



FIGURE 1. Assembled apparatus for color-marking nesting birds.

The actual marking of a tern usually caused it to fly off the nest and disappear for one to 10 minutes. Upon returning to its nest, the bird approached the area cautiously, often inspecting the various small stones and pieces of sea shells that had also been dyed on either side of the nest. Occasionally, a tern would pick up dyed stones or shell pieces in the nest scrape in its bill and fly off with them. Otherwise, except for some occasional preening of the dyed feathers, its behavior was not noticeably modified. None of the birds marked with this technique deserted their nests because of the marking experience.

With slight modifications, this technique could be applied to birds other than ground-nesting species. With an adequate method of securing and perhaps camouflaging the bottle of dye, birds with nests in vegetation could probably be marked with this method. We also believe that a much longer length of rubber tubing, at least as much as 100 feet, can be used successfully. The number of nests that could be marked without having to move the blind would thus be greatly increased.

We thank D. P. Costello and C. Henley for advice and assistance with dyes. This work was carried out while one of us (L. J. M.) was supported by an N.D.E.A. fellowship.—LYNN J. MOSELEY AND HELMUT C. MUELLER, *Department of Zoology, University of North Carolina, Chapel Hill, North Carolina 27514*. Received 30 January 1975, accepted 23 July 1975.

New method for sexing Steller's Jays.—The published literature contains no recognition of sexual dimorphism in the Steller's Jay (*Cyanocitta stelleri*). I have found in the subspecies, *C. s. macrolopha*, a significant correlation between the exposed culmen length and sex. Using this measurement, sex in this subspecies can be determined with a reasonable degree of accuracy at all times of the year. During the pre-incubation period (mid-February to the end of April in the study site six miles west of Boulder, Colorado) when the jays can be observed in couples, the identification of the sexes can be further verified by the

somewhat smaller body size of the female, as well as by sexual differences in vocalizations and behaviors.

In my research on vocalizations and associated behaviors in this subspecies, it is important to have a reliable and convenient method for sexing jays in the field without resorting to laparotomy. In searching the literature for sexual differences in this subspecies, I discovered that Ridgway (*U. S. Natl. Mus., Bull.* 50: 358-361, 1904) had measured lengths of skins, wings and tails, exposed culmens, depths of bills at nostrils, and tarsus and middle toe lengths of seven female and eight male specimens of *C. s. macrolopha*. All measurements overlapped between sexes except the lengths of exposed culmens. His data showed that the *minimum* culmen length for males was 27.5 mm (average of 28.5 mm), and that the *maximum* culmen length for females was also 27.5 mm (average of 26.5 mm). From these data I hypothesized that females have culmen lengths less than or equal to 27.5 mm, and that males have culmen lengths greater than 27.5 mm.

The exposed culmen lengths of 55 specimens of *C. s. macrolopha* were measured in the Denver Museum of Natural History and the University of Colorado Museum. Culmen lengths were recorded as less than, greater than or equal to 27.5 mm. Specimens included 36 females and 19 males. Using the Chi-Square frequency analysis for a three-by-two contingency table, the correlation between exposed culmen length and sex proved highly significant ($\chi^2 = 48.75$, $df = 2$, $P = < .001$).

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Marking Marabou Storks.—Marabous (*Leptoptilos crumeniferus*) are the heaviest of all storks, males weighing 6-8 kg and females 5-7 kg. They occur throughout tropical Africa and are especially numerous in eastern Africa (Kahl, 1966b; Pomeroy, 1973). They are tall birds, the average length of tarsus being about 30 cm. Despite their size they are fairly easy to catch because they are scavengers and quite readily take meat or fish heads containing an anaesthetizing drug (Pomeroy and Woodford, 1976). It is easy to fit metal bands, e.g. B.T.O. size "M" or large, numbered plastic ones whose digits can be read from 20-30 m in the field (Houston, 1974), but within a few days bands become encrusted with excreta because Marabous excrete down their legs. Why they do this is not clear although Kahl (1966a) suggested that the purpose was evaporative cooling. After that the numbers cannot be read; soon even the color cannot be seen and within a month it is difficult to tell whether the bird is banded or not. This applies equally to bands placed above or below the tarsal joint.

Wing-tags were tried, but for various reasons were not successful. Instead I fixed numbered tags to the bill. These were made of laminated plastic and were bent in the middle so as to rest neatly on each side of the bill (Fig. 1). They measured 4 x 3 cm on each side and were held in place by copper wire (twin gauge 20; 0.09 cm diameter). The tags were shaped individually by softening them in hot water just prior to attachment. In the field tags are visible to the naked eye at a range of 20-50 meters and can be detected through binoculars at a much greater distance even when the bird is in flight. The numbers can be read at a range of 20-30 meters with ordinary binoculars (8X or 10X), unless the tag is excessively dirty, which is rare. Different colors were used to indicate different places of capture.

There is no evidence that the tags cause any inconvenience or injury to the birds. The external nares are certainly functional in the Marabou, at least during expiration (Akester et al., 1973) despite the lengthy gape (20-30 cm). The tag, however, never fits exactly and the holes in the tag also allow a passage of air. In the field, marked birds in a group are not seen to pant more often than the rest. The tags did not restrict the birds' field of vision nor was any bird seen attempting to remove one (a Marabou can scratch its bill quite easily with its toes).