GENERAL NOTES

A simple technique for hollow metal egg construction.—A number of investigators have constructed artificial bird eggs for many purposes. Such eggs are often cast from plaster or shaped from wood, but these methods are often unsatisfactory since some experiments require that the eggs be hollow or metallic. In experiments on behavior or physiology, hollow metal eggs could be utilized to contain circulating fluids of controlled temperature or density or to house various mechanical devices or sensing instruments related to motion or temperature. The hollow metal egg construction described in this paper provides a model which can contain circulating water, is of accurate size and shape, and can be economically manufactured.

Reasonably fresh eggs of the species to be investigated are blown. After the egg shell has dried, all punctures except one should be glued shut. The egg shell is prepared for plating by spraying it with metallic copper powder, and, using the puncture in the shell as a point of attachment, it is electroplated in a bath of acid copper for several days. In my experience, the metallizing and plating of the shell was most conveniently accomplished by a commercial firm that specialized in silverware plating and baby-shoe bronzing. Following plating, the shell and shell membranes will still be present inside the copper layer. The calcareous shell may be removed by flushing several minutes with concentrated hydrochloric acid (used with caution); the shell membranes may then be pulled out with a fine wire hook. The puncture in the copper shell may be sealed with soft solder, or the shell may be equipped for circulating water by drilling two holes in it and soldering in short lengths of copper tubing (Figure 1). The copper egg is camouflaged by sanding the surface and dipping in the appropriate color of flat paint.

In my experiments, I collected, weighed, measured, and blew eggs of the Ringed Turtle Dove (*Streptopelia risoria*) and the Bron-Shoe Company (269 East Broad Street, Columbus, Ohio) copper-plated them at a cost of approximately five dollars

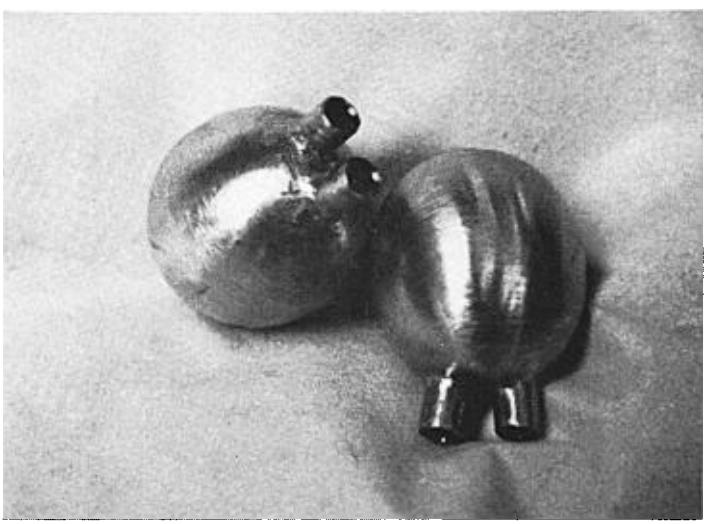

Figure 1. Two copper eggs in which copper tubing has been soldered for water circulation.

each. I drilled them, removed the shell and membranes, and fitted them with short lengths of ⅛ inch copper tubing. The eggs were painted by dipping in interior wall finish (Dean and Barry Company White Alkyd Flat). The measurements of two of these eggs are shown in Table 1.

TABLE 1

MEASUREMENTS OF TWO EGGS WHICH WERE COPPER PLATED

Measurement	*Egg A*	*Egg B*
Weight (g)		
Fresh	9.0	8.0
Copper plated, shell removed	8.5	7.8
Plated, shell removed, copper tubing attached	11.7	10.7
Plated, shell removed, tubing attached, painted	12.3	11.1
Length (mm)		
Fresh	29.6	28.0
Copper plated	30.0	28.6
Width (mm)		
Fresh	23.6	22.8
Copper plated	25.0	24.0
Plated and painted	25.0	24.2

The weights of the copper-plated eggs, after the shells and shell membranes were removed, nearly equaled the weights of the fresh eggs. Larger eggs have a reduced ratio of platable surface to fresh weight, but at the same time require a thicker plating for satisfactory stability. Exact duplication of fresh weight is not normally necessary, since there is considerable variation in fresh egg weights and a progressive weight loss during the course of incubation. The copper models are much sturdier than natural eggs.

Although many investigations using artificial eggs do not require that the eggs be hollow or metallic, construction of the eggs by copper-plating should be among the simplest of methods for preserving accurate size and shape while maintaining reasonably accurate weight.—EDWIN C. FRANKS, *Department of Zoology and Entomology, The Ohio State University, Columbus, Ohio*; present address, *Department of Zoology, The Pennsylvania State University, University Park, Pennsylvania.*

Notes on breeding of the Common Nighthawk in Panama.—The taking in Panama on 7 May 1961 of a Common Nighthawk (*Chordeiles minor*), which was brooding a single downy young, established that this species, essentially one of temperate North America, breeds far south into the tropics, where it had generally been regarded as a migrant only. This formed the chief basis for the description of the subspecies *panamensis* (E. Eisenmann, *Amer. Mus. Nat. Hist., Novit.* no. 2094, 1962). Recently, on 12 May 1963, Olson took a female incubating two eggs containing fairly well developed embryos, on a hill on the outskirts of the city of Panama, four miles east of Albrook Field. This is about 20 miles east of Cerro Campana, where the specimen had been taken in 1961, thus bringing the breeding range nearer to South America. The eggs, the first known of this southernmost population, measure 30.5 × 22.0 and 29.2 × 21.6 mm, have a creamy white or pale buff ground color, and are densely and uniformly speckled with fine ochraceous brown and gray markings; the larger egg is somewhat more finely marked. Judging