

### Attempted hormonal induction of brood patches and broodiness in ducks.

—There is evidence that brood patch formation can be brought about by sex hormones and prolactin. Bailey (1952) showed that in certain fringillids an estrogen and prolactin induced brood patch formation; Hutchison et al. (1967) reported brood patch formation in canaries treated with an estrogen and either progesterone or prolactin. Breitenbach, cited in Breitenbach et al. (1964), reports defeathering of the brood patch in pheasants by prolactin; Selander and Yung Yang (1966) produced brood patches in House Sparrows with estradiol and prolactin, though these were not as fully developed as in incubating wild birds; Legait (1955) induced brood patch formation in laying hens with prolactin; Johns and Pfeiffer (1963) showed that in two species of phalaropes brood patches could be induced by administration of an androgen plus prolactin.

In regard to waterfowl, Weller (*in Delacour*, 1964: 61) states that under the influence of reproductive hormones, the down that eventually lines the nest is shed. Dr. Weller informs me (*in lit.*) that this statement was not based on experiments on waterfowl but rather on the general state of knowledge relating hormones to brood patch development in birds, such as cited above. Just which reproductive hormones are involved in the shedding of nest down in ducks and in what sequence they must act is still unknown.

It is thus appropriate to report certain pilot experiments in which formation of a brood patch or the induction of shedding of nest down out of season by means of hormone treatments was attempted in ducks, although the results obtained are not more than suggestive.

Female Mallards (*Anas platyrhynchos*) were kept in indoor cages at about 70°F during December and January; they received light for 8 hours per day. Two un-injected birds served as controls. Four experimental birds were treated as summarized in Table 1. The results were as follows: Duck No. 1 after the 4th day of prolactin injection, and No. 2 after the 5th day of these injections, showed some down projecting beyond the belly feathers and at this time there were a few down feathers on the floor of the cage of both birds. In duck No. 3, new black down feathers that did not project beyond the contour feathers were noted on the 5th day after cessation of the progesterone injections. In No. 4 new black down feathers were also found beneath the contour feathers of the lower parts at this time. Such down was also found in one of the control ducks, but in the injected birds it was larger.

TABLE 1  
HORMONES GIVEN TO FEMALE MALLARDS TO INDUCE BROOD PATCH FORMATION

Duck No.	First 10 days (daily)	Second 10 days (daily)	Subsequent 8 days (daily)	Later treatments
1	½ mg E.d. <sup>1</sup>	20 mg prol.		
2	½ mg E.d.	20 mg prol.		
3	½ mg E.d.	20 mg prol.	25 mg prog.	
4	½ mg E.d.	20 mg prol.	25 mg prog. + 20 mg prol. <sup>2</sup>	17.5 mg prol. twice daily for 6 days

<sup>1</sup> E.d. = estradiol dipropionate; prol. = prolactin; prog. = progesterone.

<sup>2</sup> A 9-day period without injection between the second treatment and the subsequent 8 days in the case of Duck No. 4.

None of the birds showed increased vascularity of the abdominal skin or edema, two prominent features of brood patches, nor was there any suggestion of incubation behavior although table tennis balls and straw were provided as egg and nest substitutes. Large doses of prolactin following a pretreatment with an estrogen therefore produced no relevant effect beyond some stimulation of the growth of down on the under parts and, in two birds, some indication of shedding of a little down.

A female Rouen type domestic duck was injected during January and February twice weekly for 3 weeks with 5 mg estradiol dipropionate and then twice daily with 10 mg prolactin for 3 weeks. No effect as regards to either brood patch formation or behavior was noted.

Another Mallard experiment is also relevant. A female Mallard of the year was kept with another female and a pair of larger domestic Mallards as controls. The immature bird was injected once a week for 2 weeks with 5 mg estradiol dipropionate. Then she was injected with 5 mg prolactin daily. From the 7th day onward she showed what I judged to be broody behavior. She spent most of her time squatting on the straw in one spot and hardly preened or bathed, as the control birds often did. When I entered the pen, all except the injected bird rose in alarm from their resting postures, but she remained sitting. When my closer approach forced her to get up and withdraw, she showed the typical gesture of rejection, "Abweisungs gebärde," described and illustrated by Lorenz (1941) as normally shown by female Mallards pursued by strange males, but she did not pluck nest down or feathers and showed no indication of brood patch formation.

A positive result is always of interest, but the fact that essentially similar treatment did not induce broodiness in the other ducks referred to above must be emphasized. In view of the results obtained in other species cited in the opening paragraph, I believe that I used relevant hormones in my experiments on ducks, yet my results were limited to apparent growth stimulation, perhaps the shedding of down, and in one bird only the induction of broodiness. This suggests, as Selander and Yung Yang (1966) stated in connection with the brood patch in icterids and House Sparrows, "full development of the brood patch may depend on some special sequential action of hormones" that was not approximated closely enough in my experiments.

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**First report of Sandwich Terns in Peru.**—On 7 April 1970 I collected four Sandwich Terns, *Thalasseus sandvicensis*, at a large estuary 23 miles south of Sechura, Piura Dept., Peru, approximately 5° 51' S, 80° 57' W. Of the four terns, three were females weighing 216.8 g (UF 15251), 186.6 g (UF 15253), and 170.9 g (UF 15252); and one was a male, weighing 185.1 g (UF 15254). One female (UF 15251) had been banded by Lovett Williams on the Chandeaur Islands (29° 30' N, 88° 50' W) off the coast of Louisiana on 27 June 1963. All four were in their winter plumage, and I prepared them as skeletal specimens. Although I saw additional *T. sandvicensis* in the estuary, I visited it only twice and have no idea how many *T. sandvicensis* were actually present.

This is the first record of *T. sandvicensis* in Peru, and represents a southern range extension of approximately 250 miles. In November and December 1955 and 1956, Marchant (Ibis, 100: 349, 1958) recorded small numbers of *T. sandvicensis* at the Santa Elena Peninsula (02° 06' S, 80° 58' W) of Ecuador. He did not record a spring passage of the birds. Marchant's records were the first for *T. sandvicensis* on the west coast of South America. Lovett Williams (pers. comm.) reports one additional banding recovery for *T. sandvicensis* on the west coast of South America in Nuquí, Colombia. The Organization for Tropical Studies provided field research funds through OTS Pilot Research Grant N69-23. I thank Sr. Max Cerro for his hospitality during my stay at his farm near Sechura, Peru.—KENNETH E. CAMPBELL, JR., *Department of Zoology, University of Florida, Gainesville, Florida 32601*. Accepted 9 Oct. 70.

**Publication dates of the North American Fauna series.**—The correct date of publication of numbers in the well-known North American Fauna series, begun in 1889, was printed on the cover of each issue through No. 48. After that time dates of publication that appear on the covers are either incomplete or incorrect. For taxonomic purposes, for developing a chronological survey of a subject, or for other reasons, the exact date of publication of numbers in this important series is useful. We think it important to call attention to the correct dates of publication for numbers beyond 48. Those dealing with birds are listed below by number, followed by the author's name for ease of reference, the date printed on the cover of the issue, and the correct date of publication in parentheses. Numbers not listed do not relate to birds (see J. Mammal., 51: 845, 1970).

No. 57, V. W. Lehmann, 1941 (19 November 1941); No. 58, J. A. Neff, 1947 (2 June 1947); No. 61, O. J. Murie and V. B. Scheffer, 1959 (4 November 1959); No. 62, R. E. Stewart and C. S. Robbins, 1958 (7 July 1958); No. 63, W. E. Banko, 1960 (22 April 1960); No. 65, G. B. Saunders, 1968 (16 July 1968); No. 67, B. Meanley, May 1969 (22 September 1969).—RICHARD C. BANKS, *Bureau of Sport Fisheries and Wildlife, National Museum of Natural History, Washington, D. C. 20560*. Accepted 8 Feb. 71.