

'COURTSHIP FEEDING IN BIRDS'

'COURTSHIP FEEDING'—A CORRECTION, AND FURTHER RECORDS

IN my paper on courtship feeding in birds (Auk, 57: 169-178, 1940) I was mistaken in including the presentation of snow by the Adélie Penguin (*Pygoscelis adeliae*), which was based on observations of Murray Levick. Mr. Brian Roberts recently made an intensive study of the behavior of this species when he was a member of the British Graham Land Expedition (in press). He informs me that pebbles, which form the nest lining, are presented in courtship and that when snow is presented, this is as a substitute for such pebbles, and has nothing to do with the male feeding the female.

The newly published fourth volume of the 'Handbook of British Birds' (1940, ed. H. F. Witherby) includes two more records. T. A. Coward saw a male Fulmar (*Fulmarus glacialis*) eject oil into the mouth of a female, and D. Nethersole-Thompson a male Slavonian Grebe (*Podiceps auritus*) bring a fish to a female at nest relief. These seem the only records for the petrels and grebes, respectively. Also included is a second record of this habit in the Stone Curlew (*Burhinus oedipnemus*), which is apparently the only charadriiform bird with the habit. Mr. Nethersole-Thompson writes me of two further unpublished observations, namely, in the Falconiformes the habit occurs in *Falco subbuteo* not only during incubation but also prior to laying; and in the Motacillidae, courtship feeding is regular in the Meadow Pipit (*Anthus pratensis*) during incubation.—DAVID LACK, *Dartington Hall, Totnes, England.*

'COURTSHIP FEEDING' IN VARIOUS BIRDS

ON a recent trip to New York I found in the American Museum of Natural History two articles which give theories as to the function of the feeding of the female by the male that are not mentioned in David Lack's article in the April 1940 number of 'The Auk.' H. Wachs (Verh. d. Deutsch. Zool. Ges. e. V. Zool. Anz., Suppl., 6: 192-202, 1933) considered that in the case of gulls and terns the food itself had a definite function in supplying the female with extra nourishment for egg laying. G. Steinbacher (Ber. Verein Schles. Ornith., 23: 42-64, 1938) doubted this theory, as there was little courtship feeding with his gulls in the zoo, yet the same number of eggs was laid as in the wild. (However, food is certainly more easily obtained in such a situation than in Nature.) He believes that this feeding has nothing to do with the formation of the pair, and suggests that it may be a premature appearance of the instinct to feed young, and the male is the chief provider for the newly hatched chicks.

For the Order Ciconiiformes the habit of 'courtship feeding' is stated by Lack to be "absent," but in a recent note by G. K. Yeates (British Birds, 34: 98-99, 1940) there is a reference to male feeding female in the case of the European Bittern (*Botaurus s. stellaris*).

In Lack's list there was no example of males feeding females among the Hirundinidae; I have found two reports of its occurrence during incubation in the Tree Swallow, *Iridoprocne bicolor* (J. A. Cash, Bird-lore, 35: 201-205, 1933; Weydemeyer, W., Bird-lore, 36: 100-105, 1934).

Finally this habit is recorded for *Troglodytes rufociliatus* in the recent article by Skutch (Auk, 57: 308, 1940), making the first instance for the wrens.—MARGARET M. NICE, 5708 Kenwood Avenue, Chicago, Illinois.

SOME ADDITIONS TO THE LIST OF DAVID LACK

PARIDAE (Titmice). CAROLINA CHICKADEE, *Penthestes carolinensis carolinensis*.—From 'Bird Banding Brevities' (The Migrant, 9: 51, 1938): "On a limb above the feeding shelf, the orange-plumed individual was seen posturing like a begging juvenile with quivering wings while the red-plumed male fed her." This occurred in April 1938. I do not know if nesting had started as the nest was not found.

TUFTED TITMOUSE, *Baeolophus bicolor*.—On March 21, 1940, hearing unfamiliar shrill, sibilant calls, I went to the window to see the source. A Tufted Titmouse perched on the rim of the feeding shelf with quivering body and wings, was giving the call as some food was held in the beak. My sudden appearance caused the bird to fly and I was unable to find out if a companion was near but this behavior undoubtedly occurred as a part of courtship because this year nesting was not started at that date.

TROGLODYTIDAE (Wrens). BEWICK'S WREN, *Thryomanes bewicki bewicki*.—Some years ago when a pair of Bewick's Wrens nested in a gourd on our porch, the male brought food many times a day to the brooding female on the nest. Each time he arrived at the porch, he perched several feet from the nest and announced his arrival with a song before flying to the gourd. In Lack's list 'courtship feeding' is given as "apparently absent" in the Troglodytidae.—AMELIA R. LASKEY, *Graybar Lane, Nashville, Tennessee*.

ADDITIONAL CASES OF 'COURTSHIP FEEDING'

THE following recorded instances of courtship feeding extend the list recently published by Mr. David Lack, and may be called to mind here.

EASTERN BELTED KINGFISHER, *Megaceryle alcyon alcyon*.—In his latest volume of 'Life Histories' (Bull. U. S. Nat. Mus., no. 176: 112, 115, 1940), A. C. Bent reports on his own authority and quoting Bendire, that the male feeds the female while she is incubating.

BALTIMORE ORIOLE, *Icterus galbula*.—In her book entitled 'Bird Ways' (Chapter 8, p. 120, 1885), Olive Thorne Miller writes: "An oriole that I watched in the Catskill Mountains regularly fed his mate while she was sitting."

AMERICAN PIPIT, *Anthus spinoletta rubescens*.—William Gross in his paper on 'Home-life of the American Pipit' (Bird-lore, 34: 309-314, 1932) reports regular feeding of the female by the male during incubation and brooding of the young.

LARK SPARROW (*Chondestes grammacus*).—An observation made in the case of this species (probably of the typical race, since it occurred in Michigan), was reported by Dr. Frank N. Wilson (Bird-lore, 33: 108-110, 1931), who states that the male feeds the female while she is brooding nestlings.—HERVEY BRACKBILL, *3201 Carlisle Avenue, Baltimore, Maryland*.

COURTSHIP OF THE ROADRUNNER

(Contribution from the Archbold Expeditions of the American Museum of Natural History)

ON March 31, 1940, near Tucson, Arizona, I saw the mating ceremony of a pair of Roadrunners (*Geococcyx californianus*). They were about fifty yards from their nest which contained three eggs, as it did when I found it on March 28, and in which three more eggs were subsequently laid. When I first saw the pair the male was standing with a lizard dangling from his bill. The female, about three feet distant, was turned away from the male. She was crouched low to the earth and

was fluttering her wings. After a few moments of this, the male ran to the female, mounted her and copulation ensued, the male not seizing hold of the female with his bill but retaining the lizard in his bill. Copulation completed, the male stepped from the back of the female. As he did so the female turned her head, took the lizard from the bill of the male and swallowed it. The male, with head outstretched, ran rapidly three times around the female and then away. This display was seen only once.

This type of courtship display has apparently not been previously recorded for this species, though it occurs in some other cuckoos, and many other distantly related species of birds (see Lack, Auk, 57: 169-178, 1940).

The Roadrunner ceremony consisted of: *pre-copulation* (1) the posing of the male with the lizard, (2) the invitation of the female, (3) copulation; *post-copulation* (4) the passing of food from male to female, (5) the circling of the female by the male.

Some of these acts used in the Roadrunner's display have a real use in the reproductive cycle which follows, but appear here out of place as a formalized display; all the acts of the complex series, with the exception of copulation itself, are found in the life of the bird at other times.

To consider them in order. The posing of the male with a lizard is a very common, almost characteristic action of these birds at any time. The killing of a lizard with the bill alone, as the Roadrunners do it, frequently takes time, and the bird often stands or runs with the lizard in its bill during the killing. Also, when young are being fed, lizards are being continually carried. This act, used as part of the courtship procedure, is perhaps a premature, useless, stereotyped appearance of an act which later becomes of essential service in raising the brood.

The invitation of the female, with fluttering wings, suggests the actions of the young in begging for food. (I could not see the details of the female's head to see if she was holding her bill open for food.) Here is the use of an act which is brought over from infancy and which also suggests the actions of the young to come. In the young bird there is a physical need which can be satisfied only by the cooperation of another individual and this need is conveyed to that individual by 'begging.' Or the 'begging' is the releaser which sets off the corresponding response in the parent bird. The wing fluttering of the female in her invitation to copulation also serves to secure the cooperation of another bird.

There are, however, two other acts of Roadrunners which are also somewhat similar to this invitation of the female. One is dust bathing, in which the bird squats on its breast, and by shuffling its feet and fluttering its wings, forces dust into its ventral feathers. In the crouching, the invitation of the female resembles the dusting position. The dusting, however, is performed when the bird is at rest and at ease.

Another type of activity in which wing fluttering is used is in injury feigning. In the twenty to thirty times that I flushed an incubating or brooding bird from its nest, only once did the bird feign injury. It then darted to the ground from its nest, ran some distance to a shrub, crouched on its breast and fluttered its wings. Several times it did this, ran a few yards and repeated this before finally running away. Friedmann (*Psychoanalytic Review*, p. 11, 1934) has postulated injury feigning as a conflict between two drives; to me it seems a specific type of action given under certain conditions. In any event it is given when the bird is much excited.

Here we have modification of a similar type of act used in four quite different

ways under four different sets of circumstances, when the bird is quite differently excited, and serving different purposes. Perhaps there is a paucity of ways in which the bird can react, due to physical equipment.

The actual copulation is the only act peculiar to this ceremony. The post-copulation act of the male passing food to the female finds its counterpart in the act of the adult feeding the young. This is another case where an act which later has an essential use in the reproductive cycle appears early, before it has any real use, as do many instinctive acts. Here, however, the act becomes part of a formalized ceremony which initiates a cycle in which the act plays an essential rôle. The final post-copulation part of the ceremony, the rapid circling of the female by the male, recalls the dashing about of an excited bird. Young birds which I have raised by hand frequently dashed about in various directions in their cages for no obvious reason, apparently as a release for surplus nervous energy that could be assuaged only by rapid motion. Perhaps the motivation of the mating bird is similar.

SUMMARY.—Here we have a series of acts used in sequence to give a complex ceremony, which has its climax, though not its end, in copulation. The act of copulation which is necessary to give meaning to the ceremony is the only part of the ceremony which is peculiar to it. All the other components of the ceremony are also used under other circumstances, for other purposes. The Roadrunner has not evolved new types of acts for its sexual display, as have some birds, but has used acts already in existence. Some of these acts in other connections have definite significance, in infancy, in raising the young, and in assuaging excess nervous energy. These, together with a single peculiar act, are bound together into a complex conventionalized ceremony with a special use.—A. L. RAND, *American Museum of Natural History, New York City.*

INCUBATION FEEDING OF CALLIOPE HUMMINGBIRD

DAVID LACK, in his timely and interesting summary article 'Courtship Feeding in Birds,' which appeared in the April issue of 'The Auk' (57: 169-178, 1940) records many examples of courtship, incubation and other feeding of birds and suggests that any additional information be submitted. In his classified list of bird orders (page 176) he says that in the Micropodiformes (swifts and hummingbirds) this courtship- or incubation-feeding habit is "apparently absent" and on page 175 he states that "in the order Pelecaniformes feeding of adult birds is found only in the Tropic-birds."

It seems appropriate, therefore, to report that in the summer of 1923, while attending the Alpine Summer School (of Brigham Young University), on Mount Timpanogos of the Wasatch Mountains, Utah, my wife and I had the good fortune of placing our tent near the nest of a Calliope Hummingbird (*Stellula calliope*) which was on a maple bough overhanging a cool mountain stream at about 7,800 feet elevation. Incubation had already started when we discovered the nest. The male bird on a number of occasions was observed to feed the incubating female by regurgitation. Both the male Calliope and Broad-tailed Hummingbirds (*Selasphorus platycercus*) were seen feeding on oozing maple sap from holes that had been recently drilled by a Red-naped Sapsucker.

As evidence that the Tropic-birds feed other adults, Lack (page 172) refers to Murphy's report of finding among breeding island colonies an adult *Fregata magnificens* and a four-year-old Booby (*Sula leucogaster*), both in excellent flesh but

each with only one wing. Both birds obviously were unable to capture their own food.

Equally convincing evidence that the food-begging behavior of the young is sometimes retained and successfully used by old White Pelicans is contained in Captain Howard Stansbury's entertaining diary (Exploration and Survey of the Valley of the Great Salt Lake of Utah, etc., Philadelphia, 487 pp., 1852). Under date of May 30, 1850, at Gunnison Island (page 193) in Great Salt Lake, Captain Stansbury writes that while rambling about the shores of the island he came across an old White Pelican that was very large and fat but stone blind. As the bird was totally helpless, it must have "subsisted on the charity of its neighbors and his slick and comfortable condition showed that, like beggars in more civilized communities, he had fared sumptuously every day." Stansbury points out that inasmuch as the nearest possible source of food was not less than thirty miles distant, it necessitated at least a sixty-mile trip daily to feed this helpless bird. Unfortunately no description of the method of feeding is reported.—CLARENCE COTTAM, *U. S. Biological Survey, Washington, D. C.*