specimens of *Lampropsar tanagrinus* in the form of the bill, the details of scutellation of the tarsus, the width of the remiges, the lack of a white shoulder patch, and the more extensive but duller gloss on the body feathers. They are, as Bond suggested, indistinguishable from *Lampropsar*. Therefore, *Pyrrota valeryi* J. and E.. Verreaux (Rev. Mag. Zool., ser. 2, 7; 351, 1855) should be placed in the synonymy of *Lampropsar tanagrinus tanagrinus* (Spix).—ROBERT W. STORER, *University of Michigan Museum of Zoology, Ann Arbor, Michigan.*

Suggestions Regarding Alcoholic Specimens and Skeletons of Birds.—Dr. Josselyn Van Tyne (1952, Auk, **69**: 27–33) recently discussed problems related to the preparation of study skins and emphasized the importance of recording accurate and complete data on the bird-skin label. My work on avian anatomy has made me aware of deficiencies both in the labels and the preservation of specimens in "alcoholic" and in skeleton collections. Wet-preserved specimens require considerable storage space; use of such space is not warranted if the specimens are nearly useless for dissection. Specimens without adequate data serve only part of the use to which they could be put.

The need for spirit collections is great. The complete appendicular myology is known for very few genera of birds. The internal anatomy of most genera, and even of many subfamilies, is unknown. The study of one region in many genera, such as has been made by Beecher on jaw muscles, is dependent almost entirely on spirit collections in the larger museums. An understanding of phylogenetic relationships of the larger taxonomic categories can be had only when the anatomy of those forms is known. Furthermore, it is not enough to know the myological formulae of the leg; the total appendicular myology must be known if one is to understand functional as well as phylogenetic relationships.

Alcohol or formalin are most frequently used to preserve specimens, but each has its disadvantages. There is a need for experimentation with other preservatives in order to learn which will give optimal fixation and preservation. Consideration should be given to the use of a modified embalming fluid (see Woodburne and Lawrence, Anat. Rec., **114**, 1952: 507–514). However, phenol slowly decalcifies bone; toluene might prove to be an adequate substitute.

The most important factor in securing adequate preservation, however, probably is the time between collecting the specimen and placing it in the preservative. This interval, especially in the tropics, should be as short as possible. For small birds, one needs only to make a slit in the ventral abdominal wall to permit entrance of the fluid into the body cavity, though use of a detergent may also be desirable to insure penetration through the feathers to the skin. Incisions along the lateral margins of the sternum should be avoided because they cut through the sternal portion of the ribs and the muscles covering them.

Intravenous injection is the best method for insuring rapid and proper preservation, especially for large birds, but this may be impractical in the field. In the absence of this procedure, injection of major muscle masses, the brain, and the orbit is necessary for large birds. The following areas should be injected: breast, arm, thigh, crus, and neck. It may also be desirable to inject the thoracic cavity by passing the hypodermic needle posteriorly along the lateral side of the esophagus. An incision through the abdominal wall should, of course, be made. Incisions in the skin should not be made in any other part of the body.

The specimen should not be skinned nor should the feathers be plucked. Skinning removes or damages dermal muscles; obviously, it is not possible on a plucked bird to determine the relative lengths of primaries, secondaries, rectrices, and alula quills, and the location or absence of the carpal remex and its covert.

Further information is needed on the type of label and writing medium best suited for long immersion in preservatives. A specimen in excellent condition is useless when accompanied by an illegible label.

The following notes apply specifically to the preparation of skeletons so that the maximum use may be made of them. Before preparing the specimen, measurements of wing length (specify "arc" or "chord") and tail length should be made. When the gonads cannot be found, a notation as to plumage should be made: e.g., "gonads not seen; male plumage." Intellectual honesty here, as elsewhere, is taken for granted.

In removing the skin and feathers, care should be taken not to remove also digit II (= pollex) and phalanx 2 of digit III (formerly digit II; see Montagna. 1945. Journ. Morph., **76:** 87–113). For large birds, it is advisable either to skin the feet or, at least, to incise the plantar pads of the digits so as to free the flexor tendons from the vaginal sheaths. The tongue, the supporting hyoid bone, and the trachea, including the bronchi, should be preserved intact. The eyeball (for sclerotic plates and for the os opticus), including the orbital portion of the optic nerve, should be saved (see Tiemeier, 1950. Journ. Morph., **86:** 25–46). In removing the larger muscle masses covering the humerus and the shoulder joint, the origin of the deltoid muscle (from the scapula and the capsule of the shoulder joint) should be left intact, so as not to remove or damage the os humeroscapulare (little is known about the presence or absence of this bone in the various groups of birds). The patella should also be preserved; this will be insured if the tendons at the knee joint are not removed.

In most instances, the "final cleaning" of the skeleton will be accomplished by dermestid beetles. Experience indicates that the following additional steps should be taken to insure proper final cleaning. The lungs and kidneys should be removed. The thoraco-abdominal cavity should be rinsed out with water to remove excess blood. It is desirable to make an opening between the halves of the furcula to permit a circulation of air through the body cavity. Sawdust should never be used when removing the skin; cornmeal may be used, but it is preferable to use no absorbent agent at all. Because storage and shipping space are ever-present problems, the skeleton may be tied into a loose ball. The skeleton, thus prepared, should not be exposed to excessive heat, i.e., it should not be dried in an oven. While drying, the specimen should be placed in a wire container where it will be protected from flies; dermestids do not like the partially digested meat left by maggots. Needless to say, no preservative should be put on the specimen.

For rare species, where it is desirable to have both a skin and a skeleton, the bones of one leg and one wing may be left with the skin; those of the other leg and wing may be saved with the axial skeleton, including the skull and pygostyle. (Be sure to measure and record on the label the length of the tail *before* removing the pygostyle.)

Preparation of durable labels in the field presents a problem. Labels prepared with pencil or "indelible" ink may become illegible after a period of blowing about in the wind in inclement weather. Labels should be tied around bones whose configuration will prevent the string from slipping off one end. The label should be tucked under the string to prevent undue flapping. The identity of the specimen (genus and species) should be written on the label. If the identity is uncertain, do not prepare as a skeleton, but make up as a skin.

A small bird sustaining undue shot damage should either be prepared as a skin or should be discarded. A bird which has two shattered wings or two shattered legs is useless either for dissection or as a skeleton.

My feelings on the need for numbers of *completely articulated skeletons* were expressed, in part, in an editorial several years ago (1951. Wilson Bull., **63:** 119–120). Anyone who has attempted to identify the phalanges of the foot and to reconstruct the several digits from a mass of separate bones is well aware of the problem implied here. Because small bones are easily lost, one can, for example, feel certain that counts of cervical and free caudal vertebrae are accurate only when it is possible to study articulated skeletons. Tabulation of the number of fused vertebrae in the synsacrum (a difficult and, perhaps, unreliable determination in the adult bone) may be meaningless unless one also presents the numbers of cervical, dorsal, and free caudal vertebrae; the total number of bones in the vertebral column may be the same in two specimens of a species even though there may be variation in the numbers of vertebrae in adjacent regions. Furthermore, I have now found variation, infrequent to be sure, in all regions of the vertebral column in several genera of the family Cuculidae.

Though perhaps not all ornithologists will agree with me, I prefer to work with "rough" rather than with shiny-white, bleached skeletons. I am not sure, when working with strongly bleached skeletons, how much of the bone has been eroded away; I prefer not to introduce this extra factor for error when taking measurements accurate to within 0.1 mm. I have examined strongly bleached skeletons of a particular species of cuckoo where the atlas appeared to be notched, rather than perforated, by the odontoid process of the axis, although in alcoholic material and in properly prepared skeletons of the same species, the atlas was invariably perforated. One rarely finds a patella, an os humeroscapulare, or an os opticus in a box of "thoroughly cleaned," disarticulated bones of a small bird. Furthermore, one can tell considerable about the myology of a species by inspecting the tendons still attached to the bones; sometimes relatively large aponeuroses leave no macroscopically visible impression on the bones.

It should not be necessary to say that the minimum data desired for study skins should also be recorded for spirit specimens and skeletons, yet I have received specimens with only the generic and specific names (sometimes not even the latter) recorded. An anatomist would like to have all of the data now considered minimal for the bird skin label: locality, date, name of collector, sex (for skeletons), and identification to species. In addition, the student of anatomy could often use to advantage ecological information, data on colors of soft parts, weight, wing area, and tail area. There is little published information on bird weights; there is even less on wing area (Poole, Auk, **55,** 1938: 511–517). Weight and wing area are indispensable factors when considering functional appendicular anatomy. Ecological and biological data are as important in determining degree of relationship as is the analysis of myology or osteology. On labels for skeletons, it is desirable to include data on plumage (whether it was of the male or female and of the immature or adult type). An even better procedure is to put on the label "like skin number —."

Fortunately, the day seems to have passed when long rows of bottled specimens were considered to have an intrinsic value. They do not have such value; unused specimens, whether they be "alcoholics" or skins, contribute nothing to our knowledge. In one instance, I was given permission to dissect but one side of a specimen because it was the only one in the collection. This policy was made even though the bird had been collected probably twenty-three (no date given) years earlier and it is unlikely that anyone else would be interested in dissecting this genus within the next twenty-five or fifty years.

That more care should be given to the preservation of spirit specimens is evident

from the fact that I have received several birds, preserved for twenty or more years, which had deteriorated so much that it was possible to determine accurately the extent and relationships of less than a dozen muscles. Other specimens of equal age, however, were in excellent condition.

One specimen is inadequate for the study of a subspecies. Why should we expect to obtain a satisfactory anatomical picture from a single specimen? Thorough dissection of one region frequently necessitates sacrificing some adjacent region or structure. Furthermore, it is difficult, if not impossible, to make an accurate dissection and description of each of the approximately 100 appendicular muscles in any given specimen. This would be true even were it not for the frequent shot damage which may make an entire appendage unusable. Nor can one adequately dissect the vascular, nervous, and muscular systems in the same specimen.

Though presenting more problems in the field than the preparation of a bird skin, "alcoholic" specimens and carefully prepared skeletons in numbers, with full data, are badly needed. A job worth doing at all is worth doing well. This aspect of ornithology deserves more emphasis than evidenced in recent years by the sponsoring institutions and by the leaders of field expeditions whose primary purpose is to collect study material.—ANDREW J. BERGER, *Department of Anatomy, East Medical Building, Ann Arbor, Michigan.*

Chipping Sparrow with song of Clay-colored Sparrow at Toronto.—The typical song of the Clay-colored Sparrow was heard on June 8, 1947, in the Don Valley at Toronto's northern limit. The singer, who had not been heard on numerous earlier visits to this residential area, was identified as a bird identical in appearance to a Chipping Sparrow. He was perched at the top of one or other of several small Lombardy poplars that dominated the surrounding gardens. He was again found on the next visit to this exact spot on June 17, 1947, unfortunately the last that could be made there that summer. He was heard to emit one song continually, *bzzz bzzz bzzz bzzz*, but no mate could be located. The following spring he, or an identical bird, was seen singing the same song in the same trees on May 3. Again no mate could be found; he was never heard again.

This observation is presented as another example of the ability of passerine birds to return on successive years to the same spot and suggests hybridization between the Chipping and Clay-colored sparrows although Clay-colored Sparrows are but transient irregular visitors in the Toronto area.—RONALD R. TASKER, M.D., *253 Old Orchard Grove, Toronto 12, Ontario, Canada.*