remnant of the nest but did not build there. The hide at this nest had been removed after the second nest was completed, and so there was nothing to disuade the birds from nesting there. They selected a spot on the opposite side, thus making the location of the three nests at the three angles of a triangle, more or less equidistant from each other, with the second nest at the apex of the triangle. The second nest was completely abandoned, and the third nest was built by the side of the compound wall with freshly collected material. This time the plant chosen was *Bougainvillia spectabilis*, and the type of nest was the same as the previous one. The process of nest building was at the usual speed. On 18 August when this was nearing completion, I noticed, and so did these nesting birds, a Crow-pheasant (*Centropus sinensis* Stephens) that came from the direction of the second nest to this nest and put its head into it for eggs or young ones. This suggested the fate of the four eggs in the second nest. The birds thereafter abandoned the nest and did not nest again for the year. Ordinarily their nesting season extends from March to September.

Literature Cited

Dharmakumarsinhji, R. S. 1955. Birds of Saurashtra (India) Dil Bahar, Bhavanagar. 362 pp.

Salim Ali. 1956. The Book of Indian Birds. The Bombay Natural History Society, Bombay. 440 pp.

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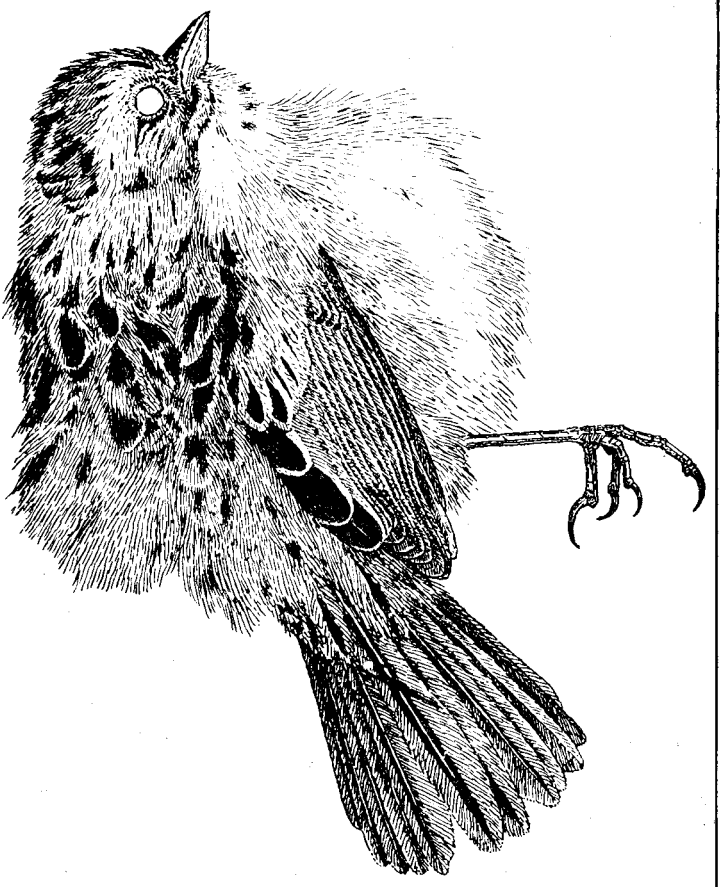
A New Method of Preserving Bird Specimens.—In the fall and winter of 1957–1958 I had occasion to preserve more than a hundred birds, mostly passerines, which had been killed at a television tower south of Aiken, Aiken County, South Carolina. In the course of this work I evolved a method whereby both the skin and the major part of the skeleton of a given specimen could be saved. This method is as follows.

The mouth and deep gashes are plugged with cotton. The wings and legs are then examined; the side on which the appendage bones are unbroken is the one where the opening incision is made. This incision extends from the eyelid back along the side of the neck to the shoulder region. It is continued as a circular incision, which is made against the body around the base of the wing. From this stage on, an absorbent, cornmeal or perhaps hardwood sawdust, is liberally applied and serves to keep the feathers dry. Skin and feathers are then stripped off the wing. From the circular incision in the shoulder area an incision is carried back to the area where the thigh meets the trunk, and another circular incision is made around this joint. Skin and feathers are stripped off the thigh. The incision is extended back to the region of the base of the tail. The skin is then loosened from the body both dorsally and ventrally, with cuts being made through the tail-base region (the pygostyle and some caudal vertebrae admittedly may be lost in this process) and through the knee joint and humerus of the appendages on the side opposite the opening incision. The skin is reversed over the neck and skull, this being facilitated by the split extending to the eyelid. Just anterior to the lacrimal bones a transverse cut is made. This leaves the bill with the skin. If the bill is to go with the skeleton, the skin is carefully detached from the skull in the region of the bill base. This of course leaves one with a more nearly complete

skeleton but also with a beakless skin. Although lacking somewhat in esthetic appeal, a beakless skin is still valuable, particularly if bill measurements are included among data accompanying the skin.

The body, which includes the wing and leg bones on one side as well as most, or all, of the skull, is then examined. Sex and, where possible, age are determined; the specimen is weighed and visceral organs are preserved. The eviscerated body is bound with thread into a sort of ball and hung up to dry. Completion of preparation of the skeleton can be accomplished through maceration or, better, through use of dermestid beetles. Anderson (*Methods of Collecting and Preserving Vertebrate Animals*, 2nd ed., rev. Ottawa: National Museum of Canada Bull. No. 69, 1949), among others, provides details as to procedure. One may wish to preserve specimens for studies in myology, neurology, angiology, or splanchnology, in which event the body should be placed in a suitable fluid preservative and provided with a label bearing data considered minimal for the bird-skin label. For detailed suggestions concerning alcoholic specimens and skeletons of birds, see Berger (*Auk*, 72: 300–303, 1955; *Auk*, 73: 452, 1956). Specimens thus preserved should be suitable for extensive myological study, even though, as Berger in his earlier note (1955) points out, skinning does remove or destroy dermal muscles.

The base of the tail and the leg and wing bones attached to the skin are then cleaned in the usual fashion. The oil gland is removed. The preparator should avoid "stripping" the secondaries from their attachment to the ulna. Fat is scraped from the skin. If small quantities of a powder called "Pounce" (Keuffel & Esser Co.) are applied to the skin, much of the residual grease is absorbed. Where necessary the plumage is cleaned and dried. A little ball of cotton is used to replace the eyeball, with a flattish wisp of cotton extending down alongside the skin of the neck region. With heavy- or broad-billed species it is desirable to "build up" the head region so that its thickness is about the same as the maximal bill width. The skin, after being dusted with arsenic, is arranged on a flat surface, such as a piece of cardboard (a 5- x 8-inch filing card serves well for small passerines), in a suitable manner. Figure 1 illustrates the type of skin arrangement that I tend to favor. One should bear in mind that none of the body's contour feathers have been plucked and discarded; hence, even though one gets the impression of seeing the contour feathers of one side only, one is actually seeing more. Thus, the feathers forming the periphery of most of the dorsal and ventral regions are actually feathers of the "other side." The bill is closed by passing a threaded needle through the nostrils and then tying the thread around the basal part of the lower mandible. A bit of Duco cement applied to the anterior palatal region often facilitates securing the mandibles in a natural, closed position. The tail feathers are affixed in spread position by means of a heavy-paper strip (cut from a 5 x 8 card) smeared with Duco cement and attached crosswise beneath these feathers approximately where the under tail coverts terminate. The ends of this strip can be cut off flush with the edge of the outer webs of the outermost tail feathers. Another piece of cardboard bearing weights amounting to several grams (the larger the specimen, the greater the weight) is set down on the carefully arranged skin so that it will be more or less flattened. The skin is then allowed to dry. It should probably remain undisturbed for a minimum of several hours at room temperature, but if it can be placed on or in a drying oven, or perhaps on a radiator, it will dry sufficiently in a half hour or less. The weights



Melospiza georgiana ♂ ad.
Channel 6 TV Tower, SW Aiken Co., S.C.
October 26, 1957 1978 R. A. Norris Fat/tot. wt.
Wt., 19.2 Wt. subcut. fat, 1.58 Heart wt., 0.21 = 8.2%
Bill (exp. cul.), 10.5 Bill (nostr.), 8.3 Bill dpth., 5.3 Bill wdth., 4.5
Wing (chord), 60.5 Wing (flat), 62.5 Tail, 56.5
Tarsus, 21.6 Molt? No Wing area and formula (over)
Skel. prepared

are removed from the dried skin, and a plate of glass or transparent plastic is then placed over the specimen. The specimen, sandwiched between this plate and the cardboard underneath, is then inverted so that the underside faces upward. The cardboard is removed. From the head region to the base of the tail Duco cement is applied to the skin and, in small quantities, to such feathers as may be underturned. Whereas it is not necessary to cover the entire undersurface with cement, it is well to have the cement distributed over all the major areas. A little more is applied to one side of the tarsus and toes, so that they will stick to the card. A piece of white cardboard or other mounting material (again, unlined 5 x 8 cards are suitable for small passerines) is obtained. (In my own work I use a card on which sundry data, as shown in Figure 1, already have been entered.) The piece of glass or plastic bearing the specimen is then held up above the preparator's head and the mounting card is brought down against the specimen, the cement causing the skin to adhere to the card. The advantage of the transparent plate is that it enables the worker to place the specimen exactly where he wants it on the mounting card. A little cement is extruded in the region of the under wing coverts, this assuring the wing's adherence to the rest of the skin. The mounted specimen, which may be weighted again, is set aside until the cement hardens; again, if artificial heat is used the hardening or drying takes only a short time.

Data pertaining to the specimen may be recorded, as suggested above, before the specimen is skinned. With smaller passerines it is convenient to enter the data on the same side of the card with the specimen. If the specimen is too large or the data are too extensive, a second card can be attached to the first with drafting-tape hinges and the data can be entered on the second card. In my own work I usually have a second card on which I record a wing-area tracing, wing-formula data, and other information. Whereas it is easy to "clutter" a conventional, 3- by 5/8-inch museum label (or even two of them) attached to a conventional study skin, it is not so easy to clutter what we may call "aviarium cards," of which there may be more than one for each specimen.

Folders provide protection for the flat, card-mounted skins. For many passerines these can readily be made from halves of standard-sized manila folders. One half can be folded to make a folder that is approximately 6 x 8¼ inches. This accommodates a specimen on a 5 x 8 card. It has been my practice to print the generic and specific names, as well as the collector's initials and catalog number, in the upper left-hand corner of the folder. Data so placed are useful in filing and in the replacement of specimens in correct folders. For passerines I have found it convenient to file the specimens alphabetically by genus and species. If flat skins should be arranged in large collections or "aviaria," some other filing scheme might well be used.

The above-described method of preserving bird specimens is not without its disadvantages. Some that come to mind are as follows: (1) Neither the under tail coverts nor the underside of the tail shows in the flat-mounted skin. The tail coverts can, however, be clipped off and mounted separately, close to the specimen, as I have done with Catbirds and other species having distinctively marked

Figure 1. An example of a flat skin mounted on an "aviarium card." The drawing was made from a specimen of the Swamp Sparrow in the writer's collection.

under tail coverts. Where it is particularly desirable to see the ventral aspect of the tail, a window of suitable size could be cut in the card. (2) Comparison of skins in series is not as easy with flat mounts as with regular study skins. (3) Where beaks are kept with skeletons or alcoholic specimens, the beakless skins are rather "incomplete looking" and, in a measure, less useful than would be ones with beaks intact. (4) Large birds might present difficulties, although it is believed that use of appropriate materials (a relatively inexpensive mounting medium, heavy cardboard or fiberboard, etc.) and special procedures (such as the use of a thin underpadding of cotton or other material) would obviate these difficulties.

Some advantages of the method are these: (1) There is an economical use of bird specimens, wherein one saves a skeleton or alcoholic specimen as well as a skin and can associate these (which would bear identical catalog numbers) with one another. (2) There is an economical use of space, the flat-skin collection requiring substantially less space than a collection of conventional study skins. (3) The time required for preparation of flat skins is somewhat less than that needed for conventional skins; this is particularly true when one is "set up" to prepare flat skins in numbers. (4) Flat skins are easier to prepare than regular skins, especially as regards the late, skin-assembly phase of the work. (5) There is ample space for data on the card or cards, as mentioned earlier. These data are likely to be more valuable when accompanying the specimen than when recorded in a field notebook, which might not always be deposited in the same place as the specimen. The importance of having data with specimens has been emphasized by Van Tyne (*Auk*, 69: 27–33, 1952). (6) Linear measurements, if not taken in advance (where possible, I prefer to take these in advance), can be taken from flat skins as easily, I believe, as from regular study skins (bill width being a probable exception). Admittedly, quantitative relationships between flat-skin wing measurements, on the one hand, and "chord" and "arc" measurements, on the other hand, remain to be worked out for different species. Color measurements, which may become increasingly important as a refinement in taxonomic procedure, can, in my opinion, be taken more easily from the flattish surfaces of the carded skins. (7) Where specimens are subject to much handling, as by students, the skins mounted on cards show less wear and tear through the years than do unprotected, conventional study skins.

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Dichromatism in Juvenal Yellow Warblers.—According to Dwight (See Bent, *Life Histories of North American Warblers.* U.S. Natl. Mus. Publ. No. 203. 1953: 170) the juvenal plumage of the Yellow Warbler (*Dendroica petechia*) is uniform among all individuals of the species. He described the plumage as being pale olive-brown above; wings clove-brown, broadly edged with bright olive-yellow paling at the tips of the quills, edge of the outer primary bright lemon-yellow; below pale sulphur-yellow, unstreaked; tail pale clove-brown, inner webs lemon-yellow, outer webs edged with olive-brown. On 27 June 1960 I collected two sibling Yellow Warblers (WES 620 and 621) from a nest near Sarona, Washburn County, Wisconsin. The nestlings were about nine days old and were from