pedition to Guinea and his elaboration of its results, was appointed to the position.

Reichenow devoted his attention chiefly to the avifauna of Africa and, as is well known, made a number of contributions to Ethiopian ornithology which were published in his three volume work: "Die Vögel Afrikas" (1900–1905). He succeeded Cabanis in 1893 and remained director until 1921. It was Reichenow who about 1875 began to work up all the collections from Africa. The most important of these acquired before the founding of the colonies were those of Dr. Gustav Adolf Fischer made in eastern Africa in 1877–1886 and those of Dr. Richard Böhm made in 1880–1884 in the later colony of German East Africa. Later accessions belong to recent times and may here be omitted.

In 1924 the Berlin Bird Collection contained about 100,000 specimens, of which 25,000 are mounted. The number of types is about 2000. The most valuable specimens in the museum are several extinct birds, among which may be noted: *Ara tricolor,* collected by Dr. Gundlach in Cuba; *Chaunoproctus ferreirostris,* from Bonin-Shima, collected by Kittlitz; *Hemiphaga spadicea* from Norfolk Island, and a number of extinct Drepanididae, collected partly by Deppe in 1838, and partly by Behm in 1841 in the Sandwich Islands.

Boothstrasse 21, Berlin, Germany.

BIRD NETTING AS A METHOD IN ORNITHOLOGY.[1]

BY JOSEPH GRINNELL.

A chain of circumstances, fortuitous as far as I, the reporter, am concerned, has prompted me to give the following recital, and, in particular, has put at my command the material for some inductions that may prove of interest to serious ornithologists.

On October 21, 1923, Deputy John Burke of the California State Fish and Game Commission for San Mateo County, arrested four "Italians" for the illegal killing of song birds. The birds had been taken by netting, and they and the five nets were confiscated. By

[1] Contribution from the Museum of Vertebrate Zoology of the University of California. Read at the Pittsburgh Meeting of the A. O. U.

instruction of Mr. J. S. Hunter, Assistant Executive Officer of the Fish and Game Commission, the birds, numbering 133, were, on the next afternoon, brought over to Berkeley by Deputy Burke and turned over to the custody of the California Museum of Vertebrate Zoology, to put to whatever scientific use might seem desirable.

In conversation with Deputy Burke, whose headquarters are at Daly City, San Mateo County, California, I learned that he had seen the men on their way to the field of their operations, had suspected their purpose, and, after giving them sufficient time to get into action, had descended upon them, gathering in the men and their whole outfit. The entire lot of birds had been captured within a period of 1½ hours and had been taken in one ravine, opposite Holy Cross Cemetery, just over the San Mateo County line from San Francisco. It is my impression, from what Deputy Burke said, that the capture had been made at one drive, or setting of the nets, in a shallow, brushy "draw." However, as will be explained later, I was unable to verify any of these points. At the time of the conversation I was counting on full opportunity to learn first-hand the methods used by "Italians" to net birds.

Subsequently, the four defendants were arraigned, convicted, and fined in the aggregate $450.00—which amounted to $3.38 for each bird taken. (See Calif. Fish and Game, vol. 10, January, 1924, p. 35.) The nets were, at last accounts, still in the custody of the Fish and Game Commission, though it was hinted that they would eventually be destroyed.

The 133 dead birds were counted and checked at the Museum on the afternoon of October 22, and the work of preparing as many of them as possible as specimens was immediately begun. As a result, 87 were "saved" and are now duly catalogued as part of the scientific collections of the Museum of Vertebrate Zoology. Those preserved include all on the following list except most of the Golden-crowned Sparrows and some of the Nuttall's Sparrows.

List of species, with age and sex recorded as far as ascertained:

Nuttall's Sparrow (*Zonotrichia leucophrys nuttalli*), 21 ad. (7 ♂♂, 13 ♀♀, saved), 41 im. (3 ♂♂, 6 ♀♀, saved)..... 62
Intermediate Sparrow (*Zonotrichia leucophrys gambeli*), ♀ ad., ♂ im.. 2
Golden-crowned Sparrow (*Zonotrichia coronata*), only three dissected, two of them im. ♂♂, the other an im. but sex in doubt..... 16

Santa Cruz Song Sparrow (*Melospiza melodia santaecrucis*), ad., 6 ♂♂, 5 ♀♀; im., 18 ♂♂, 9 ♀♀	38
Northeastern Lincoln's Sparrow (*Melospiza lincolni lincolni*), ♀ im.	1
Forbush's Lincoln's Sparrow (*Melospiza lincolni gracilis*), ♀ ad., ♂ im., ♀ im.	3
Swamp Sparrow (*Melospiza georgiana*), ♀ im.	1
Yakutat Fox Sparrow (*Passerella iliaca annectens*), 2 im. ♀♀	2
San Francisco Spotted Towhee (*Pipilo maculatus falcifer*), 4 im. ♂♂	4
Dusky Warbler (*Vermivora celata sordida*), ♀ im.	1
Audubon's Warbler (*Dendroica auduboni auduboni*), ♂ im.	1
Vigors' Bewick's Wren (*Thryomanes bewicki spilurus*), ♂ ad.	1
Coast Bush-tit (*Psaltriparus minimus minimus*), ♀ ad.	1
Total	133

Determination of age was made, as usual, upon the basis of degree of ossification of the skull, except with the Nuttall's Sparrows not skinned out when plumage was depended upon, a seemingly reliable criterion in that species. As judged from the above record (84 immatures to 27 adults), it would appear that in passeriform birds, in October, seventy-five per cent of the general population consists of birds-of-the-year. This inference is probably more nearly correct than would be obtained from records of species in which age is not determinable at a distance, as shot by the average collector; for the method of netting—driving birds up a ravine into a series of set nets—would probably give a much fairer sample of the population. It is probable that in shooting during the autumn, when presumably no vestige of concern of parents for young remains, the larger proportion of adult, experienced birds keeps out of range, and that the tendency would thus be for the "bag" to contain a considerable excess of young birds over their real proportions.

The proportion of the sexes among birds-of-the-year (30 males to 21 females) as compared with that obtaining among adult birds (14 males to 21 females) in so far as it goes shows that, as in human populations, males exceed females in number in the younger period, the case reversing as age advances.

A striking feature in this haul by aerial nets is the presence in it of species of birds which the ordinary collector, by the shooting method, would probably have failed altogether to detect. The Swamp Sparrow (no. 44089, Mus. Vert. Zool.) constitutes the

second known occurrence for the State, the only previous record (see Dickey, 'Condor,' XXIV, 1922, p. 136), being from Lone Pine, in Owens Valley, east of the Sierra Nevada; and the westernmost record preceding that is from Arizona (Howell, 'Condor,' XVIII, 1916, p. 213). The presence of the Dusky Warbler (no. 44096, Mus. Vert. Zool.), though this bird has previously been recorded in the San Francisco Bay region, is of sustained interest because the nearest known breeding ground of the race lies on the Santa Barbara Islands, 260 miles, at nearest, to the southward. This additional record makes still more probable the regularity of a northward autumnal movement of at least a part of the population.

It may be inferred, provisionally, that, in the floral association in which the haul of the nets was made, namely, a sort of low chaparral, and at the season specified, small birds occur in the proportions shown in the above list. Thus, it would appear that the Nuttall's Sparrow is far and away the dominant species in the resident category there, and that the Golden-crowned Sparrow is the dominant species among winter visitants. There are only one-fourth as many non-resident as resident birds (27 to 106). Ninety-seven per cent of the total individuals are graminivorous or herbivorous, leaving only three per cent that are insectivorous—in this particular association at this particular season of the year. These are significant figures upon the supposition that we have here a fairer "sample" of the general population, less "selective" at least, than would have been afforded by shooting or by current banding procedure. At the same time, I must urge, again, the inadequacy of one single haul of the nets to establish really conclusive generalizations. A long series of hauls, only, would suffice.

The above comments show some ways in which wholesale sampling of bird populations would bring out important facts. Now as to method: I, personally, prepared 62 of the birds. In only one out of this number did I find any marked evidence of internal injury. There was nothing that would show that any bird had been killed by pressure on the back of the skull or by neck-wringing. I do not know *how* the birds were killed. Furthermore, despite the fact that this mass of birds had been piled in together and transported in a suitcase along with five nets and some other things, the plumage, after the birds were singled out, showed little mussing.

In very few of the specimens were wing or tail feathers missing or even permanently bent. The service of these netted birds as specimens was consequently far ahead of what would have been the case with a similar number of birds shot. There was not a shattered bill in the lot, no broken tarsi, no shot-cut feathers.

Again, in attempting to discuss method, I am in the dark on several important points. I should like to have known if birds that got away (if any) were injured. The collector, just as in the case of the hunter of game, must admit that a certain percentage of the birds he shoots at are not retrieved, and that very few of those hit likely recover from their wounds. In other words, in shooting there is a regular wastage of birds, consisting of individuals which do not drop dead but which fly off out of sight, to die sooner or later from the effects of their wounds, or to be snapped up by predators because of their weakened condition. The question of relative humaneness of method might well come up here, in addition to the purely economic one of wastage.

As all these points in favor of using the netting method for scientific purposes dawned upon me, the desire naturally grew to try it out. On October 25, 1923, I petitioned the Assistant Executive Officer of the State Fish and Game Commission for the transfer of the confiscated nets to the custody of the University of California "as objects of interest and instruction," and, furthermore (a separate proposition), for the purpose of operating them myself, under instruction of some "Italian," to capture birds for scientific purposes. I stated that in operating the nets, only scientifically desirable birds would be "collected," the balance liberated. Also, I suggested the testing out of the netting method as a means of capturing, banding and releasing birds in the general campaign of bird-banding now in vogue.

In reply, surprise was expressed by the Fish and Game representative at my "audacity." My petition was not granted. I wrote again on November 26, 1923, and on January 15, 1924. I was put off, without any better reason than that, if my proposal were met favorably, a bad example would be set to "Italians." And I may say, further, that I proposed the same thing verbally to an official of the United States Department of Agriculture—with exactly the same reaction! It would be wrong to *net* birds, be-

cause (I gathered) alien "Italians" do it, when they can, to get birds to eat. I fail to see the logicality of this point of view. The same line of reasoning would make it wrong to *shoot* either game birds out of season or non-game birds at any time, *under permit*, for scientific specimens—because of the possible "example" set to unprincipled Americans (and there *are* such) who would thereupon go out and shoot birds, just for the sport of it if not to eat. I am unable, personally, to see that *method* of capture makes any difference whatsoever, on the score of "example." Permits *are*, and properly so, issued for the taking of birds for scientific purposes. The *way* of "taking" them is hardly material.

It is very likely that there is a considerable Old World literature on the subject of bird netting. In certain European countries, I understand, netting for the market has been a fixed custom for centuries. And it would likely be an aid if this literature could be sought out for "helpful hints" in the operation of nets!

Seriously, the possibilities in netting birds for banding loom up. The avowed aim of bird banders, under the leadership of the Biological Survey, is to band birds in *quantity*—the more the better. Achievement of the objects of bird banding, objects urged on the ground of their scientific value, are to be realized upon in direct proportion to the quantity of birds banded. There is no gainsaying this, surely. This thing of trapping birds one by one or, at best, a few of them at a time, is relatively hopeless as bearing on problems of migration when one considers the slim chances of re-capture. To say it another way, the chances of re-capture are to be increased directly as the number of bandings is increased. The method of netting, which the "Italians" can teach us if we grasp the opportunity to be taught, is the only adequate wholesale method in the banding campaign that has yet been suggested for the usual run of small land-birds. In human history it is, of course, nothing novel that hands should be held up in holy horror at the idea of adopting something new. "It isn't done," however, is hardly a scientific ground for turning down so promising a method in ornithology as bird netting, intelligently conducted, would seem to be.

The foregoing discussion may seem unnecessarily aspersive in places. I admit my proneness to aspersiveness, and submit apol-

ogy for allowing my weakness such full play in the present connection. My only excuse is that by so doing I may have made certain worthwhile ideas the more impressive.

Berkeley, California, August 3, 1924.

THE HISTORY AND CHARACTERS OF *VERMIVORA CRISSALIS* (SALVIN AND GODMAN).

BY OUTRAM BANGS.

Vermivora crissalis, in spite of a few specimens which have lately been taken, still remains one of the rarest of the American Wood Warblers.

The type, and for many years the only known example, was shot April 6, 1889 in the Sierra Nevada, Colima, Mexico. The next specimens, of which I have any knowledge, are the two adult males secured by Nelson and Goldman during the course of their epoch-making Biological Survey of Mexico. One of these was taken January 29, 1903 at Patamba in the mountains of Michoacan, not far from the type locality of the species. The other was secured April 25, 1902 in the Sierra Guadalupe, Coahuila, and constitutes the northernmost record for the species. Apparently *Vermivora crissalis* was not again heard from until 1922 when Mr. W. W. Brown, collecting for Dr. L. C. Sanford at Miquihuana, western Tamaulipas, shot one adult male on June 15.

This specimen was soon afterwards made the type of a new species, *Vermivora browni*, by Ludlow Griscom. Griscom, however, proves to have been quite wrong in translating the weird color-names used by Salvin and Godman and accepting them literally in comparison with the real colors shown by his specimen, which moreover was in worn midsummer plumage.

In the summer of 1924 Mr. W. W. Brown again made a collecting trip to Miquihuana, this time in the interests of John E. Thayer, Esq. Before Brown started I begged Mr. Thayer to urge him to make a special effort to get skins of this scarce species. The result was seven specimens, a very interesting series, that includes four adults, three males and a female, two in abraded nuptial plumage