

FURTHER INFORMATION ON THE HOST RELATIONS OF THE PARASITIC COWBIRDS

HERBERT FRIEDMANN

THIS paper brings together a number of recent records involving additional hosts of some of the species of cowbirds, and some that amplify earlier data on previously known victims. Some of these have been gathered from the widely scattered literature of the past few years; others are unpublished records generously made available to me by their reporters. The most important single source of new data is the material collected in Oaxaca, Mexico, in 1966 by the late J. Stuart Rowley, who suggested that I use his records and add to them any other information that I might have. At this time I wish to pay my respects to this indefatigable and enthusiastic field worker, whose tragic and untimely death in Oaxaca cut short further contributions to our knowledge of Mexican birds. All the eggs, nests, and birds Rowley collected are in the museum of the Western Foundation of Vertebrate Zoology, under whose auspices his field work was accomplished. A number of other interesting records in the collection of the Western Foundation, kindly called to my attention by Lloyd F. Kiff, are also included in this report. I am indebted to the Western Foundation, and particularly to its president, Ed N. Harrison, for permission to utilize Rowley's new information and these other records in this paper. For still other host data I am indebted to the Pacific Nest Records Scheme at the University of British Columbia and the North American Nest-Record Program at Cornell University.

The details that follow are best treated separately for each of the three species of parasitic cowbirds involved. No new information has come to my attention for the other two species (*Molothrus rufoaxillaris* and *Psomocolax oryzivorus*).

1. BROWN-HEADED COWBIRD (*Molothrus ater*)

The information brought together in this paper adds 15 kinds of birds to the list of hosts of the Brown-headed Cowbird, bringing the total to 214 species, or 350 species and subspecies. In addition, some hosts, previously reported for certain of the races of the parasite, have been found to serve as victims for other races as well. For the nominate race of the parasite there are 3 new host records, 13 for the northwestern race *artemisiae*, and 7 for the small, southwestern race, *obscurus*. These are listed below by the race of cowbird involved; those that are new to the total host catalog of the species are indicated by an asterisk.

For the purposes of the present paper the nomenclature and the sequence

of the species and subspecies of the hosts follow the arrangement in the fifth edition (1957) of the A.O.U. "Check-list of North American birds." No attempt has been made to redetermine subspecies of hosts for individual records in the light of systematic revisions issued since that standard reference, as there is no certainty which of these proposed changes may be adopted in the sixth edition, now in preparation, and the biological significance of such changes would be slight at best.

1. New hosts for *Molothrus ater ater*:

Contopus sordidulus veliei *Vireo griseus griseus**
Poliophtila caerulea amoenissima

2. New hosts for *Molothrus ater artemisiae*:

Empidonax difficilis *Regulus satrapa amoenus**
*Contopus sordidulus saturatus** *Vireo huttoni huttoni*
Hirundo rustica erythrogaster *Vermivora celata orestera**
Iridoprocne bicolor *Seiurus noveboracensis limnaeus**
Corvus brachyrhynchos brachyrhynchos *Wilsonia pusilla pileolata**
*Thryomanes bewickii calophonus** *Zonotrichia leucophrys gambelii**
*Myadestes townsendi townsendi**

3. New hosts for *Molothrus ater obscurus*:

*Campylorhynchus jocosus** *Icterus pustulatus pustulatus**
*Poliophtila caerulea nelsoni** *Aimophila ruficeps eremoeca**
*Poliophtila albiloris vanrossemi** *Junco oregonus thurberi**

Furthermore 17 species, known from earlier data only as birds in whose nests cowbird eggs had been reported, have recently been found to raise the young parasites. In other words, they have been found to be true fosterers, not merely passive victims. These are:

<i>Empidonax oberholseri</i>	<i>Wilsonia pusilla</i>
<i>Contopus sordidulus</i>	<i>Passerina amoena</i>
<i>Eremophila alpestris</i>	<i>Carpodacus purpureus</i>
<i>Hirundo rustica</i>	<i>Pipilo fuscus</i>
<i>Thryomanes bewickii</i>	<i>Ammodramus savannarum</i>
<i>Salpinctes obsoletus</i>	<i>Passerherbulus caudacutus</i>
<i>Limnothlypis swainsonii</i>	<i>Chondestes grammacus</i>
<i>Parula americana</i>	<i>Calcarius ornatus</i>
<i>Dendroica coronata</i>	

These bring the total number of species known to have reared cowbirds to 121 out of the 214 species known to be victimized. The number is bound to grow as more data become available.

Although the present paper deals only with host relations, reference may be made to the significant results announced by the two McGeens (1968). In the Otter Lake area, Michigan, they found that some Brown-headed

Cowbird females specialized on certain host species; one hen laid 18 eggs, each in a nest of the Yellow Warbler in an area of 35 acres. On the other hand 19 eggs of another presumed single female were laid in nests of three species of hosts. The McGeens found that a single hen cowbird may cover from 12 to 40 acres, with a probable average of 25 acres. A great amount of overlapping of ranges of different hen cowbirds did occur. It seemed that the density of cowbird population was determined by, or at least related to, the number of host nests available per female parasite.

The McGeens further found that the laying cycle varied from year to year with the host cycles. Their meticulous egg data from the study area around Otter Lake suggested single female cowbird cycles of 18, 19, and 25 eggs in 4, 5, 6, and 7 clutches, over periods of 40, 41, and 70 days. Further detailed studies such as these will undoubtedly provide a more critical and more meaningful approach to the whole parasite-host relationship.

In the following annotated list only those species are discussed that are either new hosts for one or more of the subspecies of the Brown-headed Cowbird, or are hosts whose relations to the parasite have been clarified or made better known by information received since my 1963 compilation and my 1966 addendum to it.

SPOTTED SANDPIPER (*Actitis macularia*).—A second record of this most unlikely victim comes from the Bear River Refuge, Boxelder County, Utah, where M. F. Baker found an egg of the Brown-headed Cowbird in a Spotted Sandpiper's nest on 2 June 1968. The previous record was from Edmonton, Alberta; both involve the north-western race of the cowbird, *M. a. artemisiae*.

MOURNING DOVE (*Zenaidura macroura*).—The Mourning Dove can only be regarded as an unusual victim of the Brown-headed Cowbird even though there are now half a dozen recorded instances of parasitized nests. All the earlier records that were accompanied by definite data referred to the nominate races of both the dove and the cowbird. A single, undocumented statement in the literature noted that the western race of the dove (*Z. m. marginella*) had once been found to be parasitized by the northwestern race of the cowbird (*M. a. artemisiae*), but there are now two definite cases. A nest of the western Mourning Dove containing a cowbird's egg in addition to one of its own, was found in Brookside Cemetery, Winnipeg, Manitoba, on 15 June 1965 by McNicholl (1968). Buckle (1969) reported another at Lady Lake, Saskatchewan.

Inasmuch as the Mourning Dove is ill-adapted as a potential host for the cowbird, it is not particularly important to know whether or not it can discriminate between its own eggs and those of the parasite. Yet Holcomb (1968) made such a study and found the doves were tolerant toward alien eggs introduced into their nests, but in the usually rapid mode of departure with which doves are apt to leave their nests, they may inadvertently knock off, or push out, their eggs.

McNicholl found that the cowbird's egg in the case cited above disappeared 2 days after it was first seen in the nest, and suggested that "since the nest was a flat platform of twigs, the cowbird egg, which is rounder than a dove's egg, could conceivably have rolled out when the adult dove took flight."

YELLOW-BILLED CUCKOO (*Coccyzus americanus*).—This is a rarely used victim of the

Brown-headed Cowbird. To the three cases previously known to me (Friedmann, 1963: 48) may now be added two more. A set of one egg of the Yellow-billed Cuckoo and one of the cowbird, taken at Penfield, Michigan, 28 May 1899 by E. A. Arnold, is now in the collection of the Western Foundation of Vertebrate Zoology. The other, a parasitized nest found at Ambler, Montgomery County, Pennsylvania, 30 April 1912 by A. Benners, is now in the collections of the Rockbridge Alum Springs Biological Laboratory, Goshen, Virginia. This contained four eggs of the cuckoo and one of the Brown-headed Cowbird. For this information I am indebted to J. P. Hubbard.

BLACK-BILLED CUCKOO (*Coccyzus erythrophthalmus*).—Like the preceding species, the Black-billed Cuckoo is rarely parasitized, but was known (Friedmann, 1963: 48) to have been so affected on three occasions, once near Buffalo, New York, once in Maryland, and once in Laval County, Quebec. To these may now be added a fourth instance, a set of two eggs of the cuckoo with one of the Brown-headed Cowbird, taken in Middlesex County, Massachusetts, 2 June 1911 by R. I. Giles and now in the collections of the Rockbridge Alum Springs Biological Laboratory, Goshen, Virginia, according to information sent me by J. P. Hubbard.

DUSKY FLYCATCHER (*Empidonax oberholseri*).—This flycatcher was previously known as a cowbird victim on the basis of a single record from Mono County, California (Friedmann, 1966: 2). To this may now be added three more instances, one from near Spokane, Washington (Rogers, 1965), and two from British Columbia, one from Naramata, June 1966 (*ex* Cornell files) and one reported by Grant (1965). The last case involved a fledged young cowbird, which showed that the Dusky Flycatcher can and does rear the young parasite on occasion. It is too early to tell how frequently this host is selected, but there is no reason for thinking it may not be regularly affected.

WESTERN FLYCATCHER (*Empidonax difficilis*).—Previously known as a victim of the dwarf race of the cowbird (*M. a. obscurus*) in California, the Western Flycatcher is now known to be parasitized by the race *M. a. artemisiae* in British Columbia as well. In the nest records files at Cornell are three instances, all from Naramata, all in 1966, and all reported by Mr. and Mrs. L. A. Gibbard, 19 June, 29 June, and 16 July. Obviously in that region this flycatcher must be a frequent host choice of the parasite.

WESTERN WOOD PEWEE (*Contopus sordidulus*).—Tatschl (1967) observed a Western Wood Pewee attending and feeding a fledged young Brown-headed Cowbird at Cedar Crest, Sandia Mountains, north-central New Mexico, on 7 July 1963. This is the first record for this flycatcher as a host of the nominate race of the parasite (*M. a. ater*), and the first record for the flycatcher actually rearing a cowbird. Previously there were half a dozen records for this pewee as a victim of the other two races of the Brown-headed Cowbird. In all cases the host was of the subspecies *C. s. veliei*.

VERMILLION FLYCATCHER (*Pyrocephalus rubinus*).—A. W. O'Neil (in Webster, 1968) reported a nest of this flycatcher (subspecies *P. r. mexicanus*) in the Falfurrias area, southeastern Texas, containing two eggs of the host and two of the Brown-headed Cowbird (subspecies *M. a. obscurus*). This is only the second record for the north-eastern race of the Vermillion Flycatcher as a cowbird host, and the first in nearly a century. Inasmuch as southeastern Texas is an area where much bird observation has been carried on, this extreme paucity of records seems significant, especially when contrasted with the greater frequency with which the northwestern subspecies, *P. r. flammeus* has been reported as a cowbird victim in Arizona and in southern California. No obvious explanation for this difference can be suggested.

HORNED LARK (*Eremophila alpestris*).—Bailey and Niedrach (1965: 731) record a pair of Horned Larks attending and feeding a fledged young Brown-headed Cowbird

at Wildona, Colorado. The species was known from a number of earlier reports to be parasitized occasionally, but this is the first time it was found to rear the young cowbird. The lark in this instance was of the race *leucolaema*.

TREE SWALLOW (*Iridoprocne bicolor*).—The Tree Swallow was previously known as a very occasional victim of the Brown-headed Cowbird in Wisconsin (Friedmann, 1963: 59). Recently John Lane (in litt. 7 April 1967) informed me of a nest containing three eggs of the swallow and two of the cowbird found 30 miles west of Brandon, Manitoba, 18 June 1966. This is probably the same nest that was mentioned by W. Miller (1966). It is the first time this swallow has been reported as a victim of the northwestern race of the cowbird (*M. a. artemisiae*).

BARN SWALLOW (*Hirundo rustica erythrogaster*).—To the very few previous records of the Barn Swallow as a cowbird host may be added several more. Sutton (1967: 361) reported a nest with a single, nearly fledged cowbird as its sole occupant, found in Marshall County, Oklahoma, 30 June 1954, by C. C. Carpenter. This is the only time the Barn Swallow has been found to rear a young cowbird. Hatch (1968) reported two parasitized nests at Oak Lake, Manitoba, as well as a third Barn Swallow nest apparently taken over by a Slate-colored Junco, but containing only a young cowbird to which the junco repeatedly brought food. These Manitoba records are the first for the northwestern race of the Brown-headed Cowbird (*M. a. artemisiae*) with the Barn Swallow as the victim. The few earlier records were from Iowa, Maryland, and Pennsylvania, and involved nominate *M. a. ater*.

COMMON CROW (*Corvus brachyrhynchos*).—Previously reported as a victim of the eastern race of the Brown-headed Cowbird a single time near Buffalo, New York (Friedmann, 1963: 61–62), the crow has twice been found to be similarly affected by the northwestern form of the parasite (*M. a. artemisiae*). Shortt (1959) mentions a cowbird egg found in a crow's nest in 1958 by George Cotter, probably in Manitoba. Hatch (1967) found a nest containing four eggs of the owner and one of the cowbird half a mile east of Oak Lake, Manitoba, 5 June 1967. The nest was destroyed a week later. The nominate race of the crow is here involved. The crow is, of course, only an "accidental" host choice, and not a species likely to be a fosterer.

BEWICK'S WREN (*Thryomanes bewickii*).—Sutton (1967: 409) noted that Jean W. Graber observed an adult Bewick's Wren attending and feeding a fledged young Brown-headed Cowbird near Cogar, Caddo County, Oklahoma, on 15 May 1954. This is only the second time the typical race of this wren has been recorded in print as a cowbird host. There are four records for the race *cryptus* in Texas, and one for *altus* in Ohio. To these may be added a first one for *calophonus* in British Columbia (Mrs. W. J. Smith, in litt.). It is obvious from the sparsity and the geographic scattering of the records that Bewick's Wren is an infrequent host choice of the parasite.

BOUCARD WREN (*Campylorhynchus jocosus*).—The Boucard Wren may be added to the known hosts of the Brown-headed Cowbird. A nest containing three eggs of the host and one of the parasite (subspecies *obscurus*) was found by J. Stuart Rowley, 10 miles east of Oaxaca, Oaxaca, Mexico, on 5 May 1966.

ROCK WREN (*Salpinctes obsoletus*).—The Rock Wren (typical *obsoletus*) was previously known as a cowbird host in Kansas (13 records) and in Colorado (1 record). It may now be added that it has also been found to be parasitized in Oklahoma. Sutton (1967: 416) reported a parasitized nest found at Black Mesa, Cimarron County, Oklahoma, 13 May 1961. Also in Colorado, Bailey and Niedrach (1965: 731) report Rock Wrens feeding a fledged young cowbird; this is the first evidence that this species

can and does raise the young parasite, all other records being merely of cowbird eggs in nests of this wren.

TOWNSEND'S SOLITAIRE (*Myadestes townsendi*).—This thrush is an addition to the known victims of the Brown-headed Cowbird (subspecies *M. a. artemisiae*). The two records are both from British Columbia and both involve the nominate race of the solitaire and the northwestern race of the parasite. Rogers (1963) reported a parasitized nest at Vernon containing four eggs of the host and one of the cowbird. Grant (1965) also recorded the solitaire as a cowbird victim, but gave no precise data. The pertinent details have been supplied through the cooperation of Mrs. W. J. Smith from the files of the nest records scheme at the University of British Columbia as follows. The nest, containing three eggs of the solitaire and two of the Brown-headed Cowbird, was found at Mile 3, McNulty Creek Road, west of Hedley, British Columbia, 3,000 feet, on 30 July 1965. The lack of previous records for this bird as a cowbird victim cannot be interpreted as a result of insufficient observations on only a few nests of the solitaire. The species appears to be rarely imposed upon even where both it and the parasite are quite numerous. This was the experience of Paul (1964), who examined no fewer than 75 nests of this thrush, and was led to summarize that, "no solitaire nest, to my knowledge, has ever contained a cowbird egg, although there are usually some of these birds in the vicinity." It is not known if this usual immunity to parasitism is due to the vigilance of the solitaire or if its nests are not attractive to the parasite.

MOUNTAIN BLUEBIRD (*Sialia currucoides*).—The Mountain Bluebird was previously recorded as a victim of the Brown-headed Cowbird a single time, in Alberta. A second instance is a parasitized nest found at Okanagan Falls, British Columbia, 27 June 1964. This species is very rarely molested by the parasite, as the files of the Pacific Nest Records Scheme have data on some 115 other nests, none of which contained cowbird eggs.

BLUE-GRAY GNATCATCHER (*Polioptila caerulea*).—The subspecies *amoenissima* of the Blue-gray Gnatcatcher was previously known as a victim of two races of the Brown-headed Cowbird (*artemisiae* and *obscurus*), and has recently been found to be parasitized by typical *ater* as well, by Tatschl (1967) in Embudo Canyon, Sandia Mountains, north-central New Mexico.

The Mexican subspecies *P. c. nelsoni* is now known to be parasitized by the dwarf race of the Brown-headed Cowbird. J. Stuart Rowley collected a nest with three eggs of the host and one of the parasite, 10 miles east of Oaxaca, Oaxaca, Mexico, on 5 May 1966. Two northern races of this gnatcatcher, *caerulea* and *amoenissima*, are known to be not infrequent victims of all three races of the Brown-headed Cowbird.

BLACK-TAILED GNATCATCHER (*Polioptila melanura*).—The following notes have to do with the subspecies *P. m. lucida*. Taylor (1966) reported that of six nests of the Black-tailed Gnatcatcher found at Mesa, Arizona, four were parasitized by the Brown-headed Cowbird. This gives us the first definite indication as to the frequency with which this bird is victimized at times. Previously (Friedmann, 1963: 79) I knew of five other Arizona records and three from Mexico for this race of the gnatcatcher, and had only an undocumented statement from W. J. Sheffler to the effect that he had found parasitized nests in Arizona.

WHITE-LORED GNATCATCHER (*Polioptila albiloris*).—J. Stuart Rowley informed me that he collected a nest of this gnatcatcher containing two eggs of the host and one of the dwarf cowbird at El Zopilote, Oaxaca, Mexico, on 21 May 1966, now in the col-

lections of the Western Foundation of Vertebrate Zoology. This is the first record for this species as a molothrine victim; the record refers to the race *P. a. vanrossemi*.

GOLDEN-CROWNED KINGLET (*Regulus satrapa*).—The Golden-crowned Kinglet may be added to the list of victims of the northwestern race of the Brown-headed Cowbird in British Columbia. The two records are in the files at the University of British Columbia: a fledged young cowbird fed by a pair of these kinglets at Victoria, Elk Lake Park, 1 July 1960; and a young cowbird nearly ready to fly, in a nest at North Surrey, 4 June 1963.

RUBY-CROWNED KINGLET (*Regulus calendula*).—This little bird, one of the smallest birds parasitized by the Brown-headed Cowbird, is an uncommon choice of the parasite, but the number of records has increased to the point where it becomes impossible to look upon the kinglet as an unusual victim. Previously seven instances were known to me, five involving the eastern, nominate race of the kinglet, and two involving the western subspecies *R. c. cineraceus*. To these last two may be added two more: a nest with seven eggs of the kinglet and one of the cowbird collected by Ed N. Harrison at Twin Lakes, Mono County, California, 19 June 1944, and one with similar numbers of eggs reported by Grant (1965) from south-central British Columbia. In all the four cases now known involving the western Ruby-crowned Kinglet, the parasite was of the subspecies *M. ater artemisiae*. To the five instances involving the eastern nominate races, both of the kinglet and of the cowbird, may be added a sixth, related to me (in litt.) by James Bond, a nest with five eggs of the kinglet and one of the cowbird found on Mt. Desert Island, Maine, by Charles Platt, in the summer of 1969.

WHITE-EYED VIREO, (*Vireo griseus*).—The only reason for commenting here on this fairly frequent host is that the few records of it as a cowbird victim in southern Louisiana and in southern Alabama refer to the nominate race of the White-eyed Vireo. This subspecies, *V. g. griseus*, was inadvertently omitted from my 1963 list (p. 42), where it was treated together with *V. g. noveboracensis*.

HUTTON'S VIREO (*Vireo huttoni*).—To the eight records of this vireo as a cowbird host known to me earlier (Friedmann, 1963: 83) may be added a ninth, unusual in the large number of eggs involved and also in being the first record involving the northwestern race of the parasite (*M. a. artemisiae*). Baldrige and Crowell (1965) reported a nest found 5 miles from Medford, southern Oregon, containing no fewer than six eggs of the vireo and five of the cowbird. All the other records of typical *huttoni* as a victim involved the dwarf race of the parasite (*M. a. obscurus*).

SOLITARY VIREO (*Vireo solitarius*).—Although the Solitary Vireo was known previously as an infrequent victim of the Brown-headed Cowbird and in my 1963 summary (p. 86) I was able to report some 20 records, the instances were all sporadic, one at a time or single records from a place. It is therefore worth noting that Bailey and Niedrach (1965: 732) in one season (1961) located seven parasitized nests of this bird, apparently in one limited area, in Colorado. This is the first indication that this vireo is, at times, heavily parasitized. The Colorado records all refer to the subspecies *plumbeus* of the vireo.

SWAINSON'S WARBLER (*Limnothlypis swainsonii*).—This seldom observed warbler is an unimportant host in the general economy of the Brown-headed Cowbird, but the known instances of its being parasitized are slowly increasing. Recently Carter (1968; also in Parnell, 1968) found a nest in central Moore County, North Carolina, 19 May 1968, containing an egg of the cowbird as well as one of the warbler. Both eggs hatched and apparently both young birds were reared to the fledging stage. Meanley (1969) has published three additional instances of cowbird parasitism on Swainson's

Warbler, all found in May 1967 at Pendleton Ferry, Arkansas County, Arkansas. The very few (seven) previous records were from Oklahoma, West Virginia, and Mississippi, and were of eggs only, not of this warbler actually rearing the young cowbird. It now appears probable that in some areas, such as Arkansas and West Virginia (Sims and DeGarmo, 1948), this warbler is parasitized regularly, and that its apparent infrequency was based on very limited observation in the past.

ORANGE-CROWNED WARBLER (*Vermivora celata*).—To the single earlier record (Friedmann, 1963: 95) may be added two more, both from British Columbia, one involving a newly fledged cowbird chick attended by both members of the warbler pair at Victoria, 31 July 1960, and one of a cowbird egg in a nest of this species at Oliver, 4 June 1963.

BLACK-THROATED GRAY WARBLER (*Dendroica nigrescens*).—To the very few previous records of this warbler as a host of the Brown-headed Cowbird (two instances for *obscurus* and one for *artemisiae*) may be added two more, both from the nest records at the University of British Columbia, both involving recently fledged young of the parasite attended by the foster parents—Stanley Park, 17 August 1960, two young cowbirds, and Burke Mountain, Coquitlam, 25 July 1967, one fledgling.

HERMIT WARBLER (*Dendroica occidentalis*).—To the single previous record of this bird as a cowbird host may be added a second instance. Yocom (1968) noted a female Hermit Warbler feeding a recently fledged cowbird at Arcata, northwestern California, on 5, 13, and 15 July. The fact that this was observed repeatedly over a span of 11 days indicates that the warbler was the real foster parent and not a casual responder to the food call of the young parasite.

NORTHERN WATERTHRUSH (*Seiurus noveboracensis*).—The northwestern race of this relatively seldom used host, *S. n. linnaeus*, may be added to the host catalog of the Brown-headed Cowbird (race *artemisiae*). The files at the University of British Columbia contain one report of a pair of these warblers with a recently fledged cowbird at Kleene, British Columbia, 21 July 1965.

WILSON'S WARBLER (*Wilsonia pusilla*).—Gustafson (1966) observed one of these warblers feeding a recently fledged young Brown-headed Cowbird (*M. a. artemisiae*) west of Denver, Colorado. The local race of the warbler, *W. p. pileolata*, has not been reported previously as a victim of the Brown-headed Cowbird, although two other races, typical *pusilla* and *chryseola*, have been so noted a small number of times. This warbler had not been reported previously as raising the young parasite.

HOUSE SPARROW (*Passer domesticus*).—To the few, geographically scattered, previous records may be added two from the Detroit-Windsor area of Michigan (Kelley et al., 1963: 93–94.).

SCARLET-HEADED ORIOLE (*Icterus pustulatus*).—This oriole, previously known as a victim of the Bronzed Cowbird, may now be added to the list of birds parasitized by the Brown-headed Cowbird as well. J. Stuart Rowley collected a nest containing three eggs of the oriole (n nominate race) and three of the parasite (subspecies *M. ater obscurus*) at Cuernavaca, Morelos, Mexico, on 28 May 1959. This set is now in the collection of the Western Foundation of Vertebrate Zoology.

WESTERN Tanager (*Piranga ludoviciana*).—In the nest record files at the University of British Columbia are two reports of newly fledged young Brown-headed Cowbirds being attended and fed by Western Tanagers in British Columbia, one at Naramata, 2 June 1968, and one at Langley, 15 July 1968. There are only three earlier instances of parasitism on this host (Friedmann, 1963: 135).

PYRRHULOXIA (*Pyrrhuloxia sinuata*).—In view of the fact that until 1963 but six records of the Pyrrhuloxia as a cowbird victim were known to me, it is surprising to

find three additional instances from one locality—a few miles southeast of Premont, Jim Wells County, Texas, in 1967 and 1968, all reported by J. F. Boerjan to the nest record files at Cornell.

BLACK-HEADED GROSBEAK (*Pheucticus melanocephalus*).—A parasitized nest of this grosbeak was found at Penticton, British Columbia, 10 June 1967. The interest attached to this record is that it is the first one from the Pacific northwest. The nominate race *P. m. melanocephalus*, was previously known as a cowbird host from Montana, Utah, and Colorado, to Nebraska and Kansas. In light of the present information it appears that the Black-headed Grosbeak at Penticton is of the nominate race. The western *P. m. maculatus* has not been reported as a victim of the parasite.

BLUE GROSBEAK (*Guiraca caerulea*).—My 1963 report (pp. 139–140) mentioned the experience of Guy Love finding in Woods County, Oklahoma, five nests of the Blue Grosbeak parasitized by the cowbird, and suggested that this host was a frequently used victim in that area. This is further proved by Sutton's more recent (1967: 577) statement about this bunting in nearby Marshall County, where of 33 nests found no less than 20 contained cowbird eggs. Sutton further cites (*ex* an unpublished thesis on the comparative nesting success of certain Oklahoma birds, 1957) that six parasitized nests found in one season in a limited area contained 13 grosbeak eggs and 14 cowbird eggs; of these 5 grosbeak eggs and 6 cowbird eggs hatched, and 4 of each species survived to the fledging stage.

LAZULI BUNTING (*Passerina amoena*).—While this little bunting has been listed many times as a cowbird host, all the records were merely of eggs of the parasite in nests of this species. It is now known to rear the young cowbirds and to be truly a fosterer for the parasite. Rogers (1965) mentioned one of these buntings attending and feeding a fledged young cowbird near Baker, Oregon. Bailey and Niedrach (1965: 731, 751) reported similar observations in Colorado.

DICKCISSEL (*Spiza americana*).—New information on this frequent host of the Brown-headed Cowbird nearly doubles the number of records of parasitism and adds new dimensions to its effect. Previously (Friedmann, 1963: 143) about 55 such instances were known. Zimmerman's study of this species (1966) in Kansas adds 43 more, and more importantly it reveals a much higher frequency of parasitism than was previously known. Of 55 nests observed, 43, or 78 per cent, were parasitized, often by multiple cowbirds, and 16 per cent were lost because of cowbird parasitism. In one of two nests each of which eventually held eight cowbird eggs, no fewer than five were deposited during a single day.

Zimmerman found that the polygyny was very frequent in the Dickcissels he studied. Of the 55 nests he observed, 29 were of monogamously mated females, and 26 were of females mated to polygynous males. Cowbird parasitism was higher in the latter group than in the former, but it is not clear why this was so. Nest parasitism was 72 per cent in the monogamous, and 86 per cent in the polygynous nests.

PURPLE FINCH (*Carpodacus purpureus*).—Recently (1 July 1968) two fledged cowbird chicks were found being fed by a pair of Purple Finches in British Columbia. This is the first time this finch has been reported as raising the young parasite; all earlier records were of eggs only.

LARK BUNTING (*Calamospiza melanocorys*).—The Lark Bunting was previously known as a cowbird victim in North Dakota and Montana; it has recently been found to be parasitized in Saskatchewan as well. Smith and Smith (1966) found three parasitized nests at Regina, two with single eggs and one with three eggs of the cowbird. Cohen and Rever (1966) found another such case near Saskatoon. As noted in my 1963

summary (p. 153) a number of cases of cowbird eggs in nests of the Lark Bunting were reported prior to 1878, but only one since then. The present additional instances help to do away with the otherwise puzzling question as to whether the Lark Bunting had somehow become less frequently molested by the parasite than it was in earlier times.

LE CONTE'S SPARROW (*Passerherbulus caudacutus*).—Because of the scarcity of records of this sparrow as a cowbird host (see Friedmann, 1963: 155–156 for the data on the seven cases then known) six additional ones may be mentioned. Gollop et al. (1966) found a parasitized nest containing a recently hatched young of the host and one cowbird egg (*M. a. artemisiae*) about 10 miles southeast of Saskatoon, Saskatchewan, 24 July 1965. Murray (1969: 222–223) found five nests in two successive seasons in one area in North Dakota, all of which had cowbirds' eggs in them. The number of these eggs ranged from one to four per nest. In three of these five instances, Le Conte's Sparrow reared the young parasites to the fledging stage.

GRASSHOPPER SPARROW (*Ammodramus savannarum*).—Because of the difficulty usually experienced in finding the nests of this secretive sparrow and the small number (11) of earlier records, it may be worth noting that in the nest record files at Cornell are no fewer than seven additional instances, four from Nebraska and others from Kansas and North Dakota. In one case the cowbird was a young nestling nearly ready to leave the nest, the first evidence that the Grasshopper Sparrow is a true host and not merely a victim of the parasite.

LARK SPARROW (*Chondestes grammacus*).—The Lark Sparrow was previously known as a cowbird victim solely on the evidence of eggs of the latter in its nests. It has recently been noted as rearing the young parasite in Colorado by Bailey and Niedrach (1965: 731). The subspecies *strigatus* of the sparrow is here involved.

ROCK RUFIOUS-CROWNED SPARROW (*Aimophila ruficeps*).—Phillips (1968) correctly reidentified a report of a Brown-headed Cowbird egg in a nest of *Aimophila carpalis* from San Antonio, Texas, as really being *Aimophila ruficeps*, since the species *carpalis* does not occur in Texas. Although his discussion is given in his account of *A. ruficeps scottii*, his statement refers to the species and not to the race. The A.O.U. Check-list (1957: 600) places the Texas population of the Rufous-crowned Sparrow in the race *eremoeca*. The record is the first, and so far the only one for this sparrow as a cowbird victim.

BLACK-THROATED SPARROW (*Amphispiza bilineata*).—To the very few previous observations on this sparrow as a cowbird victim may be added seven additional instances, six from Texas and one from New Mexico, all in the files of the nest record card program at Cornell. From one to three cowbird eggs were found in these nests.

OREGON JUNCO (*Junco oreganus*).—De Groot (1967) found a nest of the race *J. o. thurberi* with one egg of the junco and one of the small southwestern race of the cowbird, *M. a. obscurus*, near Big Bear Lake, San Bernardino County, California, on 16 June 1966. This is the first record for *thurberi* as a cowbird host, although two other subspecies of this junco were previously known to be victimized by the Brown-headed Cowbird.

CLAY-COLORED SPARROW (*Spizella pallida*).—Although the Clay-colored Sparrow has been reported frequently as a victim of the Brown-headed Cowbird with about 50 known instances (Friedmann, 1963: 163), and has been recorded as rearing the young parasite occasionally, the recent study by Salt (1966) indicates that the members of this species are by no means uniform in their reaction to, or in their tolerance of, cowbird parasitism. In an area 12 miles southeast of Edmonton, Alberta, Salt had

under observation some 24 nests of the Clay-colored Sparrow, of which five or more were parasitized; "cowbirds were known to be responsible for the desertion of 4 nests . . . and were suspected of causing the desertion of others. . . . Clay-colored sparrows in this area did not tolerate parasitism by brown-headed cowbirds; in no instance was a cowbird's egg incubated by a clay-colored sparrow for as long as one day." Further evidence of diverse reaction to the parasite was noted in Saskatchewan, where Fox (1961) found that these sparrows accepted and incubated cowbird eggs laid in their nests, although in none of the cases under observation did any of these eggs reach the hatching stage.

WHITE-CROWNED SPARROW (*Zonotrichia leucophrys*).—This sparrow has been recorded as a cowbird victim infrequently, and these earlier instances have involved two races, *leucophrys* and *oriantha*. We may now add three cases involving the race *gambellii*, all from British Columbia: Ferguson Point at Stanley Park, 17 August 1960; Campbell River, 31 July 1967; and Burnaby, 2 May 1962. The first two of these records were of fledgling cowbirds attended by their foster parents, the third a cowbird egg in a nest of the White-crowned Sparrow. All these records are from the Pacific Nest Records Scheme at the University of British Columbia.

CHESTNUT-COLORED LONGSPUR (*Calcarius ornatus*).—Recently Smith and Smith (1966) reported two observations of cowbird parasitism on this longspur at Regina, Saskatchewan; one of a nest with two cowbird eggs with those of the host, and one of a pair of longspurs attending a fledged young cowbird. The second of these records gives us the first evidence that this species can, and does, rear the young parasite. Aside from this it may be pointed out that the total number of records that have come to my notice over many years is still small—only a single previous one from Canada, and less than ten from North Dakota.

2. SHINY COWBIRD (*Molothrus bonariensis*)

New information about this, the most widespread species of cowbird in the American tropics and subtropics, comes to light with discouraging slowness. In the 6 years since my 1963 compilation (pp. 199–215) only three new hosts have been reported, new to three races of the Shiny Cowbird. Even these involve only one species not previously known to be parasitized, although two others are subspecies new to the total host catalog. The paucity of new data about the more frequently imposed-upon fosterers reflects the lack of bird observers in South America, the continent with richest avifauna of any, and the least studied in the field. Exception should be made for the work of Hoy (reported by Hoy and Ottow, 1964), whose observational data was generously made available to me for inclusion in my 1963 report.

The northeastern race of the Shiny Cowbird (*M. b. minimus*) has been expanding its range northward in the past century in the islands of the West Indies. In so doing it cannot help but come into contact with new hosts, and particularly with hosts that have no previous experience with brood parasitism, and that, accordingly, have not developed any adaptive response to it. This lack of self-protective ethological mechanisms has

already had disastrous effects. Thus, Bond (1966) reported that the presence of the Shiny Cowbird in the Lesser Antilles has, "resulted in the near extinction of the Barbadian race of *Dendroica petechia*, and almost certainly has affected, or will affect, the status of other species whose breeding seasons are concurrent." This situation is somewhat similar to that of the Kirtland's Warbler in northern Michigan, which has become seriously affected by the recent intrusion there of the Brown-headed Cowbird. Yet in that species Mayfield (1965) found that annual censuses of the warbler revealed no decline in the decade 1951 to 1961, even though the species has no reservoir of population in any part of its limited breeding range that escapes cowbird parasitism.

On the other hand, it is true that nonhost-specific brood parasites, like the cowbirds, differ from most predators in not being density-dependent on any one host species. The situation now developing in the West Indies with the Shiny Cowbird will provide an interesting parallel to what transpired in the North American mainland with the spread of the Brown-headed Cowbird into eastern regions of the United States after numerous and extensive openings were cleared in the original forests for agriculture. Mayfield found that the small passerine birds of these eastern areas are tolerant of cowbird parasitism to a greater degree than are the birds of the western grasslands with long ancestral experience, which seems to have enabled them to react less receptively, less passively, to it.

At the present time the study of the host relations of the Shiny Cowbird in the West Indies is, of necessity, a matter of compiling as many observations as possible with the hope of eventually interpreting them in proper ecological and ethological perspective. Unfortunately, the paucity of resident observers in many of the islands will affect the rate at which data may be anticipated.

KISKADEE FLYCATCHER (*Pitangus sulphuratus*).—At Marienburg, Surinam, Havereschmidt (1968) found a nest of this bird with three eggs of the flycatcher and one of the Shiny Cowbird (subspecies *M. b. minimus*). This is the first time the nominate race of the kiskadee has been reported as a cowbird victim, and the first time the species has been found to be parasitized by the small race of the Shiny Cowbird. Previously two other subspecies of the flycatcher, *maximiliani* and *bolivianus* were known as hosts of typical *M. b. bonariensis*.

BUFF-BREASTED WREN (*Thryothorus leucotis*).—Skutch (1968) reported a nest of the nominate race of this wren at La Araguata, Carabobo, Venezuela, containing one feathered young wren and one less developed young Shiny Cowbird. The subspecies of the parasite in that area is *M. b. venezuelensis*. Previously this wren was known only as a victim of the larger race *M. b. cabanisi*.

BLUE AND YELLOW TANAGER (*Thraupis bonariensis*).—Johan Ottow informs me (in litt.) that Gunnar Hoy collected two parasitized nests of this tanager (subspecies *T. b. schulzei*) at Payogasta, 100 km southwest of Salta, Argentina, in January 1968. This

is the first record for the subspecies *schulzei* as a victim of the Shiny Cowbird. The nominate race of the tanager had been known previously to be parasitized in eastern Argentina.

ORIOLE-BLACKBIRD (*Gymnomystax mexicanus*).—To the single previous record of this blackbird as a victim of the Shiny Cowbird (*M. b. venezuelensis*) in Venezuela, may be added a second one, reported by Skutch (1967).

WARBLING FINCH (*Poospiza torquata pectoralis*).—This finch is added to the known victims of the nominate race of the Shiny Cowbird on the basis of a nest containing one egg of the parasite and three of the finch found in San Luis, Argentina, by de Masramon (1962).

3. BRONZED COWBIRD (*Molothrus aeneus*)

Following Parkes and Blake (1965) the Bronzed Cowbird is placed in the genus *Molothrus*, as none of the characters of the formerly recognized genus *Tangavius* seem to be trenchant. So far as our present disposition of data on the host-parasite relations are concerned, this generic placement has resulted in an unfortunately necessary change of the scientific name of the northwestern race of the Bronzed Cowbird from *mülleri* to *loyei*.

The new information on the parasitism of the Bronzed Cowbird includes seven kinds of birds new to its host catalogue, bringing the total up to 62 species, or 76 species and subspecies. All but three of the new victims involve the southwestern race of the cowbird, *M. aeneus assimilis*, and all of these stem from a single source, the field work in the state of Oaxaca, Mexico, in 1966 by J. Stuart Rowley. The others are hosts of the other two races of the Bronzed Cowbird.

These may be listed for ready reference, as follows:

1. New hosts for *M. a. aeneus*:
Zenaidura macroura carolinensis
2. New hosts for *M. a. loyei*:
Troglodytes brunneicollis cabanisi *Pyrrhuloxia sinuata sinuata*
3. New hosts for *M. a. assimilis*:
Campylorhynchus rufinucha humilis *Icterus pustulatus formosus*
Polioptila albiloris vanrossemi *Piranga flava hepatica*
Icterus gularis gularis

Aside from the host records annotated below, the new material reveals an unexpected intensity of parasitism reflected in multiple eggs of the Bronzed Cowbird in single nests, as many as six in a nest of a Redwinged Blackbird, and seven in a Cardinal's nest! It is not known if these were multiple eggs of single or of multiple hens.

On a number of occasions nests have been found to be parasitized simultaneously by both the Brown-headed and the Bronzed Cowbird. At least six species of hosts have been so recorded—*Agelaius phoeniceus*, *Icterus*

spurius, *Icterus cucullatus*, *Icterus graduacauda*, *Arremonops rufivirgata*, and *Melospiza kieneri*. These instances mean nothing so far as the host choice of each of the parasites is concerned, but they do present to their observers the opportunity to study and to evaluate the relative incubation period, growth-rate, and general "efficiency" of the two parasites. No one has yet made such a study, but the results should be of interest.

One other point is worth mentioning before proceeding to the various host records. This is the very close similarity in coloration and in size of the eggs of the Bronzed Cowbird to those of some of its fringilline hosts, especially such species as *Melospiza kieneri*, *Atlapetes gutturalis*, and *Aimophila* (several species), pointed out to me by Lloyd Kiff. It is becoming increasingly evident that these finches suffer a high incidence of parasitism. Inasmuch as the eggs of the Bronzed Cowbird show little variation over the whole range of the species, both altitudinal and latitudinal, it seems that such egg similarities represent a useful but fortuitous pre-adaptation on the part of the cowbird, rather than any adaptive evolutionary specialization on these hosts.

MOURNING DOVE (*Zenaidura macroura*).—A dove of any species is hardly suitable as a host for a passerine bird, and consequently all records of cowbirds parasitizing any pigeons can only be looked upon as unusual occurrences and as biologically erroneous. It is to be expected that on occasion a cowbird with an egg ready to be laid may deposit one in such an unsuitable nest, but it is surprising to find not one, but three such instances in one locality in one season. K. McCracken (*in* Webster, 1967) reported three nests of the Mourning Dove near Corpus Christi, Texas, each with a Bronzed Cowbird egg. All three were in a single backyard, which raises the possibility that all may have been laid by the same hen Bronzed Cowbird. In each instance the property owners, Mr. and Mrs. Cunningham, removed the parasitic eggs, and all three nests were successful in raising Mourning Doves. No previous records are known for the Mourning Dove as a victim of the Bronzed Cowbird, and only single ones for two other pigeons, the White-winged Dove, and the little Ground Dove.

BROWN-THROATED WREN (*Troglodytes brunneicollis*).—This is an addition to the known hosts of the Bronzed Cowbird. Ed N. Harrison collected a nest containing three eggs of the wren and one of the cowbird at Rancho Guercoba, Sonora, Mexico, 11 June 1947. The race of the wren in that locality is *T. b. cahooni*; the cowbird is *M. a. loyeyi*.

RUFIOUS-NAPED WREN (*Campylorhynchus rufinucha*).—This wren is added to the list of hosts of the Bronzed Cowbird (subspecies *assimilis*) on the basis of a nest with five eggs of the wren and one of the parasite found at Rancho Soy y Lima near Tepastepec, Oaxaca, Mexico, 15 May 1966, by J. Stuart Rowley. The wren in that region is the subspecies *C. r. humilis* Sclater.

VAN ROSSEM'S WHITE-LORED GNATCATCHER (*Poliophtila alboris*).—Rowley found a nest of this gnatcatcher containing two eggs of its own and one of the Bronzed Cowbird, at Rancho Sol y Lima, near Tepastepec, Oaxaca, Mexico, 22 May 1966. This is the first known instance of the White-lored Gnatcatcher (subspecies *vanrossemi*) as a host.

MEXICAN CACIQUE (*Cassiculus melanicterus*).—To the 2 earlier records of parasitism

on the Mexican Cacique (Friedmann, 1963: 181) we may now add 10 more, all found by Rowley at Rancho Sol y Lima, near Tepastepec, Oaxaca, Mexico, 9-28 May. The nests contained from one to three eggs of the cacique and one to two eggs of the cowbird; no nest contained a combined total of more than four eggs. These 10 records clearly show that in that area this cacique must be a favorite host.

REDWINGED BLACKBIRD (*Agelaius phoeniceus*).—To the four instances known to me earlier (Friedmann, 1963: 181) of the southeastern Texas race of the Red-wing (*A. p. megapotamus*) as a victim of the Bronzed Cowbird, may be added two more. One is a nest with four eggs of the host and one of the parasite taken 3 miles north of Brownsville, Texas, 25 May 1945, by F. F. Nyc, now in the collection of the Western Foundation of Vertebrate Zoology; the other, a nest found in the Beeville area reported by Webster (1968). This case is of interest because of the unusually large number of the parasitic eggs involved. When first found on 26 May the nest contained only one egg of the blackbird, but by 2 June it had in addition one of the Brown-headed Cowbird and six eggs of the Bronzed Cowbird. By 9 June the nest was abandoned.

LICHTENSTEIN'S ORIOLE (*Icterus gularis*).—J. Stuart Rowley collected a nest of this oriole with four eggs and one egg of the Bronzed Cowbird at Rancho Sol y Lima near Tepastepec, Oaxaca, Mexico, on 15 May 1966. This is the third record for this oriole as a victim, and the first one that involves the southwestern subspecies of the parasite, *M. a. assimilis*; the earlier ones were by the nominate race *M. a. aeneus*. In all cases the oriole was of the nominate race.

SCARLET-HEADED ORIOLE (*Icterus pustulatus*).—The southern Mexican race of this oriole (*I. p. formosus*) is added to the list of hosts of the Bronzed Cowbird (*M. a. assimilis*). Rowley collected a set of four eggs of this bird with one of the parasite at Rancho Sol y Lima near Tepastepec, Oaxaca, Mexico, on 15 May 1966. Previously three other races of the Scarlet-headed Oriole (*microstictus*, *alticola*, and *pustulatus*) were known to be parasitized by the other two races of the Bronzed Cowbird (*aeneus* and *loyei*).

HEPATIC Tanager (*Piranga flava*).—To the two previous records of the Hepatic Tanager as a victim of the Bronzed Cowbird may be added a third—a parasitized nest containing three eggs of the host and one of the parasite collected at Rancho Vicente, Cerro Baul, Oaxaca, Mexico, 28 May 1966, by J. Stuart Rowley, and presently in the museum of the Western Foundation of Vertebrate Zoology. This is the first record for this tanager (subspecies *P. f. hepatica*) as a victim of the southwestern race of the Bronzed Cowbird (*M. a. assimilis*), the previous records having to do, one each, with the other two races of the parasite, *M. a. aeneus* and *M. a. loyei*.

CARDINAL (*Richmondia cardinalis*).—Although the Cardinal was previously known as an occasional host choice of the Bronzed Cowbird, one recent record is of interest because of the unusual number of Bronzed Cowbird eggs involved. At Corpus Christi, Texas, K. McCracken (*in* Webster, 1967) found the surprisingly high total of seven eggs of the Bronzed Cowbird in a single nest of the Cardinal (subspecies *R. c. magnirostris*).

PHYRRHULOXIA (*Pyrrhuloxia sinuata*).—This species is added to the list of victims of the Bronzed Cowbird by three records kindly supplied me by the North American Nest Card Program at Cornell University: a nest with two eggs of the parasite, west of Lake Corpus Christi, Live Oak County, Texas, 20 July 1967; and a nest with three Bronzed Cowbird eggs, Premont, Jim Wells County, Texas, 2 July 1967; and a nest with two cowbird eggs, 5¼ miles south of Zapata, Zapata County, Texas, 26 May 1968.

RUSSET-TAILED SPARROW (*Aimophila ruficauda*).—This little-known sparrow (sub-

species *lawrencii*) was added to the known victims of the Bronzed Cowbird (race *assimilis*) by J. Stuart Rowley, who collected a nest containing two eggs of the host and one of the parasite, at Rancho Sol y Lima near Tepastepec, Oaxaca, Mexico, on 19 May 1966.

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Los Angeles County Museum of Natural History, Los Angeles, California
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