

# FIELD CRITERIA FOR DETERMINING INCUBATION STAGE IN EGGS OF THE COMMON TERN

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DURING the course of field work on Common (*Sterna hirundo*) and Roseate (*Sterna dougallii*) Terns on Great Gull Island, Suffolk County, New York, we submerged eggs of known age of the Common Tern in a beaker of water, then collected the embryos in order to correlate the period in incubation with the specific gravity and the stage of development. Westerkov (1950) describes a technique for determining stage of incubation of pheasant (*Phasianus colchicus*) and European partridge (*Perdix perdix*) eggs by immersing them in water. As the embryo develops the egg floats increasingly higher in the water, gradually rising to the surface over a period of days. More recently, Schreiber (1970) describes flotation characteristics for eggs of the Western Gull. Fant (1957) studied the development of pheasant embryos and published line drawings for embryos at different stages of incubation. Weller (1957) photographed embryos of the Redhead at various stages of development. Others have used similar techniques, particularly with game birds, but we find no such study for terns. Such information is potentially useful as a means of estimating approximate hatching dates in a tern colony infrequently visited or in studies involving egg transfer experiments. And as Schreiber (1970) suggests, if enough studies of this type are done, it may be possible to devise a flotation scale applicable to incubation periods of differing lengths.

## METHODS

As part of a study of production each nest was marked the day the first egg was found. The nests then were examined daily for seven days and additional eggs were numbered until the clutch was complete. For our study we used only the third egg in 18 clutches of the Common Tern so marked. Each egg was floated in a beaker of fresh water. The embryo then was collected and preserved in 95 per cent alcohol. We used only the third egg as it is the egg that hatches most consistently in 20–21 days. Incubation times vary from 20–28 days, the longer periods probably being due to sporadic incubation prior to the laying of the second egg.

The series of embryos was examined for characteristics that the field worker can see with the naked eye or a hand lens. We could easily distinguish the differences in flotation and the gross differences in the embryos at 2-day intervals. (Fig. 1 and Fig. 2).

As the nests were checked only once a day, any egg could be as much as 24 hours old when marked (e.g., in Fig. 1, no. 2, which represents 3 to 4 days of incubation, the embryo could be as much as 5 days old). However, development of the embryos within our series appeared to be quite regular except in one embryo (11 days of incubation) which showed no more development than the embryo taken 24 hours earlier.

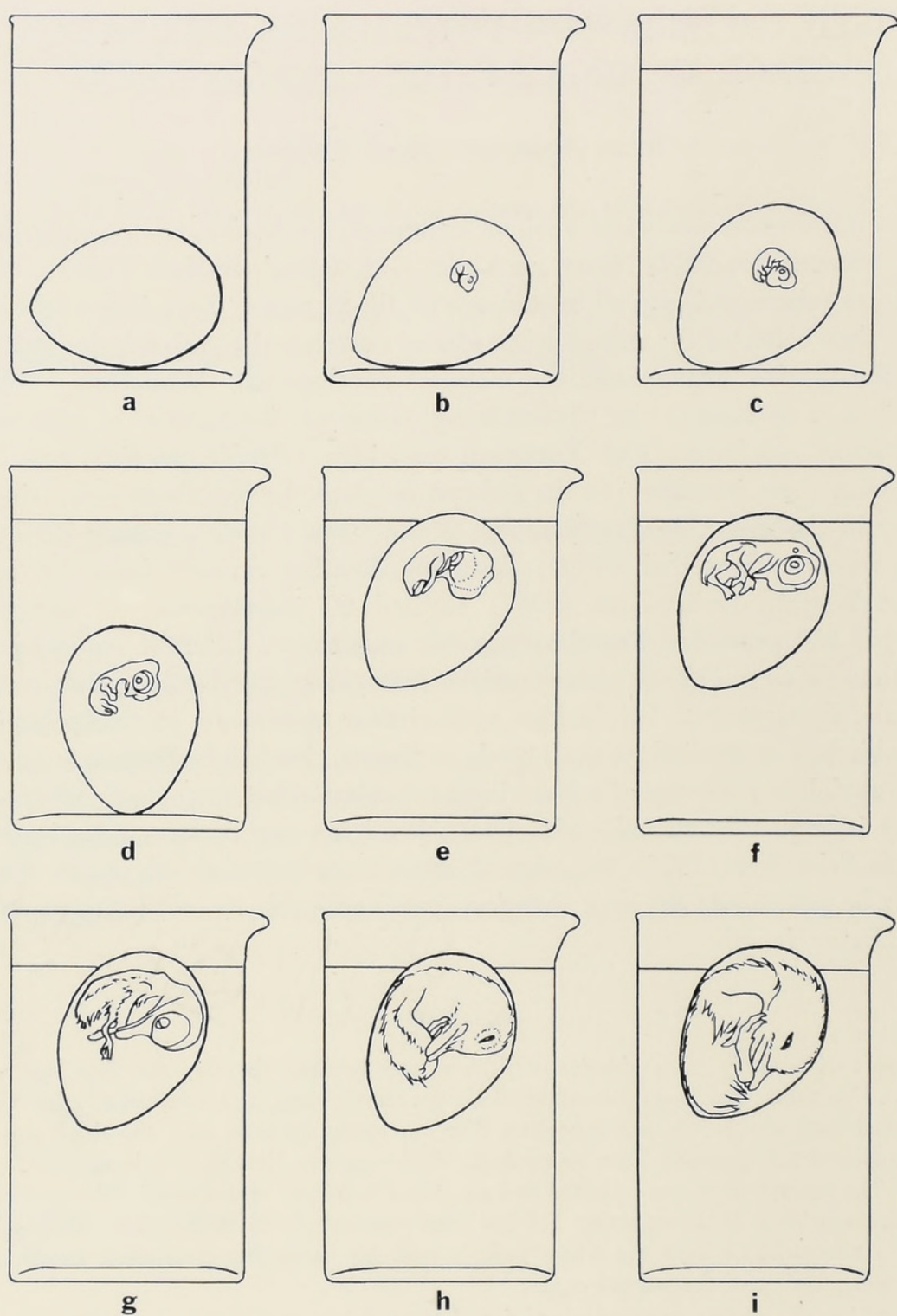


FIG. 1. Changes in egg flotation and embryo development with incubation in the Common Tern. a) 1-2 days incubation, b) 3-4 days, c) 5-6 days, d) 7-8 days, e) 9-10 days, f) 11-12 days, g) 13-14 days, h) 15-16 days, i) 17-18 days. Embryos  $\frac{1}{2}$  natural size.



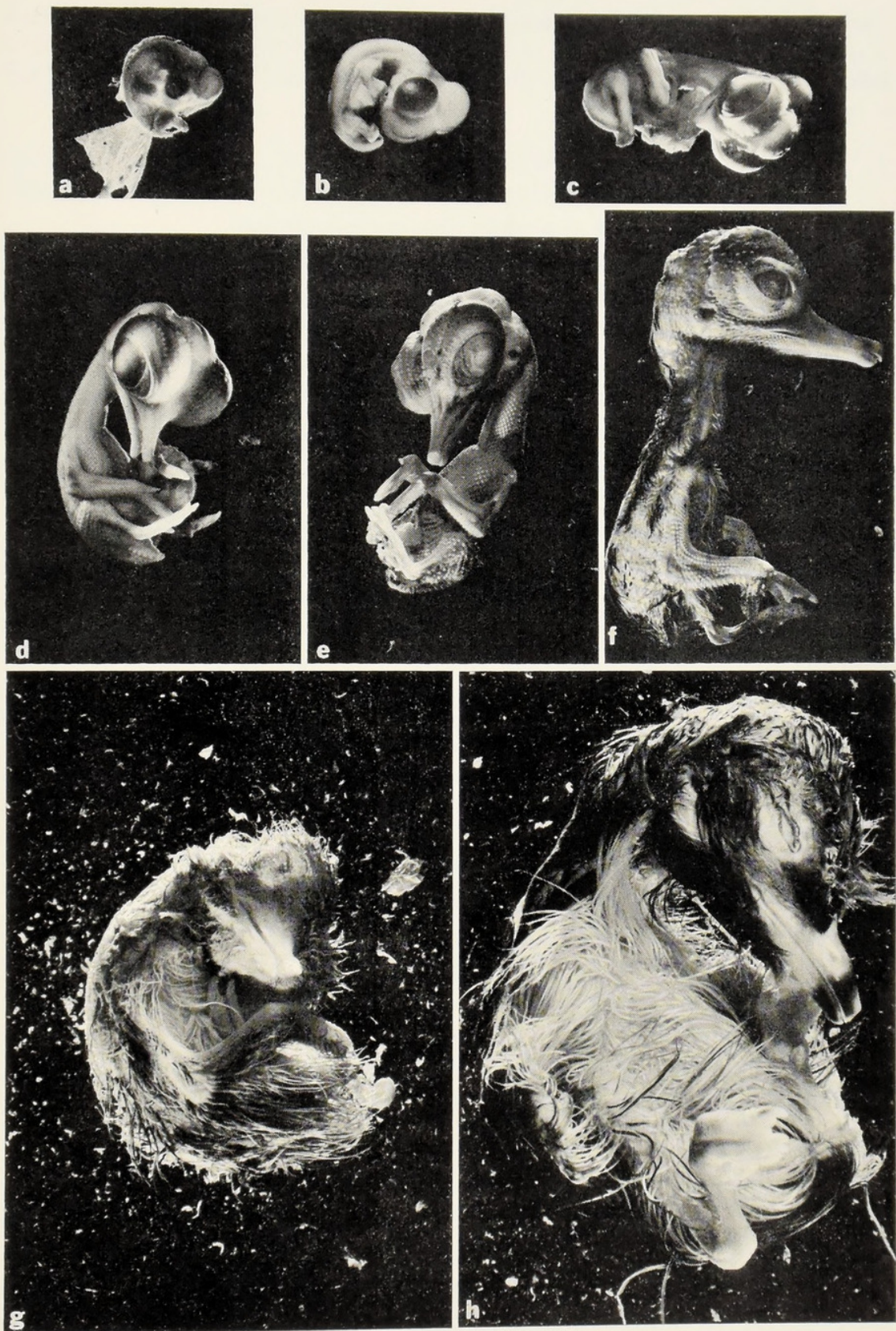


FIG. 2. Embryos of the Common Tern. a) 3-4 days incubation, b) 5-6 days, c) 7-8 days, d) 9-10 days, e) 11-12 days, f) 13-14 days, g) 15-16 days, h) 17-18 days. Embryos  $1\frac{1}{2}$  natural size.



It is possible for a field worker using the following criteria as well as the illustrations to estimate the stage of incubation of eggs of the Common Tern within approximately 2 days. Roseate Terns seem similar in their developmental stages, although only a few eggs of this species were collected.

#### DESCRIPTION OF STAGES

1-2 days incubation—Egg lying on bottom of beaker with long axis parallel to bottom. Embryo visible as a white disk on yolk surface.

3-4 days incubation—Egg with small end on bottom of beaker and with long axis forming an angle of  $30^\circ$  with bottom. Embryo with midbrain prominent, eye prominent and slightly pigmented, bill not visible, limb buds separate from body.

5-6 days incubation—Egg with small end on bottom and with long axis forming angle of  $45^\circ$  with bottom. Embryo with upper mandible projecting from head and lower mandible visible and with wings and legs jointed.

7-8 days incubation—Egg stands vertically with small end on bottom. Embryo with eyelid, nictitating membrane and ear opening visible and with distinct grooves between digits.

9-10 days incubation—Egg floats at surface with diameter of exposed part of large end 15 mm. Embryo with egg tooth visible; with feather papillae visible along backbone and prominent around tail, and alula visible on wings; and with toes and webs distinct.

11-12 days incubation—Egg floats with exposed part of large end 17 mm in diameter. Embryo with down just breaking out of papillae along dorsal feather tract and around tail and with claws visible.

13-14 days incubation—Egg floats with exposed part of large end 20 mm in diameter. Embryo with eyelid beginning to close and with down breaking out of papillae in scapular area and on elbow and with down well grown on ventral surface.

15-16 days incubation—Egg floats with exposed part of large end 21 mm in diameter. Embryo with eye a slit and with body down-covered except for a bare area at base of bill.

17-18 days incubation—Egg floats with exposed part of large end 25 mm in diameter. Down-covered embryo fills egg; shell cracked but not pipped.

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Leg that has been banded: this will tell if the bird is an adult or an immature.





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