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CATALOG OF BROWN-HEADED COWBIRD HOSTS FROM KANSAS

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The Brown-headed Cowbird (*Molothrus ater*) is a brood parasite that is not host specific. Its range extends across North America, but it is most abundant in the Great Plains (Van Velzen 1972, Dolbeer and Stehn 1979). Host species in Kansas habitats comprise those communities with which cowbirds have been associated the longest (Mayfield 1965).

Friedmann (1929, 1963, 1971, Friedmann et al. 1977) has compiled host records for cowbirds. Friedmann gives general impressions of geographically varying host communities by listing states and provinces with records of parasitism. I have consolidated the Kansas records from Friedmann's works and have added additional reports. In all, 48 species are listed in this catalog of Kansas cowbird hosts (two of these species have parasitism records from Missouri counties bordering Kansas). An appendix lists 43 species of birds which have bred in Kansas and which have been recorded as cowbird hosts other than in Kansas. Of this second group, 18 of these hosts are known to have reared cowbird young.

Two extensive studies of Brown-headed Cowbirds and their host community have been undertaken in Kansas. Hill's (1974, 1976) work in Ellis County during 1973 and 1974 was not available to Friedmann et al. (1977). Elliott's (1976, 1977, 1978, 1980) research in Riley County during 1974 and 1975 provided more information on cowbird biology. Another study that provides data on cowbird-host interactions is Platt's (1975) long series of Breeding Bird Censuses in Harvey County (from 1967 to 1975).

Table 1 lists those hosts most important in rearing cowbirds in Kansas. These species are generally common and widespread in Kansas, are frequently parasitized and have been reported to have reared cowbird young. Some of these species have a distribution-abundance pattern similar to the distribution-abundance pattern of the Brown-headed Cowbird. These species are likely to have had a long history of interaction with cowbirds.

Three of these common hosts have been subject to long term study in Kansas with some particular attention to their interaction with cowbirds: Barlow's (1962) study of Bell's Vireo in Douglas County during 1959 and 1960, Klaas' work with Eastern Phoebes from 1961 to 1965 (Klaas 1962, 1970, 1975) was also done in Douglas County, and Zimmerman's long term study of Dickcissels (Zimmerman 1966, 1982a, 1982b, 1983) in Riley and Geary counties.

Species Accounts

In the following accounts, mention of Friedmann refers primarily to his 1963 work with additional data from Friedmann (1971) and Friedmann et al. (1977). Often, not much more than "...Kansas..." appears in Friedmann's accounts but any specific citations he gave are included. In these species accounts I include total number of parasitism records

that Friedmann tabulated, the frequency with which the species has reared cowbird young (cf. Friedmann 1963:39-41), and the number of parasitism records known from Kansas. Friedmann (1963) frequently cited correspondence from Richard F. Johnston. Reference to these data are of nest card records compiled by Johnston in preparation of his publication on Kansas breeding birds (Johnston 1964).

Mourning Dove, *Zenaida macroura*. — Freidmann noted only 8 instances of Mourning Doves serving as cowbird hosts; 1 of these was from Kansas. This single instance was reported by Johnston from among 1010 nest records. Hill (1976) found no parasitized nests among 1023 dove nests he found in Ellis County.

Yellow-billed Cuckoo, *Coccyzus americanus*. — One of Friedmann's 6 records was from Kansas. This instance was described by Woods (1972).

Acadian Flycatcher, *Empidonax virescens*. — Friedmann listed 65 cases of parasitism of this species and "several" instances known of this flycatcher rearing cowbird young; an undetermined number of these were from Kansas. Linsdale (1928) reported 1 nest with a buried cowbird egg.

Eastern Phoebe, *Sayornis phoebe*. — This phoebe is a commonly reported host which "frequently" rears cowbirds; of 600 records gathered by Friedmann, more than 126 were from Kansas. In his work on cowbird-phoebe interactions in Douglas County, Klaas (1962, 1970, 1975) found 105 of 457 phoebe nests were parasitized; phoebes reared 63 cowbird young from 149 eggs. In Ellis County 7 (of 68) nests were parasitized and 4 cowbirds reared from 10 eggs laid (Hill 1976, Schukman 1974). Friedmann presented Johnston's report of 8 of 79 phoebe nests parasitized, but these data may have included some of Klaas' observations.

Say's Phoebe, *Sayornis saya*. — Friedmann knew of only 9 instances of Say's Phoebe serving as cowbird hosts with 7 of these from Kansas. Observations from Ellis County add another parasitism record for Kansas with 1 of 37 nests parasitized (Hill 1976, Schukman 1974)

Eastern Kingbird, *Tyrannus tyrannus*. — Of the 24 host records known to Friedmann, 1 nest reared cowbird young. Friedmann mentioned Kansas as supplying some of these records. Guy Love collected a parasitized Eastern Kingbird set 1 July 1915 in Decatur County (WFVZ). Platt (1975) found 1 of 10 kingbird nests parasitized, but Hill (1974) noted none of 16 nests to be parasitized. Eastern Kingbirds are known to eject cowbird eggs (Rothstein 1975).

Horned Lark, *Eremophila alpestris*. — Friedman noted 36 cases of parasitism in this species and reported instances of Horned Larks rearing cowbirds. Some of these 36 records were from Kansas and Hill's (1976) work added 14 parasitized nests (of 31) to this total. Hill found 7 cowbird young reared from 24 eggs in these nests.

Barn Swallow, *Hirundo rustica*. — Only 9 instances of parasitism were listed by Friedmann; some of these were from Kansas. Friedmann referenced Wells' (1934) account which noted "several" cases of parasitism. Hill (1976) found no instance of parasitism among 284 nests.

Rock Wren, *Salpinctes obsoletus*. — Almost all (13) of Friedmann's 15 records of parasitism were from Kansas.

Carolina Wren, *Thryothorus ludovicianus*. — Only 2 of Friedmann's 19 parasitism records for Carolina Wrens were from Kansas. These were Johnston's 2 of 11 nests that were parasitized. Linsdale (1928) noted another parasitized nest. Carolina Wrens have reared cowbirds in 1 of Friedmann's 19 cases.

Eastern Bluebird, *Sialia sialis*. — Friedmann recorded 50 cases of parasitism; 1 (a report by Wells 1934) was from Kansas.

Wood Thrush, *Hylocichla mustelina*. — The Wood Thrush is another commonly recorded cowbird host. Friedmann reported 216 records with "several" instances of thrushes rearing cowbird young. At least 6 of these records were from Kansas; Johnston reported 6 of 28 nests were parasitized. Additional Kansas records are noted in Linsdale (1928),

Lowther (1977) and Lowther and Johnston (1977).

American Robin, *Turdus migratorius*. — Friedmann knew of 44 records of robins serving as hosts. Some Kansas records add to this total. Elliott (1978) found 2 of 5 nests parasitized; and Lowther (1981) observed a robin feeding an out-of-nest cowbird young over a period of 12 days. American Robins will usually eject cowbird eggs (Rothstein 1975)

Gray Catbird, *Dumetella carolinensis*. — Friedmann knew of 39 instances of cowbird parasitism of catbirds with 2 records of catbirds rearing cowbird young. Mengel and Jenkinson (1970) provided the only Kansas record in Friedmann's accounts. To this total I (Lowther 1980) added 4 instances of catbirds rearing cowbirds to the Kansas catalog. Gray Catbirds usually eject cowbird eggs (Rothstein 1975).

Northern Mockingbird, *Mimus polyglottos*. — Of Friedmann's 8 records, Johnston's report of 1 of 49 nests parasitized, was the only Kansas instance of cowbirds parasitizing mockingbirds.

Brown Thrasher, *Toxostoma rufum*. — Friedmann recorded 79 instances of parasitism of this species which has reared cowbirds "several" times. He knew of 8 Kansas records, including Mengel and Jenkinson (1970) and Elliott (1978). Elliott found 3 of 8 nests parasitized and 1 cowbird young was reared from 6 cowbird eggs. Hill (1976) adds 3 more Kansas records (out of 49 nests he found). Two parasitized egg sets (one each in the Field Museum, Chicago, and in the Museum of Natural History, University of Kansas) add to Friedmann's total. Brown Thrashers are known to usually eject cowbird eggs (Rothstein 1975).

White-eyed Vireo, *Vireo griseus*. — Friedmann listed 59 cases of parasitism of this vireo which has "frequently" reared cowbirds. An undetermined number of these records were from Kansas. Wells (1934) noted parasitism of this species and Johnston (1964) listed this vireo as "conspicuously" parasitized.

Bell's Vireo, *Vireo bellii*. — Friedmann noted about 25 Kansas records out of his total of 147 cases of parasitism of Bell's Vireo, a species that "infrequently" rears cowbird young. Garrette (1889) gave an old record. Barlow (1962) in his studies in Douglas County, found 24 of 35 nests parasitized but none of the 33 cowbird eggs in these nests produced young that left the nest. Records in Hill (1976) and Lowther and Johnston (1977) add 2 more parasitized nests to Friedmann's total. Half of the 6 parasitized egg sets in the museum material I have seen are additions to Friedmann's total.

Yellow-throated Vireo, *Vireo flavifrons*. — Perhaps only Goss' (1884) observation contributed a Kansas recorded to Friedmann's total of 117 cases of parasitism. Yellow-throated Vireos have "frequently" reared cowbird young.

Red-eyed Vireo, *Vireo olivaceus*. — Red-eyed Vireos are very commonly recorded as cowbird hosts. Friedmann knew of more than 875 records of parasitism of this vireo which "frequently" rears cowbirds. Only a few of these records were from Kansas. Two egg sets and Linsdale's (1928) record of a parasitized nest were the only Kansas records I could find.

Northern Parula, *Parula americana*. — Friedmann mentioned only 12 parasitism records, none of which were from Kansas. However, Johnston (1964) listed this species as a Kansas host.

Yellow Warbler, *Dendroica petechia*. — Yellow Warblers are one of the two most commonly recorded cowbird hosts in Friedmann. Friedmann noted abou 1300 parsitism records of this warbler which "frequently" rears cowbird young; "Kansas" was merely mentioned in his account. Yellow Warblers are on Johnston's (1964) list. The closest specific records I found were of egg sets taken in Jackson County, Missouri.

Prairie Warbler, *Dendroica discolor*. — One record (Rising 1964, 1965) of Friedmann's 35 instances of parasitism is from Kansas. This warbler has reared cowbird "several" times.

Black-and-White Warbler, *Mniotilta varia*. — This warbler is on Johnston's (1964) host list, and this Kansas source contributed to some of Friedmann's 40 records. Black-and-white Warblers have reared cowbirds "several" times.

[Prothonotary Warbler, *Protonotaria citrea*. — Although none of Friedmann's 54

records were from Kansas, the Museum of Natural History at the University of Kansas, has 1 parasitized set from bordering Jackson County, Missouri (Lowther 1977).]

Louisiana Waterthrush, *Seiurus motacilla*. — Friedmann has 86 records of this warbler which has "frequently" reared cowbirds. Some of these instances were from Kansas since Johnston (1964) includes this species in his host list.

Kentucky Warbler, *Oporornis formosus*. — Some of Friedmann's 150 cases of parasitism were from Kansas. Kentucky Warblers have reared cowbirds "several" times.

Common Yellowthroat, *Geothlypis trichas*. — Yellowthroats have been commonly recorded as cowbirds hosts. Friedmann has more than 300 instances and he recorded yellowthroats as "frequently" rearing cowbird young. The few Kansas records included Linsdale (1928), Johnston's (1964) host list, Lowther and Stahmann-Lowther (1980).

Yellow-breasted Chat, *Icteria virens*. — Friedmann listed 183 cases of parasitism for the Yellow-breasted Chat and recorded chats as "frequently" rearing cowbirds. Only a few definite records are from Kansas (Peabody 1893, Linsdale 1928). The museum records I have seen show 4 parasitized egg sets.

Scarlet Tanager, *Piranga olivacea*. — Friedmann knew of 77 cases of parasitism of this tanager and reported "several" instances of Scarlet Tanagers rearing cowbirds. Lowther (1977) added 2 Kansas records to this total.

[Summer Tanager, *Piranga rubra*. — Friedmann listed only 19 records of parasitism of Summer Tanagers with "several" instances of them rearing cowbirds. No definite Kansas records exist but there are 2 parasitized egg sets from nearby Missouri (Lowther 1977).]

Northern Cardinal, *Cardinalis cardinalis*. — There were about 15 records of parasitism in Kansas out of Friedmann's total of 159. Cardinals have reared cowbirds "several" times. Old references and references adding to Friedmann's total include Elliott (1978), Hill (1976), Linsdale (1928, Lowther (1977) and Lowther and Johnston (1977).

Black-headed Grosbeak, *Pheuctius melanocephalus*. — Of Friedmann's 8 records, 2 were from Kansas.

Blue Grosbeak, *Guiraca caerulea*. — One nest of Friedmann's 66 cases of parasitism reared cowbirds. Elliott's (1978) study and 2 egg sets were the only definite records I found for this Kansas host.

Indigo Bunting, *Passerina cyanea*. — Indigo Buntings "frequently" rear cowbirds; few of Friedmann's 200 records are from Kansas. Johnston (1964) listed Indigo Buntings as "conspicuously" parasitized. Some specific references include Linsdale (1928), Lowther (1977) and Lowther and Johnston (1977).

Dickcissel, *Spiza americana*, — Dickcissels are indeed conspicuous Kansas hosts. Of Friedmann's total of 500 parasitism records, about 450 were from Kansas. Most of the Kansas total came from work by Zimmerman and his colleagues in Riley and Geary counties from 1965 to 1979. Zimmerman (1983) gave his most recent tabulation: of 620 nests studied, 430 were parasitized; and from 848 cowbird eggs, 153 young were reared by Dickcissels. Interim reports on this Kansas State University research include Zimmerman (1966, 1967, 1982a, 1982b), Elliott (1978), and Hatch (1975, 1983). Additional Kansas records are given by Fleischer (1981), Hill (1976), Linsdale (1928), Lowther (1977), Lowther and Cink (1979), Lowther and Stahmann-Lowther (1980), and Paul and Cink (1975).

Rufous-sided Towhee, *Pipilo erythrophthalmus*. — Friedmann listed 328 cases of parasitism of towhees and categorized them as "frequently" rearing cowbirds. A few of these records were from Kansas. Additional records include Hebert (1980), Lowther (1977) and Lowther and Johnston (1977).

Chipping Sparrow, *Spizella passerina*. — This species is another commonly recorded host, Friedmann has 877 records, that "frequently" rears cowbirds. Published Kansas records are few (Lowther and Rothstein 1980).

Field Sparrow, *Spizella pusilla*. — About 25 of Friedmann's 193 parasitism records are from Kansas. Field Sparrows have reared cowbirds "several" times. Platt (1975) found 19 of 35 Field Sparrow nests parasitized in Harvey County. Other Kansas records include

Lowther (1977) and Lowther and Johnston (1977).

Lark Sparrow, *Chondestes grammacus*. — Friedmann listed 70 parasitism records for this sparrow and 2 cases of this species rearing cowbird young. About 15 records were from Kansas. Johnston (1964) listed Lark Sparrows as "conspicuously" parasitized. Both nests found by Platt (1975) were parasitized and 9 of the 11 nests Hill (1976) found had a total of 16 eggs from which 11 young were reared.

Lark Bunting, *Calamospiza melanocorys*. — Friedmann listed only 15 instances of parasitism of Lark Buntings but 38 Kansas records can be added to this total. Hill (1976) found 22 of 142 nests parasitized and 1 young cowbird reared from 15 eggs that were monitored. Wilson (1976) found 16 parasitized nests of a total of 77 studied but no cowbirds were reared.

Grasshopper Sparrow, *Ammodramus savannarum*. — Friedmann noted only 28 records of parasitism of this sparrow. A total of 15 Kansas records included reports from Elliott (1978) with 9 of 18 nests parasitized and 1 cowbird reared from 14 eggs laid, and from Hill (1976) with 4 of 18 nests parasitized and 3 cowbirds reared from 5 eggs laid.

Henslow's Sparrow, *Ammodramus henslowii*. — None of Friedmann's 8 records of cowbird parasitism on Henslow's Sparrow were from Kansas. However, Hatch (1975, Zimmerman, pers. comm.) has added 2 Kansas records: these 2 nests received at least 4 cowbird eggs and produced 3 cowbird young.

Red-winged Blackbird, *Agelaius phoeniceus*. — More than 500 parasitism records were included in Friedmann's lists with about 80 of these from Kansas. Hill (1976) recorded 50 parasitized nests out of 228 in Ellis County. Other mention of redwings as cowbird hosts include Elliott (1978), Fleischer (1981), Lowther (1977, 1979), Lowther and Johnston 1977), Lowther and Stahmann-Lowther (1980), Platt (1975), Rising (1965), Zimmerman (1967). Johnston (1964) listed Red-winged Blackbirds as a "conspicuous" host. Friedmann (1963) quotes correspondence from L. R. Wolfe reporting a high proportion ("probably 90%") of redwing nests were parasitized in Decatur County during the early 1900s.

Eastern Meadowlark, *Sturnella magna*. — Friedmann noted 87 parasitism records of this species. Most of the Kansas reports derive from Elliott's (1978) study in Riley County in which 28 of 40 meadowlark nests were parasitized with 5 cowbirds reared from 86 eggs laid. Other mention of Eastern Meadowlarks as cowbird hosts are in Fleischer (1981), Lowther (1977) and Zimmerman (1967).

Western Meadowlark, *Sturnella neglecta*. — Hill's (1976) study added 2 parasitized nests (out of 29 found) to Friedmann's total of 24 parasitism records.

Common Grackle, *Quiscalus quiscula*. — Friedmann knew of only 12 records of grackle nests being parasitized. Fleischer (MS) added 1 Kansas record to this total: a nest found 9 May 1982 in Douglas County. Hill (1976) found no parasitized nests among the 79 he studied.

Orchard Oriole, *Icterus spurius*. — Friedmann listed 35 records and "several instances" of Orchard Orioles rearing cowbird young. Two Kansas studies add to Freidmann's work and make about 20 records known fromm Kansas. Hill (1976) found 8 of 15 oriole nests parasitized (with 1 cowbird reared from 3 eggs that were monitored). Platt (1975) found 6 of 13 nests parasitized. Both Elliott (1978) and Williams (1972) mentioned parasitism of this species.

Northern Oriole, *Icterus galbula*. — Friedmann gave 38 parasitism records and 3 instances of Northern Orioles rearing cowbirds. One of these records was from Kansas — an egg set taken by Guy Love 8 June 1912 in Decatur County. Northern Orioles usually will eject cowbird eggs (Rothstein 1977).

Pine Siskin, *Carduelis pinus*. — To Friedman's total of 14 records and 2 instances of siskins rearing cowbirds, about 50 Kansas records can be added. Rolfs et al. (1974) noted 26 of 67 nests parasitized and no cowbird young was known to survive past 5 days of age (of the 126 nests found in all, only 18 non-parasitized nests reared siskins). Hill's (1976) study, also in Ellis County, reported 28 of 51 nests parasitized.

House Sparrow, *Passer domesticus*. — One of Friedmann's 17 records of House Sparrows serving as cowbird host was from Kansas. This was a report by Woods (1972) of a sparrow nest in a bluebird box that was parasitized.

Table 1. Most common cowbird hosts in Kansas. The species listed here are commonly parasitized (see text for studies), are knopwn to have reared cowbird young (see Friedmann 1963 and Friedmann et al. 1977) and are abundant in Kanss (data from Zimmerman 1968, 1969, 1978). Based on mean number individuals seen per Breeding Bird Survey route for each state (Robbins and Van Velzen 1969. Van Valzen and Robbins 1971), I calculated Pearson product-moment corelation coefficients with the state-wise abundance pattern of Brown-headed Cowbirds.

Species	No. (%) parasitized nests in Kansas studies	Abundance in Kansas No./route	% of routes	Correlation with cowbird range
Eastern Phoebe	119 of 594 (20%)	1.5	55	0.086
Horned Lark	14 of 31 (45%)	30.5	100	0.175
Bell's Vireo	25 of 37 (68%)	0.9	38	0.333*
Northern Cardinal	——— ——	17.2	85 +	0.180
Dickcissel	430 of 620 (69%)	68.9	100	0.537**
Field Sparrow	19 of 35 (54%)	5.0	52	0.032
Lark Sparrow	11 of 13 (85%)	4.7	100	0.236
Grasshopper Sparrow	13 of 36 (36%)	16.4	85 +	0.589**
Red-winged Blackbird	55 of 240 (23%)	80.3	100	0.306*
Eastern Meadowlark	28 of 40 (70%)	51.9	85 +	0.223
Orchard Oriole	14 of 28 (50%)	7.9	100	0.091

*, $P < 0.05$; **$P < 0.01$

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Literature Cited

Barlow, J. C. 1962. Natural history of the Bell Vireo, *Vireo bellii* Audubon. Univ. Kansas Publ. Mus. Nat. Hist. 12:241-296.

Dolbeer, R. A., and R. A. Stehn. 1979. Population trends of blackbirds and starlings in North America, 1966-76. U. S. Dept. Int., Special Sci. Report, Wildlife No. 214.

Elliott, P. F. 1976. The role of community factors in cowbird-host interactions. Ph.D. dissertation, Kansas State Univ., Manhattan.

———. 1977. Adaptive significance of cowbird egg distribution. Auk 94:590-593.

———. 1978. Cowbird parasitism in the Kansas tallgrass prairie. Auk 95:161-167.

———. 1980. Evolution of promiscuity in the Brown-headed Cowbird. Condor 82:138-141.

Fleischer, R. C. 1981. Host-specificity and egg dispersion by the brood parasitic Brown-headed Cowbird. American Zool. 21:924. [abstract]

Freidmann, H. 1929. The cowbirds, a study in the biology of social parasitism. Charles Thomas Publ., Springfield, Illinois.

———. 1963. Host relations of the parasitic cowbirds. U. S. Nat. Mus. Bull. 233.

———. 1971. Further information on the host relations of the parasitic cowbirds. Auk 88:239-255.

———., L. F. Kiff, and S. I. Rothstein. 1977. A further contribution to knowledge of the host relations of the parasitic cowbirds. Smithsonian Contr. Zool. 235.

Garrette, A. O. 1889. Bell's Vireo. Oologist 6:169.

Goss, N. S. 1884. Notes on the nesting habits of the Yellow-throated Vireo (*Lanivireo flavifrons*). Auk 1:124-126).

Hatch, S. 1975. Growth of the Brown-headed Cowbird and hosts at Konza Prairie Research Natural Area in the Kansas Flint Hills. Unpubl. MS. NSF Undergrad. Res. Program, Kansas State University, Manhattan.

Hatch S. 1983. Nestling growth relationships of Brown-headed Cowbirds and Dickcissels. Wilson Bull. 95:669-671.

Herbert L. 1980. [Census] 219. Woodland along stream on prairie. American Birds 34:106.

Hill, R. A. 1974. Host-parasite relationships, summer movements, and population structure of the Brown-headed Cowbird in a prairie habitat of west-central Kansas. M.S. thesis, Fort Hays State Univ., Hays, Kansas.

———. 1979. Host-parasite relationships of the Brown-headed Cowbird in a prairie habitat of west-central Kansas. Wilson Bull. 88:555-565.

Johnston, R. F. 1964. The breeding birds of Kansas. Univ. Kansas Publ. Mus. Nat. Hist. 12:575-655.

Klaas, E. E. 1962. Nesting success and cowbird parasitism in the Eastern Phoebe. Kansas Orni. Soc. Bull. 13:17-19.

———. 1970. A population study of the Eastern Phoebe, *Sayornis phoebe*, and its social relationships with the Brown-headed Cowbird, *Molothrus ater*. Ph.D. dissertation, Univ. Kansas, Lawrence.

———. 1975. Cowbird parasitism and nesting success in the Eastern Phoebe. Occ. Papers, Mus. Nat. Hist., Univ. Kansas, No. 41.

Linsdale, J. M. 1928. Birds of a limited area in eastern Kansas. Univ. Kansas Sci. Bull. 28:517-626.

Lowther, P. E. 1977. Old cowbird breeding records from the Great Plains region. Bird-Banding 48:358-369.

———. 1979. Nest selection by Brown-headed Cowbirds. Wilson Bull. 91:118-122.

———. 1980. Gray Catbirds rear Brown-headed Cowbirds. Inland Bird Banding 52:29-30.

———. 1981. American Robin rears Brown-headed Cowbird. J. Field Orni. 52:145-147.

———. & C. L. Cink. 1979 [Census] 97. Floodplain tallgrass prairie. Ameri. Birds 33:80-81.

———. & R. F. Johnston. 1977. Influence of habitat on cowbird host selection. Kansas Orni. Soc. Bull. 28:36-40.

———.& S. I. Rothstein. 1980. Head-down or "preening invitation" displays involving juvenile Brown-headed Cowbirds. Condor 82:459-460.

———.& C. T. Stahmann-Lowther. 1980. [Census] 103. Floodplain tallgrass prairie. Amer. Birds 34:69.

Mayfield, H. 1965. The Brown-headed Cowbird, with new and old hosts. Living Bird 4:13-28.

Mengel, R. M., and M. A. Jenkinson. 1970. Parasitism by the Brown-headed Cowbird on a Brown Thrasher and a Catbird. Wilson Bull. 83:74-78.

Paul, J. T., [Jr.], and C. L. Cink. 1975. [Census] 103. Floodplain tallgrass prairie. Amer. Birds 29:1121.

Peabody, P. B. 1893. Chat and Cliff Swallow. Oologist 10:71-72.

Platt, D. R. 1975. Breeding birds of Sand Prairie Natural History Reservation, Harvey County, Kansas. Amer. Birds 29:1146-1151.

Rising, J. D. 1964. Prairie Warbler nesting in Cherokee County, Kansas. Kansas Orni. Soc. Bull. 15:26.

Rising, J.D. 1965. Summer birds from Cherokee County, Kansas. Kansas Orni. Soc. Bull. 16:9-14.

Robbins, C. S., and W. T. Van Velzen. 1969. The Breeding Bird Survey 1967 and 1968. U. S. Dept. Int., USF&WS, Spec. Sci. Rep., Wildl. No. 124.

Rolfs, M.E., C. A. Ely, J. K. Wilson, and R. A. Hill. 1974. Pine Siskin nesting in west-central Kansas. Kansas Orni. Soc. Bull. 25:26-28.

Rothstein, S. I. 1975. An experimental and teleonomic investigation of avian brood parasitism. Condor 77:250-271.

———. 1977. Cowbird parasitism and egg recognition of the Northern Oriole. Wilson Bull. 89:21-32.

Schukman, J. M. 1974. Comparative nesting ecology of the Eastern Phoebe (*Sayornis phoebe*) and Say's Phoebe (*Sayornis saya*) in west-central Kansas. M. S. thesis, Fort Hays State Univ., Hays, Kansas.

Van Velzen, W. T. 1972. Distribution and abundance of the Brown-headed Cowbird. Jack-Pine Warbler 50:110-113.

———.& C. S. Robbins. 1971. The Breeding Bird Survey, 1969. U. S. Dept. Int., USF&WS, Admin. Rep., 28 July.

Wells, W. 1934. Nesting notes of Kansas birds. Oologist 51:130-131.

Williams, F. 1972. Southern Great Plains. Amer. Birds 26:872-875.

Wilson, J. K. 1976. Nesting success of the Lark Bunting near the periphery of its breeding range. Kansas Orni. Soc. Bull. 27:13-22.

Woods [= R. Sutherland]. 1972. Two cowbird hosts new to Kansas. Kansas Orni. Soc. Bull. 23:14-15.

Zimmerman, J. L. 1966. Polygyny in the Dickcissel. Auk 83:534-546.

———. 1967. [Census 85] Grassland. Audubon Field Notes 21:667.

———. 1968. Kansas Breeding Bird Survey for 1967. Kansas Orni. Soc. Bull. 19:9-13.

———. 1969. Kansas Breeding Bird Survey for 1968. Kansas Orni. Soc. Bull. 20:13-16.

———. 1978. Ten year summary of the Kansas Breeding Bird Survey: An overview. Kansas Orni. Soc. Bull. 29:26-31.

———. 1982. Nesting success of Dickcissels (*Spiza americana*) in preferred and less preferred habitats. Auk 99:292-298.

———. 1982. The density dependent impact of cowbird parasitism on Dickcissels. Bull. Eco. Soc. Amer. 63:107.

———. 1983. Cowbird parasitism of Dickcissels in different habitats and at different nest densities. Wilson Bull. 95:7-22.

Appendix

List of species recorded as cowbird hosts (Friedmann 1963, Friedmann et al. 1977) which breed in Kansas but have not been recorded as hosts in Kansas. Species known to have reared cowbird young are indicated by an *.

Blue-winged Teal, *Anas discors*; Ferruginous Hawk. *Buteo regalis*; Killdeer, *Charadrius vociferus*; Upland Sandpiper, *Bartramia longicauda*; Spotted Sandpiper, *Actitis macularia*; Wilson's Phalarope, *Phalaropus tricolor*; Black-billed Cuckoo, *Coccyzus erthropthalmus*; Ruby-throated Hummingbird, *Archilochus colubris*; Red-headed Woodpecker, *Melanerpes erthrocephalus*; Western Kingbird, *Tyrannus verticalis*; *Scissor-tailed Flycatcher, *Tyrannus forficatus*; *Willow Flycatcher, *Empidonax traillii*; *Eastern Wood-Pewee, *Contopus virens*; *Western Wood-Pewee, *Contopus sordidulus*; *Tree Swallow, *Tachycineta bicolor*; Bank Swallow, *Riparia riparia*; Cliff Swallow, *Hirundo pyrrhonota*; Purple Martin, *Progne subis*;

Blue Jay, *Cyanocitta cristata*; American Crow, *Corvus brachyrhynchos*; *Black-capped Chickadee, *Parus atricapillus*; Carolina Chickadee, *Parus carolinensis*; Tufted Titmous, *Parus bicolor*; White-breasted Nuthatch, *Sitta carolinensis*; *House Wren, *Troglodytes aedon*; *Bewick's Wren, *Thryomanes bewickii*; Sage Thrasher, *Oreoscoptes montanus*; *Blue-gray Gnatcatcher, *Polioptila caerulea*; *Cedar Waxwing, *Bombycilla cedrorum*; Loggerhead Shrike, *Lanius ludovicianus*; *Warbling Vireo, *Vireo gilvus*; Prothonotary Warbler, *Protonotaria citrea*; *Hooded Warbler, *Wilsonia citrina*; *Bobolink, *Dolichonyx oryzivorus*; Yellow-headed Blackbird, *Xanthocephalus xanthocephalus*; *Rose-breasted Grosbeak, *Pheucticus ludovicianus*; *Lazuli Bunting, *Passerina amoena*, *Painted Bunting, *Passerina ciris*; Cassin's Sparrow, *Aimophila cassinii*; *Chestnut-collared Longspur, *Calarius ornatus*; *American Goldfinch, *Carduelis tristis*; Red Crossbill, *Loxia curvirostra*.

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HEMATOLOGICAL CHARACTERISTICS OF THE SERUM OF THE ROCK DOVE

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While earlier studies of the blood components of birds generally were restricted to one or a few constituents (Nice et al. 1935, Sturkie 1954, 1976, Welty 1982), more recent investigations have been more comprehensive (Driver 1981, Gee et al. 1981, Franson 1982, Rosskopf et al. 1982, Parrish and Mote 1984). The measurement of more components from the same bird during sampling permits the accumulation of more reliable, and presumably less variable, data. The serum components of the Rock Dove (*Columba livia*), a domestic pigeon, were analyzed to determine whether pigeons have blood chemical levels similar to more recently evolved birds such as the House Sparrow (*Passer domesticus*) or whether these levels are more like those of more primitive orders of birds.

Materials and Methods

Five male and five female Rock Doves (one to five years olds), which had been maintained in a loft by Workman for the last five years, were used in the study. The pigeons were maintained outdoors between 5 to 30C at natural autumn photoperiods, and given free access to good-quality grit, water and Purina Pigeon Chow (approx. 16% protein).

Serum constituents were measured by an Abbott VP Bichromatic Analyzer according to methods previously described (Parrish and Mote 1984). Blood samples (about 3 ml) were obtained by cardiac puncture between 13:00-15:00, 8 - 13 November 1983; separated serum samples were refrigerated and assayed within six hours after collection. Because of the exceptionally high serum enzyme levels found in the pigeons, serum samples were diluted to place the assay results within the limits of sensitivity of the Abbott Analyzer. The final enzyme levels were then calculated based upon the dilution required.

Results and Discussion

Since the serum chemical levels were not significantly different between the male and female pigeons, the data were combined (Table 1). The results showed that total protein levels in the pigeons were about one-fourth those found in both primitive and more recently evolved birds (Dabrowski 1966, Balasch et al. 1973, Driver 1981, Gee et al. 1981, Rosskopf

et al. 1982, Parrish and Mote 1984). The pigeon's albumin (A) levels also were about 25 to 50% of those of all other birds (Dabrowski 1966, Balasch et al. 1973, Driver 1981, Gee et al. 1981, Rosskopf et al. 1982, Parrish and Mote 1984). Serum globulin (G) levels, in contrast were only appreciably lower than those found in the primitive anseriforms (Gee et al. 1981), and the more recently evolved corvids (Dabrowski 1966) and passerids (Parrish and Mote 1984). The resultant A/G ratio of the pigeons was similar only to those of the more recently evolved passerines (Dabrowski 1966, Parish and Mote 1984). Serum calcium levels were like those previously reported in reproductively quiescent hens (*Gallus gallus*) (Sturkie 1976:322), pigeons (Welty 1982:165) and sparrows (Parrish and Mote 1984).

Table 1. **The levels of serum components and enzyme activities in Rock Doves**

Serum component (units)	No.[a]	Mean ± SE
Total protein (g/dl)	10	2.99 ± 0.13
Albumin (g/dl)	10	1.05 ± 0.07)
Globulin (g/dl)	10	1.94 ± 0.10
Albumin/globulin ratio	10	0.54 ± 0.03
Calcium (mg/dl)	10	8.36 ± 0.43
Cholesterol (mg/dl)	10	297.80 ± 15.36
Glucose (mg/dl)	10	409.70 ± 14.75
Blood urea (mg/dl)	10	7.68 ± 0.51
Blood uric acid (mg/dl)	10	11.43 ± 0.57
Bilirubin (mg/dl)	10	1.28 ± 0.07
Alkaline phosphatase (U/L)	10	566.30 ± 46.90
Creatine phosphokinase (U/L)	10	61858.5 ± 9657.7
Lactate dehydrogenase (U/L)	10	4089.4 ± 468.3
Glutamate-oxalacetate transaminase (U/L)	10	3451.8 ± 612.5

[a]Five male and female birds used for each determination.

Serum total cholesterol levels were similar to those which have been reported in hypercholestermic strains of atherosclerotic pigeons (Wartman and Connor 1973, Subbiah and Siekert 1979). They also were similar to those found in normal cockerels (Van Tienhoven 1983:180) and female House Sparrows (Parrish and Mote 1984). The data thus suggest that high cholesterol levels may be typical of birds.

The pigeons were found to be markedly hyperglycemic when compared with most other birds except the House Sparrow (Parrish and Mote 1984) and the Masked Northern Bobwhite (*Colinus virginianus*) (Gee et al. 1981). It is possible that the high glucose levels may have occurred because the pigeons were normally fed about noon each day, which also may have contributed to the elevated levels of urea in the pigeons. While urea was similar only to the levels reported in falconiforms (Gee et al. 1981), uric acid concentrations were near those which have been shown in other birds (Gee et al. 1981), except the almost twice-greater levels seen in House Sparrows (Parrish and Mote 1984).

Total bilirubin levels in the pigeons were 2 to 9-fold greater than reported in more primitive species of birds (Gee et al. 1981), but near the same levels reported in the more recently evolved House Sparrow (Parrish and Mote 1984). The high levels of bilirubin in the sparrows may be due to the more than twice higher densities of erythrocytes in sparrows (Nice et al. 1935) than in larger, primitive birds. This does not appear to be a possible cause in the pigeons, since they have about the same number of red blood cells as do primitive birds (Gee et al. 1981, Powell 1983). Surprisingly, however, pigeons have one of the highest hematocrits of all birds (Sturkie 1976, Powell 1983). Therefore, it is

likely that the relatively low erythrocyte count is counterbalanced by the much higher hematocrit of the pigeon. Thus, the net result is that pigeons have an exceptionally higher bilirubin level than other birds with similar levels of red blood cells because pigeon red blood cells likely are larger and, thus, perhaps more fragile and with a shorter life span, compared to those of other birds (Powell 1983).

The serum enzyme levels in the pigeons exceeded those determined in all other birds by several orders of magnitude (Driver 1981, Gee et al. 1981, Franson 1982, Rosskopf et al. 1982, Parrish and Mote 1984). The reason for the exceptionally high enzyme activities is not known. It is possible that the greater inbreeding that is typical of domestic pigeons may be partly the cause. In addition, the state of health of the birds may have been a factor, although all of the birds appeared to be in excellent health. Whether the fact that the blood samples were taken shortly after the birds were fed was a contributing factor remains to be determined as well.

The combined data clearly indicate that blood chemical levels in the pigeon are simiarly in may respects to those of the more primitive birds (Driver 1981, Gee et al. 1981, Franson 1982). In contrast, the A/G ratio and the markedly high levels of glucose, cholesterol and bilirubin of the pigeon are more characteristic of the more recently evolved passerines (Parrish and Mote 1984). These results might have been anticipated since the Columbiformes are placed in an intermediate position between the primitive and the most recently evolved birds. While more of the serum chemical levels are near those previously reported in birds, the cause for the strikingly high serum enzyme levels still remains unanswered. In spite of the problems associated with the enzyme activities in the pigeons, the data for the other serum components are considered to be valid and should serve as a reference for future physiological work with this bird.

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Literature Cited

Balasch, J., L. Palacios, S. Musquera, J. Palomeque, M. Jiminez and M. Alemany. 1973. Comparative hematological values of several galliformes. Poultry Sci. 52:1531-1534.

Dabrowski, Z. 1966. Electrophoretic studies of blood serum proteins of birds of the crow family (Corvidae). Acta Biol. Cracoviensio, Ser. Zool. 9:259-275.

Driver, E. A. 1981. Hematological and blood chemical values of the Mallard, *Anas p. platyrhynchos*, drakes before, during and after remige molt. J. Wildl. Dis. 17:413-421.

Franson, J. C. 1982. Enzyme activities in plasma, liver and kidney of Black Ducks and Mallards. J. Wildl. Dis. 18:481-486.

Gee, G. F., J. W. Carpenter and G. L. Hensler. 1981. Species differences in hematological values of captive cranes, geese, raptors, and quail. J. Wildl. Manage. 45:463-483.

Nice. L. B., M. Nice, and R. M. Kraft. 1935. Erythrocytes and hemoglobin in the blood of some American birds. Wilson Bull. 47:120-124.

Parrish, J. W. and M. L. Mote. 1984. Serum chemicals levels in captive female House Sparrows. Wilson Bull. 96:138-143.

Powell, F. L. 1983. Circulation, pp. 97-116 *in* M. Abs (Editor), Physiology and Behavior of the Pigeon. Academic Press, N.Y.

Rosskopf, W. J., R. W. Woerpel, G. Rosskopf and D. Van de Water. 1982. Hematologic and blood chemistry values for common pet avian species. Vet. Med./Small Anim. Clin. 77:1233-1239.

Sturkie, P. D. 1954. Avian Physiology. Comstock Publishing Assoc. Ithaca, N.Y. 423pp.

——— . (Ed.). 1976. Avian Physiology, 3rd Edition. Springer-Verlag, N.Y. 400p.

Subbiah, M. T. R. and R. G. Siekert, Jr. 1979. Dietary restrictions and the development of atherosclerosis. Br. J. Nutr. 42:1-6.

Van Tienhoven, A. 1983. Reproductive Physiology of Vertebrates, 2nd Edition. Cornell University Press, Ithaca, N.Y. 491p.

Wartman, A. M. and W. E. Conner. 1973. The cholesterol balance and turnover in genetically hypercholesterolemic pigeons: their response to treatment with a hypercholesterolemic drug, cholestane-3B,5a,6B-triol. J. Lab Clin. Med. 82:793-808.

Welty, J. C. 1982. The Life of Birds, 3rd Edition. Saunders, N.Y. 745p.

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