Thus it appears that some parental care in this species may continue for 6 months or more after the young become volant.—JEROME A. JACKSON, *Department of Zoology, Mississippi State University, Mississippi State, Mississippi 39762.* Accepted 19 Aug. 74.

Egg fertility and hatchability in *Colinus* quail and their hybrids.—Until recently very few data have been published on the production and fertility of hybrids in the New World quail (Odontophorinae). Johnsgard (1970, Condor 72: 85) reviewed the records of intergeneric quail hybrids in relation to the fertility, viability, plumage characters, and egg-white proteins of interspecific hybrids produced in his laboratory (Johnsgard 1971, Auk 88: 264). A summary of this work (Johnsgard 1973, Grouse and quails of North America, Lincoln, Univ. Nebraska Press) includes fertility data on several crosses among the three species of bobwhites (*Colinus*). Reported were a Crested Bobwhite (*C. cristatus*) × Bobwhite (*C. virginianus*) cross, a backcross of an F_1 hybrid female (*C. cristatus* × *C. virginianus*) to a male Bobwhite, and a Bobwhite × Black-throated Bobwhite (*C. nigrogularis*) cross. This paper augments Johnsgard's findings on these particular pairs and summarizes the results of pairings involving 15 *inter se*, F_1, F_2, and backcross hybrid combinations of the three species of *Colinus* quail. It also records a Black-throated Bobwhite × Crested Bobwhite hybrid combination, which to my knowledge has not been reported previously.

Quail were housed together as species and mixed-species pairs, as part of a general study on the comparative behavior of the three *Colinus* species and their hybrids (Cink MS). Eggs were collected daily, placed in cool storage, and incubated in a forced-air incubator. Infertile eggs were detected by candling after 7 days. Chicks were reared separately in small cages and brooded with heat lamps. Bills were trimmed to reduce pecking. A more complete description of housing and treatment of eggs appears in Johnsgard (1971, ibid.).

Table 1 summarizes incubation results. Hatchability and fertility of all *inter se* pairings were considerably lower than one would expect from wild birds, but the results are consistent with those achieved with *inter se* pairs of *Lophortyx*, *Callipepla*, and *Colinus* quail in the same laboratory (Johnsgard 1971, ibid.). F_1 hybrids were reared successfully from crosses between Bobwhite and Crested Bobwhite, Bobwhite and Black-throated Bobwhite, and Crested Bobwhite and Black-throated Bobwhite. No F_2 hybrids were produced. All eggs produced by *inter se* pairing of F_1 hybrids were sterile. No eggs were produced by the F_1 Crested × Black-throated Bobwhite hybrids, which died before they reached reproductive maturity. Sterility of the F_1 hybrids did not appear to be complete. Eggs produced by a backcross of an F_1 Black-throated × Bobwhite hybrid to a Bobwhite were partially fertile. The hatchability of eggs produced by a backcross of Bobwhite to Crested × Bobwhite hybrids was not significantly different (Chi-square test, $P < 0.05$) from that achieved by *inter se* pairs of Bobwhite in the same laboratory. The complete sterility seen in pairs of F_1 hybrids could have been quite real, but the possibility remains that it may also have reflected the small sample size, or be a consequence of inbreeding, which can occur in only a few generations in quail (Sittmann et al. 1966, Genetics 54: 371).

Eggs produced from the Crested Bobwhite × Bobwhite cross had a very low hatchability and nearly 70% were infertile. Of the five hybrid chicks that died a

TABLE 1

RESULTS OF INCUBATION OF EGGS FROM CAPTIVE PAIRS OF COLINUS QUAIL AND THEIR HYBRIDS

Pairings (♂ and ♀)	Total eggs incubated	Infertile eggs	Embryonic deaths		Hatched eggs	% Fertility	% Hatchability
			early	late			
Crested Bobwhite (CB) *inter se*	68	22	12	18	15	66.2	22.1
Black-th. Bobwhite (BtB) *inter se*	75	21	31	7	15	70.7	20.0
Bobwhite (B) *inter se*	50	18	6	2	22	60.0	44.0
CB × B	170	120	23	5	14	24.7	8.2
F_1 CB/B × B	11	3	3	0	5	72.7	45.4
F_1 CB/B × F_1 CB/B	22	22	0	0	0	0.0	0.0
F_1 CB/B × CB/B backcross to B	17	9	3	1	4	47.1	23.5
B × F_1 CB/B	33	8	2	3	14	57.6	42.4
B × CB/B backcross	69	57	0	0	6	8.7	8.7
CB/B backcross × CB/B backcross	21	20	1	0	0	4.8	0.0
CB × BtB	10	4	5	0	1	60.0	10.0
BtB × CB	32	20	9	0	3	37.5	9.4
BtB × B	56	26	2	2	25	51.8	44.6
F_1 BtB/B × F_1 BtB/B	8	8	0	0	0	0.0	0.0
B × F_1 BtB/B	15	14	1	0	0	6.7	0.0

late embryonic death, two died of weakness at hatching and two others were visibly deformed (loss or addition of appendages). Weakness at hatching appeared frequently in late embryonic deaths of the progeny of the three parental species but deformities occurred only in progeny of the Crested Bobwhite × Bobwhite cross. Female F_1 hybrids of this cross produced considerably larger eggs than those from either parental species (mean of 10 eggs: 34.5 × 26.3 mm). The eggs were tan in color with brown spots, reminiscent of those of the Crested Bobwhite parent. Chicks hatched from these eggs (the result of a backcross to a male Bobwhite) showed characteristic hybrid vigor and were much larger than chicks of the parental species (mean weight was 8.52 g as compared to 6.26 g for Bobwhite chicks and 5.80 g for Crested chicks). Pairing of these backcross individuals to Bobwhites resulted in significantly ($P < 0.01$) lowered fertility and hatchability of the eggs. Eggs produced by backcross females were similar in proportions to those of the Bobwhite (mean of 10 eggs: 29.0 × 22.1 mm) and were white in color. One egg had tan splotches, similar to a pattern of brown spotting infrequently seen on the white eggs of the Black-throated Bobwhite.

Female hybrids of the Black-throated Bobwhite × Bobwhite cross produced eggs of proportions similar to those of the Black-throated parental species (mean of 10 eggs: 29.3 × 22.3 mm) and of the same white color. Hatchability of the Black-

throated Bobwhite × Bobwhite hybrids was twice that of chicks hatching from *inter se* pairings of Black-throated Bobwhites and was not significantly ($P < 0.05$) different from *inter se* pairings of Bobwhites. The hatchability data for the single backcross of an F_1 female to a male Bobwhite are too few to be conclusive. C. H. Epp (pers. comm.), an aviculturist in Alabama, has achieved about a 75% hatchability of F_1 chicks and about a 30% hatchability of F_1 × Bobwhite backcrosses with a much larger breeding stock.

These data seem to indicate that the Bobwhite and Black-throated Bobwhite are more compatible genetically than are the Bobwhite and the Crested Bobwhite. This may be a consequence of the greater length of time that has passed since the Bobwhite and Crested Bobwhite diverged from a common ancestral stock. It appears to be added support for the proposal of Mayr and Short (1970, Species taxa of North American birds, Publ. Nuttall Ornithol. Club No. 9) that the Bobwhite is more closely related to the Black-throated Bobwhite than to the Crested Bobwhite, but the sterility observed in the F_1 hybrids, argues against their proposal that *Colinus nigrogularis* is probably conspecific with *Colinus virginianus*.

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A Sage Sparrow egg in a Black-throated Sparrow nest.—On 21 June 1972 in Washoe County, Nevada, I found a Black-throated Sparrow nest that held two eggs, one of the Black-throated Sparrow (*Amphispiza bilineata*) and one of the Sage Sparrow (*Amphispiza belli*). Upon approaching the nest, I flushed a Black-throated Sparrow, presumably an incubating female. The nest was in a big sage bush (*Artemisia tridentata*), 28 cm from the ground.

On six previous occasions, I heard a male Black-throated Sparrow singing near the nest. The territory of this male was overlapped by three Sage Sparrow territories. Density of Black-throated Sparrows in the area was 5.5 males per 100 acres, and density of Sage Sparrows was 30 males per 100 acres. On 6 July 1972 the nest was empty, but there was no sign of a nest predator. I could find no broken eggshells or feathers in the nest.

There are several possible explanations of finding the egg of one species in the nest of another species. (1) Brood parasitism. The Sage Sparrow is not known as a brood parasite nor even an incipient brood parasite. I could find no records in the literature of this phenomenon in the Sage Sparrow.

(2) Nest usurpation. I also could locate no records of usurpation of nests by the Black-throated Sparrow. Interspecific territoriality occurs between Black-throated and Sage Sparrows (Banks, *in* Bent 1968, U.S. Natl. Mus. Bull. 237, part 2: 999). Linsdale (1938, Amer. Midl. Naturalist 19: 160) reported an incident in central Nevada between a Black-throated Sparrow and a Sage Sparrow, in which "a few minutes earlier an individual [Black-throated Sparrow] thought to be the male of the pair had driven a Sage Sparrow from a sage bush 20 feet from the nest site."

(3) Egg-dumping. Wiens (1971, Auk 88: 185) mentions that incidental deposition of eggs in the nest of other bird species, a phenomenon he terms "egg-dumping,"