cecidomyia*, *Phora*, three specimens of *Solenopsis geminatus*, elytra of beetle, *Psyllus*, parts of spiders.

Iache latirostris.—Morelos, Mexico. Partly full.

Chlorostilbon sp. ?—Empty.

ORNITHOLOGY AT THE WORLD'S FAIR.

BY FRANK M. CHAPMAN.

WHILE the zoölogical sciences were assigned no especial place at the World's Fair in Chicago several branches are nevertheless well represented.

The larger mammals receive, in proportion to the number of species, the most attention, the exhibits ranging in size and importance from the finely mounted collections shown by the National Museum and the State of Kansas to the moth-eaten, undressed skins tacked on the wall of some exhibitor's section.

The Fish Commission of course presents an excellent economic display of piscatorial products, and the economics of entomology are well represented by the U. S. Department of Agriculture and the Illinois State Laboratory. Reptiles are exhibited in small numbers by the U. S. National Museum, while the same institution and Ward's Natural Science Establishment have exhibits of invertebrates.

In point of number of specimens probably birds are better represented than any other branch of the animal kingdom. The lack, however, of a section devoted to zoölogy makes it exceedingly difficult to learn the location of a given exhibit even after one has ascertained its existence. Thus collections of birds are displayed in many of the State and foreign build-