

THE COWBIRDS.

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Among our American birds comparatively few present such an interesting field for systematic investigation and study of their habits and mode of reproduction as the Cowbirds or Cow Buntings.

The family to which they belong, the *Icteridae*, containing such familiar birds as the Boboliuk, the Oriole, Blackbirds, etc., is confined to the American continent, and the genus *Molothrus* (with its subgenus *Callothrus*) is represented by 12 species and subspecies. Of these, three are found in the United States, namely: *Molothrus ater*, *Molothrus ater obscurus*, and *Callothrus robustus*; and a fourth, *Callothrus aneus*, is a resident of western Mexico and portions of Central America. The remaining species are confined to South America. *Callothrus armenti* is found on the coast of Colombia and Venezuela; *Molothrus atroniteus* in Guiana, Venezuela, and Trinidad; *M. purpurascens* in western Peru; *M. cassini* in Venezuela and Colombia; *M. fringillarius* in Brazil; *M. bonariensis* in Argentina, Paraguay, Bolivia, and Brazil; *M. rufoaxillaris* in Argentina and Uruguay, and *M. badius* in Argentina, Paraguay, and Bolivia.

Respecting the general habits of some of the species, comparatively little is as yet known excepting those found in the United States (but even here a great deal remains to be learned) and the three last, which have been pretty fully described in Selater and Hudson's excellent work on Argentine ornithology.

It is probable that nearly all these species are parasitic to a greater or less degree, laying their eggs in the nests of other birds and letting them perform the duties of incubation and rearing the young, with the exception of *Molothrus badius*, the Baywinged Cowbird, which occasionally builds a nest of its own or appropriates nests of other species, but incubates its own eggs or cares for its young like other respectable members of the Avian family.

This same parasitic instinct is also found among members of the more cosmopolitan family of the Cuckoos, notably with *Cuculus canorus*, the European Cuckoo, about which a great deal of interesting literature has already been published, and the same traits, only in a much more modified degree, are also said to be occasionally observed in at least one of our North American species, the Blackbilled Cuckoo, *Coccyzus erythrophthalmus*, but no such instance has as yet come under my own observation, and I consider it of rare occurrence.

On the whole, our Cowbirds present a far wider and more interesting field for careful observation and study than does the European Cuckoo, as their habits differ greatly in many respects; for instance, they are among the few, if they are not the only birds, which practice polyandry, which is probably caused for the reason that the males generally outnumber the females about 3 to 1.

In order to give the reader some idea of these disreputable but nevertheless interesting birds, my articles written for Life Histories of North American Birds, Part II, are printed from advance sheets without alteration, excepting the addition of a concise description of each species, taken from Mr. R. Ridgway's Manual of North American Birds.

Figures of an adult male and female Cowbird, *Molothrus ater*, are here given (pls. 2 and 3) as well as a nest of the Yellow Warbler, *Dendroica aestiva*, (pl. 1) containing three eggs of its own and one of this parasite.

The articles on the Cowbirds found in the Argentine Republic are copied from Messrs. P. L. Scater and W. H. Hudson's work on Argentine ornithology, the notes on their habits being based on observations made by the latter gentleman. The two series of articles combined will enable the reader to arrive at a better understanding of the general habits of some of the members of this interesting genus.

MOLOTHRUS ATER (Boddaert) Cowbird. (Plates 2 and 3).

Oriolus ater, BODDAERT, Tables des planches enluminées d'histoire naturelle, 1783, 37.

Molothrus ater, GRAY, Hand List of Birds, II, 1870, 36.
(B 400, C 211, R 258, C 313, U 495.)

Description.—Adult males: Head, neck, and chest uniform brownish (varying greatly in tint); rest of plumage glossy black, with a greenish reflection, changing to purplish next to the brown of the neck, especially on the upper back. Adult females: Plain brownish gray, darker on upper parts, paler on chin and throat; the feathers, especially on back and breast, with indistinct darker shaft streaks. Young: Above dull brownish gray, the feathers bordered with pale buffy; lower parts dull light buffy, broadly but rather indistinctly streaked with dull brownish gray.

Length (male), about 7.75–8.25; wing, 4–4.60 (4.31); tail, 2.90–3.35 (3.08); culmen, 0.61–0.72 (0.66); tarsus, .98–1.12 (1.05); female considerably smaller.

Geographical range.—United States and the southern parts of the Dominion of Canada, in the eastern portions to about latitude 49° north; in the interior to Little Slave Lake, southern Athabasca, latitude 55° 30', and probably still farther north; west to British Columbia, eastern Washington, eastern Oregon, Nevada, and southeastern California; south in winter to southern Mexico.

The breeding range of the Cowbird, also known as Cow Bunting,



NEST OF YELLOW WARBLER, *DENDROICA ÆSTIVA*, BAIRD, WITH THREE EGGS, TOGETHER WITH ONE EGG OF THE COWBIRD, *MOLOTHRUS PECORIS*.



THE COWBIRD, *MOLOTHRUS PECORIS*, BODDAERT.
Male. Natural size.



THE COWBIRD, *MOLOTHRUS PECORIS*, BODDAERT.
Female. Natural size.

Cow Blackbird, Shinyeye, Blackbird, Lazy Bird, Clodhopper, and in former years on the plains as Buffalo Bird, extends from our southern States, excepting Florida, southern and western Texas, north into the southern parts of the Dominion of Canada, as already indicated. Westward its breeding range extends to eastern British Columbia, eastern Washington, eastern Oregon, Nevada, and probably southeastern California, where Dr. A. K. Fisher shot an adult male at Furnace Creek, in Death Valley, June 20, 1891. East of the Rocky Mountains the Cowbird is pretty generally distributed over the greater part of its range, excepting the extensive forest regions and some of the more southern States, where it appears to occur only sparingly. Its center of abundance is found in the States bordering the Upper Mississippi River and its numerous tributaries. West of the one hundred and thirteenth meridian (Greenwich), in the United States at least, it must be considered as a rare summer visitor, and as far as I have been able to ascertain it has not yet been found anywhere on the Pacific Coast, west of the Cascade and the Sierra Nevada mountains, except as a straggler. In the southern portions of the provinces of Alberta and Assiniboia, Dominion of Canada, as far west as Calgary, I found this species remarkably abundant in the latter part of May, 1894, along the line of the Canadian Pacific Railway, small parties from 6 to 12 being almost constantly in sight, evidently on their way to their breeding grounds.

The most northern point where its eggs have been taken appears to be in the vicinity of Little Slave Lake, in southern Athabasca, in latitude 55° 30' north. Mr. S. Jones, of the Hudson Bay Company, forwarded specimens from there to the Smithsonian Institution in 1868, but it is quite probable that this species ranges farther north.

Although I have traveled extensively over our westernmost States and Territories I noticed the Cowbird on but very few occasions, and only found its eggs there twice; once on June 21, 1871, near Fort Lapwai, Idaho, in the nest of the Long-tailed Chat, *Icteria virens longicauda*, and again near Palouse Falls, in southeastern Washington, on June 18, 1878, in a nest of the Slate-colored Sparrow, *Passerella iliaca schistacea*, and which I believe is the most western breeding record known.

Both of these specimens are now in the United States National Museum collection.

The most southern breeding records I have knowledge of, are from Wayne and McIntosh counties, Ga., Petite Anse Island, Louisiana, and Harris County, Tex. It does not appear to breed anywhere in the immediate vicinity of the gulf coast in Texas, where it is replaced by its smaller relative, the Dwarf Cowbird. While the majority of these birds pass beyond our borders in the late fall and winter, mainly to southern Mexico, still a good many remain in our Southern States, and a few even winter occasionally as far north as New England, Michigan, etc.

Dr. G. Brown Goode tells me that while on the German Lloyd steamer

Neckar, in April, 1880, a Cowbird flew on board, fully 1,000 miles east of Newfoundland, and was captured.

The Cowbird ordinarily arrives in good-sized flocks in the middle States from its winter home in the south, during the last half of March; in the more northern States, rarely before the first week in April, more frequently after the middle of this month, the males predominating in numbers over the more plainly colored females, and generally preceding them several days. Soon after, these flocks commence to break up and scatter in small companies of from 6 to 12 individuals and disperse generally over the country. It prefers more or less cultivated districts, river valleys, etc., where other birds are abundant, and rarely penetrates far into heavily timbered sections in mountainous regions, excepting in Colorado, where it has been met with at altitudes up to 8,000 feet.

The food of the Cowbird consists principally of vegetable matter, such as seeds of different kinds of noxious weeds, like ragweed, smartweed, foxtail or pigeon grass, wild rice and the smaller species of grains, berries of different kinds, as well as of grasshoppers, beetles, ticks, flies, and other insects, worms, etc., and in this respect it does perhaps more good than harm.

While the Cowbird is fairly common in most of the States east of the Mississippi River, it is far more noticeable in the regions west of this stream, although perhaps not much more abundant. In the prairie States this is especially the case, and one will rarely see a bunch of cattle there without an attending flock of Cowbirds, who perch on their backs searching for parasites, or follow them along on the ground hunting for suitable food among their droppings. They generally act in concert; when one settles on the ground the others follow shortly afterwards, and let one start to fly the remainder take wing also. Their flight resembles that of the Red-winged Blackbird. When the nesting season approaches the males become very demonstrative in their actions toward the females, but do not appear to mind the attentions paid by other males to the same female, as other birds usually do, and rarely fight for her possession. Free lovers as they are, they do not object to such trifles.

At this time of the year several males may frequently be seen, while perched on some fence rail, or the limb of a tree, with the feathers of their throats raised, tails spread, and wings trailing, each endeavoring to pour out his choicest song to one of his protective mates, which consists of various unreproducible guttural sounds uttered while all the feathers are puffed out, the head lowered, and evidently produced only by considerable effort on the part of the performer. One of their call notes sounds somewhat like "spreele," others resemble the various squeaks of the Red-winged Blackbird, and all are difficult to reproduce on paper.

It is a well-known fact that the Cowbird is a parasite, building no nest, but inflicting its eggs usually on smaller birds, leaving to them

the labor and care of rearing its young. It appears to be entirely devoid of conjugal affection, and practices polyandry, the small flocks in which it is found during the season of reproduction generally containing several more males than females.

It is at all times more or less gregarious, especially so in fall and winter, when it often forms large flocks, and associates then with the other blackbirds, like Brewer's and the Red-winged.

The laying season rarely begins before May 15, and continues for about two months. During this time probably from 8 to 12 eggs are laid by each female, or the equivalent of two broods, and I believe that several days elapse between the laying of each egg. It is not likely, and this is very fortunate indeed, that more than half of these eggs are hatched, as some are occasionally dropped in old and abandoned nests, or, when the female is hard pressed, even on the ground; others in just completed nests in which the rightful owner had not yet laid, and, seeing the parasitic egg in its nest, either abandons it entirely or constructs another over the first, burying the stranger egg among the building material.

When the Cowbird is ready to lay she quietly leaves her associates and begins her search for a suitable nest, usually selecting one of a species smaller than herself, but if such a one is not readily found a nest of a larger bird will answer equally well, especially if the full complement of eggs has not been deposited in it. She does not forcibly drive the owner from her nest, but watches her opportunity to drop her egg in it when it is unguarded. In rare instances only will a fresh Cowbird's egg be found among incubated ones of the rightful owner. I have only observed this on a single occasion. From 1 to 7 of these parasitic eggs have been found in a nest, the larger numbers usually in those of ground-building species, especially in that of the Ovenbird, where from 3 to 5 eggs, with perhaps 2 or 3 of the owner, are not especially uncommon. I know of one instance where not less than 7 Cowbirds' eggs were found in a nest of this species with a single one of its own. Not unfrequently 2 or more eggs, in all probability laid by the same bird, will be found in one nest. There is so much variation in their eggs, both in size and markings, that the close resemblance of any 2 eggs at once attracts attention. It is not unusual to find some of the eggs of the species imposed on thrown out of the nest to make room for those of the parasite, nor to find minute punctures in the shells of some of the remaining eggs. This is possibly done on purpose by the Cowbird with her beak, to keep the eggs from hatching, or with her sharp claws while sitting on the nest and depositing her own egg. I am inclined to attribute this puncturing to the latter cause, but there is no doubt that the Cowbird sometimes throws the rightful owner's eggs out of the nest purposely to enhance the chances of its offspring coming to maturity. I have yet to see a punctured Cowbird's egg. It is astonishing how many different species are thus imposed upon by the

Cowbird. One would naturally suppose that birds breeding in holes in trees or under rocks would be exempt from this infliction, but this is not the case. Perhaps among the strangest and most unlikely of foster parents selected are the Red-headed Woodpecker and the Rock Wren.

Mr. William G. Smith, formerly of Loveland, Colo., writes me that he found a Cowbird's egg in a Rock Wren's nest which was placed under a ledge of rock fully 2 feet from the entrance, and which was barely large enough for the wren to squeeze through. It seems almost impossible that a bird of this size would be able to enter the small pendent nest of the Parula Warbler and deposit its egg therein in the usual way; still this species is occasionally imposed on, and it is possible that the egg is dropped in the nest with the beak. The following is a list of species in whose nests eggs of the Cowbird have been found, and undoubtedly a number of others yet remain to be added to it:

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| <i>Zenaidura macroura</i> , Mourning Dove. | <i>Chondestes grammacus strigatus</i> , Western Lark Sparrow. |
| <i>Coccyzus americanus</i> , Yellow-billed Cuckoo. | <i>Zonotrichia leucophrys</i> , White-crowned Sparrow. |
| <i>Melanerpes erythrocephalus</i> , Red-headed Woodpecker. | <i>Spizella socialis</i> , Chipping Sparrow. |
| <i>Tyrannus tyrannus</i> , Kingbird. | <i>Spizella pusilla</i> , Field Sparrow. |
| <i>Sayornis phoebe</i> , Phoebe. | <i>Spizella pallida</i> , Clay-colored Sparrow. |
| <i>Contopus rivens</i> , Wood Pewee. | <i>Junco hyemalis</i> , Slate-colored Junco. |
| <i>Empidonax acadicus</i> , Acadian Flycatcher. | <i>Melospiza fasciata</i> , Song Sparrow. |
| <i>Empidonax pusillus</i> , Little Flycatcher. | <i>Melospiza fasciata montana</i> , Mountain Song Sparrow. |
| <i>Empidonax pusillus traillii</i> , Traill's Flycatcher. | <i>Melospiza georgiana</i> , Swamp Sparrow. |
| <i>Empidonax minimus</i> , Least Flycatcher. | <i>Passerella iliaca schistacea</i> , Slate-colored Sparrow. |
| <i>Otocoris alpestris praticola</i> , Prairie Horned Lark. | <i>Pipilo erythrophthalmus</i> , Towhee. |
| <i>Dolichonyx oryzivorus</i> , Bobolink. | <i>Cardinalis cardinalis</i> , Cardinal. |
| <i>Xanthocephalus xanthocephalus</i> , Yellow-headed Blackbird. | <i>Habia ludoviciana</i> , Rose-breasted Grosbeak. |
| <i>Agelaius phoeniceus</i> , Red-winged Blackbird. | <i>Guiraca caerulea</i> , Blue Grosbeak. |
| <i>Sturnella magna</i> , Meadow Lark. | <i>Passerina cyanea</i> , Indigo Bunting. |
| <i>Sturnella magna neglecta</i> , Western Meadow Lark. | <i>Passerina amana</i> , Lazuli Bunting. |
| <i>Icterus spurius</i> , Orchard Oriole. | <i>Passerina ciris</i> , Painted Bunting. |
| <i>Icterus galbula</i> , Baltimore Oriole. | <i>Spiza americana</i> , Dickcissel. |
| <i>Icterus bullocki</i> , Bullock's Oriole. | <i>Calamospiza melanocorys</i> , Lark Bunting. |
| <i>Scolecophagus cyanocephalus</i> , Brewer's Blackbird. | <i>Piranga erythromelas</i> , Scarlet Tanager. |
| <i>Carpodacus purpureus</i> , Purple Finch. | <i>Piranga rubra</i> , Summer Tanager. |
| <i>Spinus tristis</i> , American Goldfinch. | <i>Petrochelidon lunifrons</i> , Cliff Swallow. |
| <i>Calcarius ornatus</i> , Chestnut-collared Longspur. | <i>Ampelis cedrorum</i> , Cedar Waxwing. |
| <i>Rhynchophanes mccownii</i> , McCown's Longspur. | <i>Vireo olivaceus</i> , Red-eyed Vireo. |
| <i>Pooecetes gramineus</i> , Vesper Sparrow. | <i>Vireo gilvus</i> , Warbling Vireo. |
| <i>Pooecetes gramineus confinis</i> , Western Vesper Sparrow. | <i>Vireo flavifrons</i> , Yellow-throated Vireo. |
| <i>Chondestes grammacus</i> , Lark Sparrow. | <i>Vireo solitarius</i> , Blue-headed Vireo. |
| | <i>Vireo noveboracensis</i> , White-eyed Vireo. |
| | <i>Mniotilta varia</i> , Black and White Warbler. |
| | <i>Protonotaria citrea</i> , Prothonotary Warbler. |
| | <i>Helmitherus vermivorus</i> , Worm-eating Warbler. |

Helminthophila pinus, Blue-winged Warbler.
Helminthophila chrysoptera, Golden-winged Warbler.
Helminthophila ruficapilla, Nashville Warbler.
Compsothlypis americana, Parula Warbler.
Dendroica aestiva, Yellow Warbler.
Dendroica caruleseus, Black-throated Blue Warbler.
Dendroica carulea, Cerulean Warbler.
Dendroica blackburnia, Blackburnian Warbler.
Dendroica virens, Black-throated Green Warbler.
Dendroica discolor, Prairie Warbler.
Seiurus aurocapillus, Ovenbird.
Seiurus noreboracensis, Water Thrush.
Seiurus motacilla, Louisiana Water Thrush.
Geothlypis formosa, Kentucky Warbler.
Geothlypis trichas, Maryland Yellow-throat.

Geothlypis trichas occidentalis, Western Yellow-throat.
Icteria virens, Yellow-breasted Chat.
Icteria virens longicauda, Long-tailed Chat.
Sylvania mitrata, Hooded Warbler.
Setophaga ruticilla, American Redstart.
Geoscopus carolinensis, Catbird.
Harporhynchus rufus, Brown Thrasher.
Salpinctes obsoletus, Rock Wren.
Troglodytes adon, House Wren.
Parus bicolor, Tufted Titmouse.
Polioptila carulea, Blue-gray Gnat-catcher.
Turdus mustelinus, Wood Thrush.
Turdus fuscescens, Wilson's Thrush.
Turdus ustulatus swainsonii, Olive-backed Thrush.
Turdus aonalaschkae auduboni, Audubon's Hermit Thrush.
Merula migratoria, American Robin.
Sialia sialis, Bluebird.

Among these the nests of the Phoebe, Song Sparrow, Towhee, Indigo Bunting, Ovenbird, and Yellow-breasted Chat seem to be most frequently selected, and these usually contain also more of the parasitic eggs than the majority of the others.

The egg of the Cowbird usually hatches in from ten to eleven days, generally in advance of those of the foster parent, and the growth of the young interloper is rapid. Mr. M. A. White, of Mathews, Va., writes on this subject as follows, and his observations correspond fairly well with my own:

It was on the 9th of June, 1891, that I placed a fresh egg of the Cowbird in the nest of a Chipping Sparrow containing two of her own that had an advance of one and a half days' incubation over the first. I watched results. About the 19th, Mr. Cowbird emerged from his prison walls, large and vigorous. A day later a little sparrow came forth from his delicate shell, but much smaller, and exhibiting less strength than his fosterbrother. The other egg failed to hatch.

The daily increase in dimension of the Cowbird was something immense, while that of his younger companion seemed rather to diminish than enlarge, until finally, at the end of three days, he died—evidently for want of food, as the Cowbird, being larger, greedily devoured everything that came in contact with his capacious mouth. The untimely end of the rightful heir was but gain to this usurper, as he now received the whole attention of the parent birds. Nature having now, at the early age of seven days, provided him with a respectable dress, he was no longer contented to remain within the small compass which the nest furnished, whereupon he betook himself to the branches of the tree in which the nest had been placed. But soon this area became too limited for his ambitious spirit, for at the end of his second week he was flitting from bush to bush, exploring the fields and hedges, his foster parents providing for him all the while. Two weeks more and he was a full-fledged bird. About July 20 I saw him for the last time.*

* The Oologist, Vol. x, Aug., 1893, pp. 230, 231.

Such seems to be the fate of nearly all the young which have the misfortune to be hatched with a Cowbird for a companion. I have yet to see a nest containing young birds of both species more than a few days old; by that time the rightful offspring are either smothered or crowded out of the nest by their stronger foster brother, or starved, and he then absorbs the entire attention of the parents. Only in such cases where these are as large or larger than the imposter is there any likelihood to be an occasional exception to this rule. It can readily be seen what an immense amount of harm a Cowbird causes in the economy of nature, granting that only a single one of its eggs is hatched in a season; to accomplish this a brood of insectivorous and useful birds is almost invariably sacrificed for every Cowbird raised, and they are certainly not diminishing in numbers.

While a few of the selected foster parents resent the addition of a parasitic egg in their nest, either by abandoning it entirely or by building a new one over it, and occasionally even a third one, the majority do not appear to be much disturbed by such an event, and after a short time go on as if nothing had happened. A few species, like the Indigo Bunting, for instance, will sometimes abandon their own eggs should the stranger egg be removed, but apparently do not mind the loss of one or two of their own, and continue incubating just the same.

Almost invariably the nests in which one or more of these parasitic eggs have been deposited contain only incomplete sets of their rightful owners. Where the Cowbird drops an egg in the nests of species considerably smaller than itself, as the Gnat-catcher, etc., its much larger size seems to be a positive advantage to the more rapid development of the embryo, as the egg must necessarily receive more animal heat than the smaller ones, which can scarcely come much in contact with the body of the sitting bird, and the development of the embryos in these must be more or less retarded thereby.

It is ludicrous to see a fat, fully fledged young Cowbird following a pair of Chipping Sparrows, or some small Warbler clamoring incessantly for food and uttering its begging call of *seerr-seerr* most persistently, only keeping quiet while its gaping beak is filled with some suitable morsel, and stranger still to note how devoted the diminutive nurses are to their foster child. One would think that they might see through the fraud, at least after the young interloper left the nest, if not before, and abandon him to his fate, but the greatest attachment seems to exist between them until the Cowbird is able to shift for himself, when he leaves and joins his own kind.

It has been asserted that, in the West, Cowbirds occasionally build nests and rear their own young, but this is undoubtedly incorrect, and on proper investigation it will be found that the supposed Cowbird is really Brewer's Blackbird.

When the laying season is over they collect again in larger flocks and frequent the marshes in company with the Blackbirds, where they

find an abundance of food at that time of the year, and the return migration to their winter homes begins usually in the latter half of October.

The eggshell of the Cowbird is compact, granulated, moderately glossy, and relatively much stronger than in the eggs of its near allies the *Icteride*. The ground color varies from an almost pure white to grayish white, and less often to pale bluish or milky white, and this is usually profusely covered over its entire surface with specks and blotches varying in color from chocolate to claret brown, tawny and cinnamon-rufous. In an occasional specimen the markings are confluent and the ground color is almost entirely hidden by them; in the majority, however, it is distinctly visible. These markings are usually heaviest about the larger end of the egg, and in rare instances they form an irregular wreath. The eggs vary greatly in shape, ranging from ovate to short, rounded, and elongate-ovate, the first predominating.

The average measurement of 127 specimens in the U. S. National Museum collection is 21.45 by 16.42 millimeters, or 0.84 by 0.65 inch; the largest egg measures 25.40 by 16.76 millimeters, or 1 by 0.66 inch; the smallest 18.03 by 15.49 millimeters, or 0.71 by 0.61 inch.

MOLOTHRUS ATER OBSCURUS (Gmelin). Dwarf Cowbird.

Sturnus obscurus, Gmelin, Systema Naturæ, I, II, 1788, 804.

M[olothrus] ater var. obscurus, Coues, Birds of the Northwest, 1874, 180, in text (B — C 211 a, R 258 a, C 314, U 495 a).

Similar to preceding, only smaller. Length (male), about 7-7.50; wing, 3.70-4.15 (3.93); tail, 2.85-3 (2.91); culmen, 0.57-0.63 (0.60); tarsus, 0.93-1 (0.96); female smaller.

Geographical range.—Mexico and adjoining portions of the United States from southern Texas to southwestern Arizona and Lower California.

The breeding range of the Dwarf Cowbird in the United States is coincident with its geographical distribution. It can only be considered as a summer resident, although a few appear to winter in southern Arizona, as I shot an adult male on Rillito Creek, near Tucson, on January 24, 1873. It usually arrives from its winter home in southern Mexico about the middle of March, and is then found associating with different species of Blackbirds, especially Brewer's Blackbird, and frequenting the vicinity of cattle ranches, roads, and cultivated fields. By April 15 the flocks have scattered, and small parties of from 5 to 12 may now be seen in suitable localities, such as the shrubbery along water courses, springs, etc., where other small birds are abundant. The character of its food and its general habits as well, are similar to those of the common Cowbird, which it closely resembles, being only a trifle smaller. In middle Texas the two races intergrade to some extent, and it is claimed both breed there. In the lower Rio Grande valley,

Texas, the typical Dwarf Cowbird is common, and I found it equally so in the vicinity of Tucson, Ariz., where I have taken quite a number of its eggs.

Mr. F. Stephens writes me that it is a common summer resident as far west as the Colorado River, beyond the immediate vicinity of which he has never seen it. Mr. L. Belding found it common in the streets of San Jose del Carbo, Lower California, associating with Brewer's Blackbirds during April, but rarely saw it later. It is questionable if it breeds there.

Like its eastern relative, the Dwarf Cowbird drops its eggs in the nests of other birds, principally in those of species which are smaller than itself. The following is a list of those in which they have thus far been found:

<i>Cotopus richardsoni</i> , Western Wood Pewee.	<i>Cardinalis cardinalis canicaudus</i> , Gray-tailed Cardinal.
<i>Pyrocephalus rubinus mexicanus</i> , Vermilion Flycatcher.	<i>Sporophila moreletii sharpii</i> , Sharpe's Seed-eater.
<i>Agelaius phoeniceus</i> , Red-winged Blackbird.	<i>Piranga rubra cooperi</i> , Cooper's Tanager.
<i>Icterus cucullatus</i> , Hooded Oriole.	<i>Vireo noveboracensis</i> , White-eyed Vireo.
<i>Icterus cucullatus nelsoni</i> , Arizona Hooded Oriole.	<i>Vireo bellii</i> , Bell's Vireo.
<i>Icterus spurius</i> , Orchard Oriole.	<i>Vireo bellii pusillus</i> , Least Vireo.
<i>Icterus bullocki</i> , Bullock's Oriole.	<i>Helminthophila luciae</i> , Lucy's Warbler.
<i>Chondestes grammacus strigatus</i> , Western Lark Sparrow.	<i>Dendroica aestiva sonorona</i> , Sonora Yellow Warbler.
<i>Amphispiza bilineata</i> , Black-throated Sparrow.	<i>Geothlypis trichas occidentalis</i> , Western Maryland Yellow-throat.
<i>Pencua carpalis</i> , Rufous-winged Sparrow.	<i>Icteria virens longicauda</i> , Long-tailed Chat.
<i>Melospiza fasciata fallax</i> , Desert Song Sparrow.	<i>Mimus polyglottus</i> , Mockingbird.
<i>Embernagra rufivirgata</i> , Texas Sparrow.	<i>Poliophtila plumbea</i> , Plumbeous Gnat-catcher.
	<i>Sialia mexicana</i> , Western Bluebird.

Doubtless a number of others still remain to be added.

According to my observations the Least Vireo seems to be oftener imposed upon, in southern Arizona at least, than any other bird; the Desert Song Sparrow, Black-throated Sparrow, and Vermilion Flycatcher following in the order named.

The earliest date known by me on which an egg of this subspecies was found is April 18, the latest August 2, showing that the laying season lasts considerably longer than with *Molothrus ater*, and it appears to be at its height during the month of June.

I found it almost impossible to obtain a full set of the Least Vireo's eggs; nearly every nest found contained 1 or 2 eggs of this parasite, and usually only 1 or 2 of its own, and the latter were frequently punctured. In fact, this was so often the case that I am inclined to believe that it is done purposely and not by accident; but whether made by the beak or claws of the bird I will not venture to say, but believe it is done with the latter. In many nests I found 1 or 2 of the owner's eggs thrown

out and broken, and occasionally every one, the foster parent sitting on the parasite's eggs alone. Among other instances I found this to be the case in a nest of the Plumbeous Gnatcatcher placed in a thick mistletoe bunch growing from a limb of a mesquite tree about 15 feet from the ground, and well hidden. I first observed the nest on June 10, 1872, when it contained a single egg; on visiting it again on the 17th, the female was sitting on a couple of Dwarf Cowbird's eggs alone, and on looking on the ground I found the remnants of 3 eggs, which evidently had been thrown out. Bullock's Oriole may occasionally rid herself of the parasitic egg; at any rate I noticed the remains of such a one lying under a nest of this species with portions of one of her own. This nest contained only 3 eggs of the rightful owner, and the bird was sitting on these. The largest number of Dwarf Cowbird's eggs found by me in one nest was 3, that of a Desert Song Sparrow, and all its own eggs were missing. I several times found nests containing single eggs of this parasite abandoned, and also picked up 2 uninjured from the ground where they evidently had been dropped by the bird, not finding a suitable nest in time to deposit them. None of the young of the foster parents seem to survive the advent of a young Cowbird in their nest longer than two or three days; they are starved by that time by their more vigorous and voracious foster brother. After the young Dwarf Cowbird is old enough to care for itself it abandons its foster parents and seeks the company of its own kind, gathering in small bands and roving from place to place. Later in the season, about the latter part of October, these gather into larger flocks, associate at this time with other congenial species, and shortly after return to their winter homes in Mexico.

In general appearance and shape the eggs of the Dwarf Cowbird resemble those of the former, and the same description will answer for both, but they appear on an average to be somewhat less heavily spotted, which gives them a lighter appearance; and they are also considerably smaller.

The average measurement of 37 specimens in the U. S. National Museum collection is 19.30 by 14.99 millimeters, or 0.76 by 0.59 inch; the largest egg in this series measures 20.57 by 15.49 millimeters, or 0.81 by 0.61 inch; the smallest 18.03 by 13.74 millimeters, or 0.71 by 0.54 inch.

CALLOTHURUS ROBUSTUS (Cabanis). Red-eyed Cowbird.

Psarocolinus aeneus, WAGLER, Isis, 1829, 758.

Callothrus robustus, RIDGWAY, Manual of North American Birds, 1887, 589.

(B —, C —, R 259, C 315, U 496.)

Adult males: Head, neck, back, and lower parts uniform glossy black, with a soft, bronzy luster, duller on head; lesser and middle wing coverts, outermost scapulars, and rump glossed with violet; wings in general, upper tail coverts, and tail glossy blue-black, changing to greenish; iris bright red. Length about 9–9.50, wing 4.60–4.80, tail

3.70-3.80, culmen 0.85-0.90, tarsus 1.15-1.25. Young male entirely blackish, with distinct gloss only on wings, etc.; the lower parts, back, etc., without bronzy luster. Adult female: Above dark brownish gray, the feathers sometimes showing distinct dusky shaft streaks. Length about 8-8.50, wing about 4.10, tail 3.25, culmen 0.75, tarsus 1.05.

Geographical range.—Mexico and Central America, north to southern Texas, south to Panama.

The breeding range of the Red-eyed or Bronzed Cowbird, a larger and darker colored species than the two preceding, coincides with its geographical distribution in the United States, and extends, as far as known, north and eastward only to Bexar County, Tex., where Mr. H. P. Attwater reports it as a rare summer resident near San Antonio, and found one of its eggs in the nest of a Bullock's Oriole in that vicinity.

We are indebted to Dr. James C. Merrill, U. S. Army, for the addition of this interesting species to our fauna, who first recorded it in the Bulletin of the Nuttall Ornithological Club, Vol. I, 1876, p. 88, as an abundant summer resident in the vicinity of Fort Brown, Tex. A full account of the breeding habits of this species by Dr. Merrill may be found in the above-mentioned bulletin, Vol. II, 1877, pp. 85-87, from which I extract the most interesting notes:

My first specimens were taken at Hidalgo, on the Rio Grande, 70 miles northwest of Fort Brown, where, however, they are not so abundant as lower down the river. Here they are common throughout the year, a small proportion going south in winter. Those that remain gather in large flocks with the Long-tailed Grackles, common Cowbirds, and Brewer's, Red-winged, and Yellow-headed Blackbirds; they become very tame, and the abundance of food about the picket lines attracts them for miles around. *C. robustus* is readily distinguishable in these mixed gatherings from the other species by its blood-red iris and its peculiar top-heavy appearance, caused by its habit of puffing out the feathers of the head and neck.

This habit is most marked during the breeding season and in the male, but is seen throughout the year.

About the middle of April the common Cowbird, Brewer's, and Yellow-headed Blackbirds leave for the north; the Long-tailed Grackles have formed their colonies in favorite clumps of mesquite trees; the Redwings that remain to breed have selected sites for their nests; the Dwarf Cowbirds, *Molothrus pecoris obscurus*, arrive from the south, and *Calliothrus robustus* gather in flocks by themselves and wait for their victims to build. The males have now a variety of notes, somewhat resembling those of the common Cowbird *Molothrus pecoris*, but more harsh. During the day they scatter over the surrounding country in little companies of one or two females and half a dozen males, returning at nightfall to the vicinity of the picket lines. While the females are feeding or resting in the shade of a bush the males are eagerly paying their addresses by puffing out their feathers, as above noted, strutting up and down, and nodding and bowing in a very odd manner. Every now and then one of the males rises in the air, and poising himself 2 or 3 feet above the female, flutters for a minute or two, following her if she moves away, and then descends to resume his puffing and bowing. This habit of fluttering in the air was what first attracted my attention to the species. In other respects their habits seem to be like those of the eastern Cowbird (*M. pecoris*).

My first egg of *C. robustus* was taken on May 14, 1876, in a Cardinal's nest. A few days before this a soldier brought me a similar egg, saying he found it in a Scissors-tail's (*Milvulus*) nest. Not recognizing it at the time, I paid little attention to him,

and did not keep the egg. I soon found several others, and have taken in all 22 specimens the past season. All but 2 of these were found in nests of the Bullock's, Hooded, and Orchard Orioles. It is a curious fact that although Yellow-breasted Chats and Redwinged Blackbirds breed abundantly in places most frequented by these Cowbirds, I have but once found the latter's egg in a Chat's nest, and never in a Redwing's, though I have looked in very many of them. Perhaps they feel that the line should be drawn somewhere, and select their cousins, the Blackbirds, as coming within it. The Dwarf Cowbirds are not troubled by this scruple, however. Several of these parasitic eggs were found under interesting conditions. On six occasions I have found an egg of both Cowbirds in the same nest. In four of these there were eggs of the rightful owner,* who was sitting. In the other two the Cowbird's eggs were alone in the nests, which were deserted. But I have known the Hooded Oriole to set on an egg of *C. robustus*, which was on the point of hatching when found. How its own disappeared I can not say. Once 2 eggs of *C. robustus* were found in a nest of the small Orchard Oriole (var. *affinis*). Twice I have seen a broken egg of *C. robustus* under nests of Bullock's Oriole on which the owner was sitting.

Early in June a nest of the Hooded Oriole was found, with 4 eggs, and one of *C. robustus*, all of which I removed, leaving the nest. Happening to pass by it a few days later, I looked in, and to my surprise found 2 eggs of *robustus*, which were broken. These were so unlike that they were probably laid by different birds. Still another egg, and the last, was laid in the same nest within ten days. But the most remarkable instance was a nest of the small Orchard Oriole, found June 20, containing 3 eggs of *C. robustus*, while just beneath it was a whole egg of this parasite; also a broken one of this and of the Dwarf Cowbird *M. obscurus*. Two of the eggs in the nest were rotten. The third, strange to say, contained a living embryo. As the nest was certainly deserted, I can only account for this by supposing that the 2 rotten ones were laid about the first week of June, when there was considerable rain, and that the other was deposited soon after, since which time the weather had been clear and very hot. On one occasion I found a female *C. robustus* hanging with a stout thread around its neck to a nest of the Bullock's Oriole. The nest contained one young of this Cowbird, and it is probable that its parent after depositing the egg was entangled in the thread on hurriedly leaving the nest, and there died. It had apparently been dead about two weeks. This case supports the view that the eggs or young of the owner are thrown out by the young parasite and not removed by its parent, though I could find no trace of them beneath the nest.

Among the species imposed on by the Bronzed Cowbird are the following:

Milvulus forficatus, Scissors-tailed Fly-catcher.

Icterus auduboni, Audubon's Oriole.

Icterus cucullatus, Hooded Oriole.

Icterus spurius, Orchard Oriole.

Icterus bullocki, Bullock's Oriole.

Cardinalis cardinalis canicaudus, Gray-tailed Cardinal.

Guiraca caerulea eurhyncha, Western Blue Grosbeak.

Icterus virens longicauda, Long-tailed Chat.

Other species undoubtedly will have to be added to this list.

The Orioles appear to be the especial victims of the Bronzed Cowbird, and among these Audubon's seem to be the worst sufferer. In nine sets of this species in the U. S. National Museum collection there are only two which contain the normal number of eggs, 4. The other seven all contain from 1 to 3 of these parasitic eggs, with 1 or 2 of

* It would be interesting to know what would have become of the three species in one nest, and had the latter been near the fort where I could have visited them daily I should not have taken the eggs. It is probable, however, that *C. robustus* would have disposed of the young Dwarf Cowbird as easily as of the young Orioles.

their own, and some of these are usually punctured. In none of these nests were eggs of the Dwarf Cowbird found in addition to those of the *Callothrus robustus*. The former appears to confine itself to the smaller Orioles only.

The eggs of the Bronzed Cowbird are rather glossy; the shell is finely granulated and strong. Their shape varies from ovate to short and rounded ovate. They are pale bluish green in color and unspotted, resembling the eggs of the Black-throated Sparrow and Blue Grosbeak in this respect, but are much larger.

The average measurement of 38 specimens in the U. S. National Museum collection is 23.11 by 18.29 millimeters, or 0.91 by 0.72 inch. The largest egg of the series measures 24.64 by 18.80 millimeters, or 0.97 by 0.74 inch; the smallest, 21.84 by 16.76 millimeters, or 0.86 by 0.66 inch.

MOLOTHRUS BONARIENSIS (Gm.). Argentine Cowbird.

Molothrus bonariensis, SCL. et SALV., *Nomencl.*, p. 37; HUDSON, *P. Z. S.*, 1872, p. 809, 1874, p. 153 (Buenos Ayres); DURNFORD, *Ibis*, 1877, pp. 33, 174 (Chupat); WHITE, *P. Z. S.*, 1882, p. 601 (Buenos Ayres); DÖRING, *Exp. al Rio Negro, Zool.*, p. 41 (*Carhué*); BARROWS, *Bull. Nutt. Orn. Cl.* VIII, p. 133 (Enterrios); SCL., *Cat. B.*, XI, p. 335.—*Molothrus sericeus*, BURM., *La Plata Reise*, II, p. 494.

Description.—Uniform shining purplish black; less lustrous on wings and tail; bill and feet black; total length, 7.5 inches; wing, 4.5; tail, 3. Female, dark ashy brown; beneath paler; slightly smaller in size.

Hab.—Argentina, Paraguay, Bolivia, and Brazil. This species is the *Tordo Comun* of Azara, and is usually called "*Tordo*" or "*Pajaro Negro*" by the Spanish, and "*Blackbird*" by the English-speaking Argentines. A more suitable name, I think, is the Argentine Cowbird, which has been given to it by some writers on ornithology, Cowbird being the name of the closely allied North American species, *Molothrus pecoris*.

This Cowbird is widely distributed in South America, and is common throughout the Argentine country, including Patagonia, as far south as Chupat. In Buenos Ayres it is very numerous, especially in cultivated districts where there are plantations of trees. The male is clothed in a glossy plumage of deep violaceous purple, the wings and tail being dark metallic green; but seen at a distance or in the shade the bird looks black. The female is inferior in size and has a dull, mouse-colored plumage and black beak and legs. The males are much more numerous than the females. Azara says that nine birds in ten are males, but I am not sure that the disparity is so great as that. It seems strange and contrary to nature's usual rule that the smaller, shyer, inconspicuous individuals should be in such a minority; but the reason is perhaps that the male eggs of the Cowbird are harder shelled than the female eggs, and escape destruction oftener when the parent bird exercises its disorderly and destructive habit of pecking holes in all the eggs it finds in the nests into which it intrudes.

The Cowbirds are sociable to a greater degree than most species, their companies not breaking up during the laying season; for, as they are parasitical, the female merely steals away to drop her egg in any nest she can find, after which she returns to the flock. They feed on the ground, where, in their movements and in the habit the male has in craning out its neck when disturbed, they resemble Starlings. The male has also a curious habit of carrying his tail raised vertically while feeding. They follow the domestic cattle about the pastures, and frequently a dozen or more birds may be seen perched along the back of a cow or horse. When the animal is grazing they group themselves close to its mouth like chickens round a hen when she scratches up the ground, eager to snatch up the small insects exposed where the grass is cropped close. In spring they also follow the plow to pick up worms and grubs.

The song of the male, particularly when making love, is accompanied with gestures and actions somewhat like those of the domestic pigeon. He swells himself out, beating the ground with his wings, and uttering a series of deep internal notes, followed by others loud and clear; and occasionally when uttering them he suddenly takes wing and flies directly away from the female to a distance of 50 yards, and performs a wide circuit about her in the air, singing all the time.

The homely object of his short-lived passion always appears utterly indifferent to this curious and pretty performance; yet she must be even more impressionable than most female birds, since she continues scattering about her parasitical and often wasted eggs during four months in every year. Her language consists of a long note with a spluttering sound, to express alarm or curiosity, and she occasionally chatters in a low tone as if trying to sing. In the evening when the birds congregate on the trees to roost they often continue singing in concert until it is quite dark; and when disturbed at night the females frequently utter their song while taking flight, reminding one of the *Icterus pyrrhopterus*, which has only its usual melody to express fear and other painful emotions. On rainy days, when they are driven to the shelter of trees, they will often sing together for hours without intermission, the blending of innumerable voices producing a rushing sound as of a high wind. At the end of summer they congregate in flocks of tens of thousands so that the ground where they are feeding seems carpeted with black, and the trees when they alight appear to have a black foliage. At such times one wonders that many small species on which they are parasites do not become extinct by means of their pernicious habit. In Buenos Ayres, where they are most numerous, they have a migration, which is only partial, however. It is noticeable chiefly in the autumn, and varies greatly in different years. In some seasons it is very marked, when for many days in February and March the birds are seen traveling northward, flocks succeeding flocks all day long, passing by with a swift, low, undulating flight, their wings

producing a soft musical sound; and this humming flight of the migrating Cowbirds is as familiar to every one acquainted with nature in Buenos Ayres as the whistling of the wind or the distant lowing of cattle.

The procreant instinct of this *Molothrus* has always seemed so important to me, for many reasons, that I have paid a great deal of attention to it; and the facts, or, at all events, the most salient of them, which I have collected during several years of observation, I propose to append here, classified under different headings so as to avoid confusion, and to make it easy for other observers to see at a glance just how much I have learned.

Though I have been familiar with this species from childhood, when I used to hunt every day for their wasted eggs on the broad, clean walks of the plantation, and removed them in pity from the nests of little birds where I found them, I have never ceased to wonder at their strange instinct, which in its wasteful, destructive character, so unlike the parasitical habit in other species, seems to strike a discordant note in the midst of the general harmony of nature.

MISTAKES AND IMPERFECTIONS OF THE PROCREANT INSTINCT OF *MOLOTHRUS BONARIENSIS*.

1. The Cowbirds, as we have seen, frequently waste their eggs by dropping them on the ground.

2. They also occasionally lay in old forsaken nests. This I have often observed, and to make very sure I took several old nests and placed them in trees and bushes, and found that eggs were laid in them.

3. They also frequently lay in nests where incubation has actually begun. When this happens the Cowbird's egg is lost, if incubation is far advanced; but if the eggs have been sat on three or four days only, then it has a good chance of being hatched and the young bird reared along with its foster brothers.

4. One female often lays several eggs in the same nest, instead of laying only one, as does, according to Wilson, the *Molothrus pecoris* of North America. I conclude that this is so from the fact that in cases where the eggs of a species vary considerably in form, size, and markings, each individual of the species lays eggs precisely or nearly alike. So when I find 2, 3, or 4 eggs of the Cowbird in one nest all alike in color and other particulars, and yet in half a hundred eggs from other nests can not find one to match with them, it is impossible not to believe that the eggs found together, and possessing a family likeness, were laid by the same bird.

5. Several females often lay in one nest, so that the number of eggs in it frequently makes incubation impossible. One December I collected ten nests of the Scissortail, *Milvulus tyrannus*, from my trees; they contained a total of 47 eggs, 12 of the Scissortails and 35 of the Cowbirds. It is worthy of remark that the *Milvulus* breeds in October

or early in November, rearing only one brood; so that these ten nests found late in December were of birds that had lost their first nests. Probably three-fourths of the lost nests of *Mitrculus* are abandoned in consequence of the confusion caused in them by the Cowbirds.

6. The Cowbirds, male and female, destroy many of the eggs in the nests they visit, by pecking holes in the shells, breaking, devouring, and stealing them. This is the most destructive habit of the bird, and is probably possessed by individuals in different degrees. I have often carefully examined all the parasitical eggs in a nest, and after three or four days found that these eggs had disappeared, others, newly laid, being in their places. I have seen the female Cowbird strike her beak into an egg and fly away with it; and I have often watched the male bird perched close by while the female was on the nest, and when she quitted it seen him drop down and begin pecking holes in the eggs. In some nests found full of parasitical eggs every egg has holes pecked in the shell, for the bird destroys indiscriminately eggs of its own and of other species.

ADVANTAGES POSSESSED BY *M. BONARIENSIS* OVER ITS DUPES.

After reading the preceding notes one might ask, if there is so much that is defective and irregular in the reproductive instinct of *M. bonariensis*, how does the species maintain its existence, and even increase to such an amazing extent, for it certainly is very much more numerous, over an equal area, than other parasitical species. For its greater abundance there may be many reasons unknown to us. The rarer species may be less hardy, have more enemies, be exposed to more perils in their long migrations, etc. That it is able to maintain its existence in spite of irregularities in its instinct is no doubt due to the fact that its eggs and young possess many advantages over the eggs and young of the species upon which it is parasitical. Some of these advantages are due to those very habits of the parent bird which at first sight appear most defective; others to the character of the egg and embryo, time of evolution, etc.

1. The egg of the Cowbird is usually larger, and almost invariably harder shelled than are the eggs it is placed with; those of the Yellow-breast, *Pseudoleistes virescens*, being the one exception I am acquainted with. The harder shell of its own egg, considered in relation to the destructive egg-breaking habit of the bird, gives it the best chance of being preserved; for though the Cowbird never distinguishes its own eggs, of which indeed it destroys a great many, a larger proportion escape in a nest where many eggs are indiscriminately broken.

2. The vitality or tenacity of life appears greater in the embryo Cowbird than in other species; this circumstance also, in relation to the egg-breaking habit and to the habit of laying many eggs in a nest, gives it a further advantage. I have examined nests of the Scissortail, containing many eggs, after incubation had begun, and have been surprised at finding those of the Scissortail addled, even when placed

most advantageously in the nest for receiving heat from the parent bird, while those of the Cowbird contained living embryos, even when under all the other eggs, and as frequently happens, glued immovably to the nest by the matter from broken eggs spilt over them.

The following instance of extraordinary vitality in an embryo *Molothrus* seems to show incidentally that in some species protective habits, which will act as a check on the parasitical instinct, may be in the course of formation.

Though birds do not, as a rule, seem able to distinguish parasitical eggs from their own, however different in size and color they may be, they often do seem to know that eggs dropped in their nest before they themselves have begun to lay ought not to be there; and the nest, even after its completion, is not infrequently abandoned on account of these premature eggs. Some species, however, do not forsake their nests; and though they do not throw the parasitical eggs out, which would seem the simplest plan, they have discovered how to get rid of them and so save themselves the labor of making a fresh nest. Their method is to add a new deep lining, under which the strange eggs are buried out of sight and give no more trouble. The *Sisopygis icterophrys*, a common Tyrant Bird in Buenos Ayres, frequently has recourse to this expedient, and the nest it makes being rather shallow the layer of fresh material, under which the strange eggs are buried, is built upward above the rim of the original nest, so that this supplementary nest is like one saucer placed within another, and the observer is generally able to tell from the thickness of the whole structure whether any parasitical eggs have been entombed in it or not. Finding a very thick nest one day, containing 2 half-fledged young birds besides 3 addled eggs, I opened it, removing the upper portion, or additional nest, intact, and discovered beneath it three buried *Molothrus* eggs, their shells encrusted with dirt and glued together with broken egg-matter spilt over them. In trying to get them out without pulling the nest to pieces I broke them all. Two were quite rotten, but the third contained a living embryo, ready to be hatched, and very lively and hungry when I took it in my hand. The young Tyrant Birds were about a fortnight old, and as they hatch out only about twenty days after the parent bird begins laying, this parasitical egg with a living chick in it must have been deeply buried in the nest for five or six weeks. Probably after the young Tyrant Birds came out of their shells and began to grow, the little heat from their bodies penetrating to the buried egg, served to bring the embryo in it to maturity; but when I saw it I felt (like a person who sees a ghost) strongly inclined to doubt the evidence of my own senses.

3. The comparatively short time the embryo takes to hatch gives it another and a great advantage; for, whereas the eggs of other small birds require from fourteen to sixteen days to mature, that of the Cowbird hatches in eleven days and a half from the moment incubation commences; so that when the female Cowbird makes so great a mistake

as to drop an egg with others that have already been sat on, unless incubation be very far advanced, it still has a chance of being hatched before or contemporaneously with the others; but even if the others hatch first, the extreme hardness of the embryo serves to keep it alive with the modicum of heat it receives.

4. Whenever the *Molothrus* is hatched together with the young of its foster parents, if these are smaller than the parasite, as usually is the case, soon after exclusion from the shell they disappear, and the young Cowbird remains sole occupant of the nest. How it succeeds in expelling or destroying them, if it indeed does destroy them, I have not been able to learn.

5. To all these circumstances favorable to the *Molothrus* may be added another of equal or even greater importance. It is never engaged with the dilatory and exhaustive process of rearing its own young, and for this reason continues in better condition than other species; and, moreover, being gregarious and practising promiscuously sexual intercourse, must lay a much greater number of eggs than other species. In our domestic fowls we see that hens that never become broody lay a great deal more than others. Some of our small birds rear two, others only one brood in the season, building, incubation, and tending the young taking up much time, so that they are usually from two to three months and a half employed. But the Cowbird is like the fowl that never incubates, and continues dropping eggs during four months and a half. From the beginning of September until the end of January the males are seen incessantly wooing the females, and during most of this time eggs are found. I find that small birds will, if deprived repeatedly of their nests, lay and even hatch four times in the season, thus laying, if the full complement be 4, 16 eggs. No doubt the Cowbird lays a much larger number than that; my belief is that every female lays from 60 to 100 eggs every season, though I have nothing but the extraordinary number of wasted eggs one finds to judge from.

Before dismissing the subject of the advantages the *Molothrus* possesses over its dupes, and of the real or apparent defects of its instinct, some attention should be given to another circumstance, viz, the new conditions introduced by land cultivation and their effect on the species. The altered conditions have in various ways served to remove many extraneous checks on the parasitical instinct, and the more the birds multiply the more irregular and disordered does the instinct necessarily become. In wild districts where it was formed, and where birds building accessible nests are proportionately fewer, the instinct seems different from what it does in cultivated districts. Parasitical eggs are not common in the desert, and even the most exposed nests there are probably never overburdened with them. But in cultivated places, where their food abounds, the birds congregate in the orchards and plantations in great numbers, and avail themselves of all the nests, ill-concealed as they must always be in the clean, open-foliaged trees planted by man.

DIVERSITY IN COLOR OF EGGS.

There is an extraordinary diversity in the color, form, and disposition of markings, etc., of the eggs of *M. bonariensis*; and I doubt whether any other species exists laying eggs so varied. About half the eggs one finds, or nearly half, are pure unspotted white, like the eggs of birds that breed in dark holes. Others are sparsely sprinkled with such exceedingly minute specks of pale pink or gray as to appear quite spotless until closely examined. After the pure white, the most common variety is an egg with a white ground, densely and uniformly spotted or blotched with red. Another not uncommon variety has a very pale, flesh-colored ground, uniformly marked with fine characters, that look as if inscribed on the shell with a pen. A much rarer variety has a pure white shell with a few large or variously sized chocolate spots. Perhaps the rarest variety is an egg entirely of a fine deep red; but between this lovely marbled egg and the white one with almost imperceptible specks there are varieties without number, for there is no such thing as characteristic markings in the eggs of this species, although, as I have said before, the eggs of the same individual show a family resemblance.

HABITS OF THE YOUNG OF *M. BONARIENSIS*.

Small birds of all species, when first hatched, closely resemble each other. After they are fledged the resemblance is less, but still comparatively great. Gray, interspersed with brown, is the color of most of them, or at least of the upper exposed plumage. There is also a great similarity in their cries of hunger and fear—shrill, querulous, prolonged, and usually tremulous notes. It is not, then, to be wondered at that the foster parents of the young *Molothrus* so readily respond to its cries, understanding the various expressions denoting hunger, fear, pain, as well as when uttered by their own offspring. But the young *Molothrus* never understands the language of its foster parents as other young birds understand the language of their real parents, rising to receive food when summoned, and concealing themselves or trying to escape when the warning note is given. How does the young *Molothrus* learn to distinguish, even by sight, its foster parent from any other bird approaching the nest? It generally manifests no fear even at a large object. On thrusting my fingers into any nest I find the young birds, if still blind or but recently hatched, will hold up and open their mouths, expecting food; but in a very few days they learn to distinguish between their parents and other objects approaching them, and to show alarm even when not warned of danger. Consider the different behavior of three species that seldom or never warn their offspring of danger: The young of *Synallaxis spixi*, though in a deep, domed nest, will throw itself to the ground, attempting thus to make its escape; the young of *Mimus patagonicus* sits close and motionless, with closed eyes, mimicking death; the young of our common

Zenaida, even before it is fledged, will swell itself up and strike angrily at the intruder with beak and wings, and by making so brave a show of its inefficient weapons it probably often saves itself from destruction. But anything approaching the young *Molothrus* is welcomed with fluttering wings and clamorous cries, as if all creatures were expected to minister to its necessities.

December 21.—To-day I found a young *Molothrus* in the nest of *Spermophila cerulescens*. He cried for food on seeing my hand approach the nest. I took him out and dropped him down, when, finding himself on the ground, he immediately made off, half flying. After a hard chase I succeeded in recapturing him, and began to twirl him about, making him scream, so as to inform his foster parents of his situation, for they were not by at the moment. I then put him back in, or rather upon, the little cradle of a nest, and plucked half a dozen large measure worms from an adjacent twig. The worms I handed to the bird as I drew them from the cases, and with great greediness he devoured them all, notwithstanding the ill treatment he had just received, and utterly disregarding the wild, excited cries of his foster parents, just arrived and hovering within 3 or 4 feet of the nest.

Last summer I noticed a young Cowbird in a stubble field, perched on the top of a slender, dry stalk. As it was clamoring at short intervals, I waited to see what bird would come to it. It proved to be the diminutive *Hapalocercus flaviventris*, and I was much amused to see the little thing fly directly to its large foster offspring and, alighting on its back, drop a worm into the upturned open mouth. After remaining a moment on its singular perch, the Flycatcher flew away, but in less than half a minute returned and perched again on the young bird's back. I continued watching them until the *Molothrus* flew off, but not before I had seen him fed seven or eight times in the same manner.

In the two foregoing anecdotes may be seen the peculiar habits of the young *Molothrus*. As the nests in which it is hatched, from those of the little *Serpophaga* and Wren to those of *Mimus*, vary so much in size and materials, and are placed in such different situations, the young *Molothrus* must have in most of them a somewhat incongruous appearance. But in the habits of the young bird is the greatest incongruity or inadaptation. When the nest is in a close thicket or forest, though much too small for the bird, and although the bird itself can not understand its foster parents and welcomes all things that, whether with good or evil design, come near it, the unfitness is not so apparent as when the nest is in open fields and plains.

The young *Molothrus* differs from the true offspring of its foster parents in its habit of quitting the nest as soon as it is able, trying to follow the old bird, and placing itself in the most conspicuous place it can find, such as the summit of a stalk or weed, and there demanding food with frequent and importunate cries. Thus the little Flycatcher had acquired the habit of perching on the back of its charge to

feed it, because parent birds invariably perch above their young to feed them, and the young Cowbird prevented this by always sitting on the summit of the stalk it perched on. The habit is most fatal on the open and closely cropped pampas inhabited by the Cachila, *Anthus corren-dera*. In December, when the Cachila Pipit rears its second brood, the *Milvago chimango* also has young, and feeds them almost exclusively on the young of various species of small birds. At this season the Chimango destroys great numbers of the young of the *Cachila* and of *Synallaxis hudsoni*. Yet these birds are beautifully adapted, in structure, coloration, and habits, to their station. It thus happens that in districts where the *Molothrus* is abundant their eggs are found in a majority of the *Cachilas's* nests; and yet to find a young Cowbird out of the nest is a rare thing here, for as soon as the young birds are able to quit the nest and expose themselves they are all or nearly all carried off by the *Chimangos*.

CONJECTURES AS TO THE ORIGIN OF THE PARASITIC INSTINCT IN *M. BONARIENSIS*.

Darwin's opinion that the "immediate and final cause of the Cuckoo's instinct is that she lays her eggs not daily, but at intervals of two or three days" (Origin of Species), carries no great appearance of probability with it; for might it not just as reasonably be said that the parasitic instinct is the immediate and final cause of her laying her eggs at long intervals? If it is favorable to a species with the instinct of the Cuckoo (and it probably is favorable) to lay eggs at longer intervals than other species, then natural selection would avail itself of every modification in the reproductive organs that tended to produce such a result, and make the improved structure permanent. It is said (Origin of Species, Chap. VII) that the American Cuckoo lays also at long intervals, and has eggs and young at the same time in its nest, a circumstance manifestly disadvantageous. Of the *Coccyzus melanocoryphus*, the only one of our three *Coccyzi* whose nesting habits I am acquainted with, I can say that it never begins to incubate till the full complement of eggs are laid—that its young are hatched simultaneously. But if it is sought to trace the origin of the European Cuckoo's instinct in the nesting habits of American *Coccyzi*, it might be attributed not to the aberrant habit of perhaps a single species, but to another and more disadvantageous habit common to the entire genus, viz, their habit of building exceedingly frail platform nests, from which the eggs and young very frequently fall. By occasionally dropping an egg in the deep, secure nest of some other bird an advantage would be possessed by the birds hatched in them, and in them the habit would perhaps become hereditary. Be this as it may (and the one guess is perhaps as wide of the truth as the other), there are many genera intermediate between *Cuculus* and *Molothrus* in which no trace of a parasitic habit appears; and it seems more than probable that the analogous instincts originated in different ways in the two genera. As regards the origin of the

instinct in *Molothrus*, it will perhaps seem premature to found speculations on the few facts here recorded and before we are acquainted with the habits of other members of the genus. That a species should totally lose so universal an instinct as the maternal one, and yet avail itself of that affection in other species to propagate itself, seems a great mystery. Nevertheless, I can not refrain from all conjecture on the subject, and will go so far as to suggest what may have been at least one of the many concurrent causes that have produced the parasitic instinct. The apparently transitional nesting habits of several species, and one remarkable habit of *M. bonariensis*, seem to me to throw some light on a point bearing intimately on the subject, viz, the loss of the nest-making instinct in this species.

Habits vary greatly; were it not so, they would never seem so well adapted to the conditions of life as we find them, since the conditions themselves are not unchangeable. Thus it happens that while a species seems well adapted to its state in its habits, it frequently seems not so well adapted in its relatively immutable structure. For example, without going away from the pampas, we find a *Tringa* with the habits of an upland Plover, a Tyrant Bird, *Pitangus bellicosus*, preying on mice and snakes, another Tyrant Bird, *Myiotheretes rufiventris*, Plover-like in its habits, and finally a Woodpecker, *Colaptes campestris*, that seeks its food on the ground like a Starling; yet in none of these—and the list might be greatly lengthened—has there been anything like a modification of structure to keep pace with the altered manner of life. But, however much the original or generic habits of a species may have become altered—the habits of a species being widely different from those of its congeners, also a want of correspondence between structure and habits (the last being always more suited to conditions than the first) being taken as evidence of such alteration—traces of ancient and disused habits frequently reappear. Seemingly capricious actions, too numerous, too vague, or too insignificant to be recorded, improvised definite actions that are not habitual, apparent imitations of the actions of other species, a perpetual inclination to attempt something that is never attempted, and attempts to do that which is never done—these and other like motions are, I believe, in many cases to be attributed to the faint promptings of obsolete instincts. To the same cause many of the occasional aberrant habits of individuals may possibly be due—such as of a bird that builds in trees occasionally laying on the ground. If recurrence to an ancestral type be traceable in structure, coloration, language, it is reasonable to expect something analogous to occur in instincts. But even if such casual and often aimless motions as I have mentioned should guide us unerringly to the knowledge of the old and disused instincts of a species, this knowledge of itself would not enable us to discover the origin of present ones. But, assuming it as a fact that the conditions of existence and the changes going on in them are in every case the fundamental cause of alterations in habits, I believe that in

many cases a knowledge of the disused instincts will assist us very materially in the inquiry. I will illustrate my meaning with a supposititious case. Should all or many species of *Columbidae* manifest an inclination for haunting rocks and banks, and for entering or peering into holes in them, such vague and purposeless actions, connected with the facts that all doves build simple platform nests (like *Columba livia* and others that build on a flat surface), also lay white eggs (the rule being that eggs laid in dark holes are white, exposed eggs colored), also that one species, *C. livia*, does lay in holes in rocks, would lead us to believe that the habit of this species was once common to the genus. We should conclude that an insufficiency of proper breeding places, i. e., new external conditions, first induced doves to build in trees. Thus *C. livia* also builds in trees where there are no rocks; but, when able, returns to its ancestral habits. In the other species we should believe the primitive habit to be totally lost from disuse, or only to manifest itself in a faint, uncertain manner.

Now, in *Molothrus bonariensis* we see just such a vague, purposeless habit as the imaginary one I have described. Before and during the breeding season the females, sometimes accompanied by the males, are seen continually haunting and examining the domed nests of some of the *Dendrocolaptidae*. This does not seem like a mere freak of curiosity, but their persistence in their investigations is precisely like that of birds that habitually make choice of such breeding places. It is surprising that they never do actually lay in such nests, except when the side or dome has been accidentally broken enough to admit the light into the interior. Whenever I set boxes up in my trees the female Cowbirds were the first to visit them. Sometimes one will spend half a day loitering about and inspecting a box, repeatedly climbing round and over it and always ending at the entrance, into which she peers curiously, and when about to enter starting back as if scared at the obscurity within; but after retiring a little space she will return again and again, as if fascinated with the comfort and security of such an abode. It is amusing to see how pertinaciously they hang about the ovens of the Ovenbirds, apparently determined to take possession of them, flying back after a hundred repulses, and yet not entering them even when they have the opportunity. Sometimes one is seen following a wren or a swallow to its nest beneath the eaves, and then clinging to the wall beneath the hole into which it disappeared. I could fill many pages with instances of this habit of *M. bonariensis*, which, useless though it be, is as strong an affection as the bird possesses. That it is a recurrence to a long disused habit I can scarcely doubt; at least, to no other cause that I can imagine can it be attributed; and, besides, it seems to me that if *M. bonariensis*, when once a nest builder, had acquired the semiparasitical habit of breeding in domed nests of other birds, such a habit might conduce to the formation of the instinct which it now possesses.

I may mention that twice I have seen birds of this species attempting to build nests, and that on both occasions they failed to complete the work. So universal is the nest-making instinct that one might safely say the *M. bonariensis* had once possessed it, and that in the cases I have mentioned it was a recurrence, too weak to be efficient, to the ancestral habit. Another interesting circumstance may be adduced as strong presumptive evidence that *M. bonariensis* once made itself an open exposed nest as *M. badius* occasionally does, viz, the difference in color of the male and female, for while the former is rich purple the latter possesses an adaptive resemblance in color to nests and to the shaded interior twigs and branches on which nests are usually built. How could such an instinct have been lost? To say that the Cowbird occasionally dropped an egg in another bird's nest, and that the young hatched from these occasional eggs possessed some (hypothetical) advantage over those hatched in the usual way, and that the parasitical habit so became hereditary, supplanting the original one, is an assertion without anything to support it, and seems to exclude the agency of external conditions. Again, the want of correspondence in the habits of the young parasite and its foster parents would in reality be a disadvantage to the former; the unfitness would be as great in the eggs and other circumstances, for all the advantages the parasite actually possesses in the comparative hardness of the eggshell, rapid evolution of the young, etc., already mentioned, must have been acquired little by little through the slowly accumulating process of natural selection, but subsequently to the formation of the original parasitical inclination and habit. I am inclined to believe that *M. bonariensis* lost the nest-making instinct by acquiring that semiparasitical habit common to so many South American birds of breeding in the large covered nests of the *Dendrocolaptidae*. We have evidence that this semiparasitical habit does tend to eradicate the nest-making one. The *Synallaxes* build great elaborate domed nests, yet we have one species (*S. agithaloides*) that never builds for itself, but breeds in the nests of other birds of the same genus. In some species the nest-making habit is in a transitional state. *Machetornis rixosa* sometimes makes an elaborate nest in the angle formed by twigs and the bough of a tree, but prefers, and almost invariably makes choice of, the covered nest of some other species or of a hole in the tree. It is precisely the same with our Wren, *Troglodytes furvus*. The Yellow House Sparrow, *Sycaelis pelzelni*, invariably breeds in a dark hole or covered nest. The fact that these three species lay colored eggs, and the first and last very darkly colored eggs, inclines one to believe that they once invariably built exposed nests, as *M. rixosa* still occasionally does. It may be added that those species that lay colored eggs in dark places construct and line their nests far more neatly than do the species that breed in such places but lay white eggs. As with *M. rixosa* and the Wren, so it is with the Bay-winged *Molothrus*; it lays mottled eggs, and

occasionally builds a neat, exposed nest; yet so great is the partiality it has acquired for large domed nests, that whenever it can possess itself of one by dint of fighting it will not build one for itself. Let us suppose that the Cowbird also once acquired the habit of breeding in domed nests, and that through this habit its original nest-making instinct was completely eradicated. It is not difficult to imagine how in its turn this instinct was also lost. A diminution in the number of birds that built domed nests would involve *M. bonariensis* in a struggle for nests, in which it would probably be defeated. In Buenos Ayres the White-rumped Swallow, the Wren, and the Yellow Seed-finch prefer the ovens of the *Furnarius* to any other breeding place, but to obtain them are obliged to struggle with *Progne tapera*, for this species has acquired the habit of breeding exclusively in the ovens. They can not, however, compete with the *Progne*, and thus the increase of one species has, to a great extent, deprived three other species of their favorite building place. Again, *Machetornis rixosa* prefers the great nest of the *Anumbius*, and when other species compete with it for the nest they are invariably defeated. I have seen a pair of *Machetornis*, after they had seized a nest, attacked in their turn by a flock of 6 or 8 Bay-wings, but, in spite of the superior numbers, the fury of the *Machetornis* compelled them to raise the siege.

Thus some events in the history of our common *Molothrus* have perhaps been accounted for, if not the most essential one—the loss of the nest-making instinct from the acquisition of the habit of breeding in the covered nests of other birds, a habit that has left a strong trace in the manners of the species, and perhaps in the pure white unmarked eggs of so many individuals; finally, we have seen how this habit may also have been lost. But the parasitical habit of the *M. bonariensis* may have originated when the bird was still a nest builder. The origin of the instinct may have been in the occasional habit, common to so many species, of two or more females laying together; the progenitors of all the species of *Molothrus* may have been early infected with this habit, and inherited with it a facility for acquiring their present one. *M. pecoris* and *M. bonariensis*, though their instincts differ, are both parasitic on a great number of species; *M. rufoaxillaris* on *M. badius*; and in this last species two or more females frequently lay together. If we suppose that the *M. bonariensis*, when it was a nest builder or reared its own young in the nests it seized, possessed this habit of two or more females frequently laying together, the young of those birds that oftenest abandoned their eggs to the care of another would probably inherit a weakened maternal instinct. The continual intercrossing of individuals with weaker and stronger instincts would prevent the formation of two races differing in habit; but the whole race would degenerate, and would only be saved from final extinction by some individuals occasionally dropping their eggs in the nests of other species, perhaps of a *Molothrus*, as *M. rufoaxillaris* still does, rather than

of birds of other genera. Certainly in this way the parasitic instinct may have originated in *M. bouariensis* without that species ever having acquired the habit of breeding in the covered dark nests of other birds. I have supposed that they once possessed it only to account for the strange attraction such nests have for them, which seems like a recurrence to an ancestral habit.

MOLOTHRUS RUFOAXILLARIS, Cassin. Screaming Cowbird.

Molothrus rufoaxillaris, SCL. et SALV., *Nomencl.* p. 37; HUDSON, *P. Z. S.* 1874, p. 161 (Buenos Ayres); DURNFORD, *Ibis*, 1877, p. 174 (Buenos Ayres); WHITE, *P. Z. S.* 1882, p. 601 (Catamarca); BARROWS, *Bull. Natl. Orn. Cl.* VIII, p. 134 (Entrerios); *Scl. Cat. B.* XI, p. 338.

Description.—Silky black, washed with purple; wings and tail with a slight greenish gloss; a chestnut spot on the axillaries; bill and feet black; whole length 8 inches, wing 4.5, tail 3.3. Female similar, but somewhat smaller.

Habitat.—Argentina and Uruguay.

This bird has no vulgar name, not being distinguished from the common Cowbird by the country people. The English name of Screaming Cowbird, which I have bestowed on it, will, I think, commend itself as appropriate to those who observe this bird, for they will always and at any distance be able to distinguish it from the species it resembles so nearly by listening to its impetuous screaming notes, so unlike anything in the language of the common Cowbird.

The Screaming Cowbird is larger than the allied species. The female is less than the male in size, but in color they are alike, the entire plumage being deep blue-black, glossy, and with purple reflections; and under the wing at the joint there is a small rufous spot. The beak is very stout, the plumage loose, and with a strong, musky smell; the oesophagus remarkably wide.

It is far less common than the other species of *Molothrus*, but is not rare, and ranges south to the Buenos-Ayorean pampas, where a few individuals are usually found in every large plantation; and, like the *M. badius*, it remains with us the whole year. It is not strictly gregarious, but in winter goes in parties, never exceeding five or six individuals, and in the breeding season in pairs. One of its most noteworthy traits is an exaggerated hurry and bustle thrown into all its movements. When passing from one branch to another, it goes by a series of violent jerks, smiting its wings loudly together, and when a party of them return from the fields they rush wildly and loudly screaming to the trees, as if pursued by a bird of prey. They are not singing birds, but the male sometimes, though rarely, attempts a song, and utters, with considerable effort, a series of chattering unmelodious notes. The chirp with which he invites his mate to fly has the sound of a loud and smartly-given kiss. His warning or alarm note when approached in the breeding season has a soft and pleasing sound; it

is, curiously enough, his only mellow expression. But his most common and remarkable vocal performance is a cry beginning with a hollow-sounding internal note, and swelling into a sharp metallic ring; this is uttered with tail and wings spread and depressed, the whole plumage raised like that of a strutting turkey cock, whilst the bird hops briskly up and down on its perch as if dancing. From its puffed-out appearance, and from the peculiar character of the sound it emits, I believe that, like the pigeon and some other species, it has the faculty of filling its crop with air, to use it as a "chamber of resonance." The note I have described is quickly and invariably followed by a scream, harsh and impetuous, uttered by the female, though both notes always sound as if proceeding from one bird. When on the wing the birds all scream together in concert.

The food of this species is chiefly minute seeds and tender buds; they also swallow large caterpillars and spiders, but do not, like their congeners, eat hard insects.

I became familiar, even as a small boy, with the habits of the Screaming Cowbird, and before this species was known to naturalists, but could never find its nest, though I sought diligently for it. I could never see the birds collecting materials for a nest, or feeding their grown-up young like other species, and this might have made me suspect that they did not hatch their own eggs; but it never occurred to me that the bird was parasitical, I suppose because in summer they are always seen in pairs, the male and female being inseparable. Probably this is the only parasitical species in which there is conjugal fidelity. I also noticed that, when approached in the breeding season, the pair always displayed great excitement and anxiety, like birds that have a nest, or that have selected a site on which to build one. But year after year the end of the summer would arrive, the birds reunite in parties of half a dozen, and the mystery remain unsolved. At length, after many years, fortune favored me, and while observing the habits of another species (*Molothrus badius*), I discovered by chance the procreant habits of the Screaming Cowbirds, and as these observations throw some light on the habits of *M. badius*, I think it best to transcribe my notes here in full.

A pair of *Leucateros* (*Anumbius acuticaudatus*) have been nearly all the winter building a nest on an acacia tree 60 yards from the house; it is about 27 inches deep, and 16 or 18 inches in circumference and appears now nearly finished. I am sure that this nest will be attacked before long, and I have resolved to watch it closely.

September 28.—To-day I saw a Bay-wing (*M. badius*) on the nest; it climbed over it, deliberately inspecting every part with the critical air of a proprietor who had ordered its construction, taking up and rearranging some sticks and throwing others away from the nest. While thus engaged two common Cowbirds (*M. bonariensis*), male and female, came to the tree. The female dropped on to the nest and began also to examine it, peering curiously into the entrance and quarreling with the

first bird. After a few minutes she flew away, followed by her glossy escort. The Bay-wing continued its strange, futile work until the owners of the nest appeared, whereupon it hopped aside in its usual slow leisurely manner, sang for a few moments, then flew away. The similarity in the behavior of the two birds struck me very forcibly. In the great interest they take in the nests of other birds, especially in large covered nests, the two species are identical. But when the breeding season comes their habits begin to diverge; then the common Cowbird lays in nests of other species, abandoning its eggs to their care, while the Bay-wings usually seize on the nests of other birds and rear their own young. Yet, as they do occasionally build a neat, elaborate nest for themselves, the habit of taking possession of the nests of other birds is, most likely, a recently acquired one, and probably its tendency is to eradicate the original building instinct.

October 8.—This morning, while reading under a tree, my attention was aroused by a shrill note as of a bird in distress issuing from the neighborhood of the *Leñatero's* nest; after hearing it repeated at intervals for over twenty minutes I went to ascertain the cause. Two Bay-wings flew up from the ground under the nest, and on searching in the rank clover growing under the tree I discovered the female *Leñatero*, with plumage wet and draggled, trembling and appearing half dead with the rough treatment she had experienced. I put her in the sun, and after half an hour, hearing her mate calling, she managed to flutter feebly away to join him. The persecutors had dragged her out of the nest and would, no doubt, have killed her, had I not come so opportunely to the rescue.

Since writing the above, I have continued to watch the nest. Both the Bay-wings and *Leñateros* left it for some days. Six days after picking up the ill-treated female, the *Leñateros* came back and resumed possession. Four days later the Bay-wings also came back; but on finding the nest still occupied, they took possession of an unfinished oven of an Ovenbird on another tree within 20 yards of the first, and immediately began carrying in materials with which to line it. When they had finished laying I took their 5 eggs, at the same time throwing down the oven, and waited to see what their next move would be. They remained on the spot singing incessantly, and still manifesting anxiety when approached. I observed them four days, and then was absent from home as many more; on returning I found that the *Leñateros* had once more disappeared and that the nest was now held by the Bay-wings. I also noticed that they had opened an entrance very low down at the side of the nest which they were using; no doubt they had killed and thrown out the young *Leñateros*.

It was now early in November, the height of the breeding season, and numbers of common Cowbirds constantly visited the nest; but I was particularly interested in a pair of Screaming Cowbirds that had also begun to grow fond of it, and I resolved to watch them closely. As

they spent so much of their time near the nest, showing great solicitude when I approached it, I strongly hoped to see them breed in it, if the Bay-wings could only be got rid of. The Screaming Cowbirds would not, or dared not, attack them; and, as I always think that the worst possible use one can put a little bird to is to shoot it, I could not help them by destroying the Bay-wings. I therefore resolved to take their eggs, hoping that that would cause them to leave in disgust.

When I was satisfied from their movements that they had finished laying, I got up to the nest and was astonished to find 10 eggs instead of 5 as I had confidently expected: for, though the common Cowbirds had paid a great deal of attention to the nest, I knew the Bay-wings would not allow them to lay in it.

The 10 eggs in the nest were all unmistakably Bay-wings' eggs, and having observed before that several females do occasionally lay together, I concluded that in this case two females had laid in the nest, though I had only seen two birds—male and female. After taking the 10 eggs the Bay-wings still remained, and in a very short time they appeared to be laying again. When I had reason to think that the full complement was laid, I visited the nest and found 5 eggs in it; these I also took and concluded that the second female had probably gone away, after having been deprived of her first clutch. During all this time the Screaming Cowbirds remained in the neighborhood and occasionally visited the tree; but to my very great surprise the Bay-wings still stubbornly remained, and by-and-by I found that they were going to lay again—the fourth time! When I next visited the nest there were 2 eggs in it; I left them and returned three days later, expecting to find 5 eggs, but found 7—certainly more than one female had laid in the nest on this occasion. After taking these last 7 eggs the Bay-wings left, and though the Screaming Cowbirds continued to make occasional visits to the nest, to my great disappointment they did not lay in it.

April 12.—To day I have made a discovery, and am as pleased with it as if I had found a new planet in the sky. The mystery of the Bay-wings' nest twice found containing over the usual complement of eggs is cleared up, and I have now suddenly become acquainted with the procreant instinct of the Screaming Cowbird. I look on this as a great piece of good fortune, for I had thought that the season for making any such discovery was already over, as we are so near to winter.

The Bay-wings are so social in their habits that they always appear reluctant to break up their companies in the breeding season. No sooner is this over, and while the young birds are still fed by the parents, all the families about a plantation unite into one flock. About a month ago all the birds about my home had associated in this way together and went in a scattered flock, frequenting one favorite feeding spot very much, a meadow about fifteen minutes' walk from the house. The flock was composed, I believe, of 3 families, 16 or 18 birds in all. The young birds are indistinguishable from the adults, but I knew

that most of these birds were young, hatched late in the season, from their incessant strident hunger notes. I first observed them about the middle of March. A week ago, while riding past the meadow where they were feeding, I noticed among them 3 individuals with purple spots on their plumage. They were at a distance from me, and I naturally concluded that they were young common Cowbirds (*M. bonariensis*) casually associating with the Bay-wings. I was surprised to see them, for the young male *M. bonariensis* always acquires the purple plumage before March, so that these individuals were changing color five weeks after the usual time. To-day, while out with my gun, I came upon the flock, and noticed 4 of the birds assuming the purple plumage, 2 of them being almost entirely that color; but I also noticed with astonishment that they had bay or chestnut-colored wings, also that those with least purple on them were marvelously like the Bay-wings in the mouse-colored plumage of the body and the dark tail. I had seen these birds before the purple plumage was acquired, and there was then not the slightest difference amongst them, the adults and their supposed offspring being alike; now some of them appeared to be undergoing the process of a transmutation into another species. I at once shot the 4 spotted birds, along with 2 genuine Bay-wings, and was delighted to find that the first were young Screaming Cowbirds.

I must now believe that the extra eggs twice found in the nest of the Bay-wings were those of the Screaming Cowbird; that the latter species lays chiefly in the nests of the former; that the eggs of the two species are identical in form, size, and color, each bird also laying 5; and that, stranger still, the similarity is as perfect in the young birds as it is in the eggs.

April 15.—This morning I started in quest of the Bay-wings, and observed 1 individual, that had somehow escaped detection the day before, assuming the purple dress. This bird I shot; and after the flock had resettled a short distance off I crept close up to them, under the shelter of a hedge, to observe them more narrowly. One of the adults was closely attended by 3 young birds; and these all, while I watched them, fluttered their wings and clamored for food every time the old bird stirred on its perch. The 3 young birds seemed precisely alike; but presently I noticed that 1 of them had a few minute purple spots, and on shooting this one I found it to be a young *M. rufoaxillaris*, while the other 2 were true young Bay-wings.

The hungry cry of the young *M. badius* (Bay-wing) is quite different from that of the young *M. bonariensis*. The cry of the latter is a long, shrill, two-syllabled note, the last syllable being prolonged into a continuous squeal when the foster parent approaches with food. The cry of the young *M. badius* is short, reedy, tremulous, and uninflected. The resemblance of the young *M. rufoaxillaris* to its foster brothers in language and plumage is the more remarkable when we reflect that the adult bird in its habits, gestures, guttural notes, also in its deep purple plumage, comes much nearer to *M. bonariensis* than to *M. badius*. It

seems impossible for mimicry to go further than this. A slight difference in size is quite imperceptible when the birds are flying about, while in language and plumage the keenest ornithologist would not be able to detect a difference. But it may be questioned whether this is really a case of an external resemblance of one species to another acquired by natural selection for its better preservation. Possibly the young *M. rufoaxillaris* in the first stage of its plumage exhibits the ancestral type—that of the progenitor of both species. If *M. badius* belonged to some other group—*Sturnella* or *Pseudoleistes*, for instance—it would scarcely be possible to doubt that the resemblance of the young *M. rufoaxillaris* to its foster brothers resulted from mimicry; but as both species belong to the limited, well-defined group *Molothrus*, the resemblance may be ascribed to community of descent.

Formerly I believed that, though *M. badius* is constantly seen rearing its own young, they also occasionally dropped their eggs in the nests of other birds. I could not doubt that this was the case after having witnessed a couple of their young following a Yellowbreast and being fed by it. I must now alter my opinion, for what then appeared to be proof positive is now no proof at all, for those two birds were probably the young of *M. rufoaxillaris*. There are, however, good reasons for believing that *M. rufoaxillaris* is parasitical almost exclusively on *M. badius*. I have spoken of the many varieties of eggs *M. bonariensis* lays. Those of *M. badius* are a trifle less in size, in form elliptical, densely and uniformly marked with small spots and blotches of dark reddish color, varying to dusky brown; the ground color is white, but sometimes, though rarely, pale blue. It is not possible to confound the eggs of the two species. Now, ever since I saw, many years ago, the Yellow breast feeding the supposed young Bay-wings, I have looked out for the eggs of the latter in other birds' nests. I have found hundreds of nests containing eggs of *M. bonariensis*, but never one with an egg of *M. badius*, and, I may now add, never one with an egg of *M. rufoaxillaris*. It is wonderful that *M. rufoaxillaris* should lay only in the nests of *M. badius*, but the most mysterious thing is that *M. bonariensis*, indiscriminately parasitical on a host of species, never, to my knowledge, drops an egg in the nest of *M. badius*, unless it be in a forsaken nest. Perhaps it will be difficult for naturalists to believe this, for if the *M. badius* is so excessively vigilant and jealous of other birds approaching its nest as to succeed in keeping out the subtle, silent, gray-plumaged, omnipresent female *M. bonariensis*, why does it not also keep off the far rarer, noisy, bustling, conspicuously colored *M. rufoaxillaris*? I cannot say. The only explanation that has occurred to me is that *M. badius* is sagacious enough to distinguish the eggs of the common parasite, and throws them out of its nest. But this is scarcely probable, for I have hunted in vain under the trees for the ejected eggs, and I have never found the eggs of *M. badius* with holes pecked in the shells, which would have been the case had *M. bonariensis* intruded into the nest.

With the results just recorded I felt more than satisfied, though so much still remained to be known, and I looked forward to the next summer to work out the rich mine on which I had stumbled by chance. Unhappily, when spring came around again ill health kept me a prisoner in the city, and finding no improvement in my condition, I eventually left Buenos Ayres at the close of the warm season to try whether change of climate would benefit me. Before leaving, however, I spent a few days at home and saw enough then to satisfy me that my conclusions were correct. Most of the birds had finished breeding, but while examining some nests of *Anumbius* I found one which Bay-wings had tenanted, and which for some reason they had forsaken, leaving 10 unincubated eggs. They were all like Bay-wings' eggs, but I have no doubt that 5 of them were eggs of *M. rufocollaris*. During my rides in the neighborhood I also found two flocks of Bay-wings, each composed of several families, and among the young birds I noticed several individuals beginning to assume the purple plumage, like those of the previous autumn. I did not think it necessary to shoot more specimens.

The question why *M. badius* permits *M. rufocollaris* to use its nest, while excluding the allied parasite, *M. bonariensis*, must be answered by future observers; but before passing from this very interesting group (*Molothrus*), I wish to make some general remarks on their habits and their anomalous relations to other species.

It is with a considerable degree of repugnance that we regard the parasitical instincts in birds. The reason it excites such a feeling is manifestly because it presents itself to the mind as—to use the words of a naturalist of the last century, who was also a theologian, and believed the Cuckoo had been created with such a habit—“a monstrous outrage on the maternal affection, one of the first great dictates of nature.” An *outrage*, since each creature has been endowed with this all-powerful affection for the preservation of its own, and not another, species; and here we see it, by a subtle process, an unconscious iniquity, turned from its purpose, perverted and made subservient to the very opposing agency against which it was intended as a safeguard. The formation of such an instinct seems, indeed, like an unforeseen contingency in the system of nature, a malady strengthened, if not induced, by the very laws established for the preservation of health, and which the *vis medicatrix* of nature is incapable of eliminating. Again, the egg of a parasitical species is generally so much larger, differing also in coloration from the eggs it is placed with, while there is such an unvarying dissimilarity between the young bird and its living or murdered foster brothers, that, unreasoning as we know instinct, and especially the maternal instinct, is, we are shocked at so glaring and flagrant an instance of its blind stupidity.

In the competition for place, the struggle for its existence, said with reason to be most deadly between such species as are most nearly allied, the operations are imperceptible, and the changes are so gradual

that the diminution and final disappearance of one species is never attributed to a corresponding increase in another more favored species over the same region. It is not as if the regnant species had invaded and seized on the province of another, but appears rather as if they had quietly entered on the possession of an inheritance that was theirs by right. Mighty as are the results worked out by such a process, it is only by a somewhat strained metaphor that it can be called a *struggle*. But even when the war is open and declared, as between a raptorial species and its victims, the former is manifestly driven by necessity. And in this case the species preyed on are endowed with peculiar sagacity to escape its persecutions, so that the war is not one of extermination, but, as in a border war, the invader is satisfied with carrying off the weak and unwary stragglers. Thus the open, declared enmity is in reality beneficial to a species, for it is sure to cut off all such individuals as might cause its degeneration. But we can conceive no necessity for such a fatal instinct as that of the Cuckoo and Cowbird destructive to such myriads of lives in their beginning. And inasmuch as their preservation is inimical to the species on which they are parasitical, there must also here be a struggle. But what kind of a struggle? Not as in other species, where one perishes in the combat that gives greater strength to the victor, but an anomalous struggle in which one of the combatants has made his adversary turn his weapons against himself, and so seems to have an infinite advantage. It is impossible for him to suffer defeat; and yet, to follow out the metaphor, he has so wormed about and interlaced himself with his opponent that as soon as he succeeds in overcoming him he also must inevitably perish. Such a result is, perhaps, impossible, as there are so many causes operating to check the undue increase of any one species; consequently the struggle, unequal as it appears, must continue forever. Thus, in whatever way we view the parasitical habit, it appears cruel, treacherous, and vicious in the highest degree. But should we attempt to mentally create a perfect parasitical instinct (that is, one that would be thoroughly efficient with the least possible prejudice to or injustice toward another species—for the preservation of the species on which the parasite is dependent is necessary to its own) by combining in imagination all known parasitical habits, eliminating every offensive quality or circumstance, and attributing such others in their place as we should think fit, our conception would probably still fall short in simplicity, beauty, and completeness of the actual instinct of *M. rufoaxillaris*. Instead of laying its eggs promiscuously in every receptacle that offers, it selects the nest of a single species; so that its selective instinct is related to the adaptive resemblance in its eggs and young to those of the species on which it is parasitical. Such an adaptive resemblance could not, of course, exist if it laid its eggs in the nests of more than one species, and it is certainly a circumstance eminently favorable to preservation. Then, there not being any such

incongruity and unfitness as we find in nests into which other parasites intrude, there is no reason here to regard the foster parents' affection as blind and stupid, the similarity being close enough to baffle the keenest sagacity. Nor can the instinct here appear in the light of an outrage on the maternal affection, for the young *M. rufocavillaris* possesses no advantage over its foster brothers. It is not endowed with greater strength and voracity to monopolize the attentions of the foster parent or to eject the real offspring; but being in every particular precisely like them, it has only an equal chance of being preserved. To this wonderful parasitical instinct we may well apply Darwin's words, when speaking of the architecture of the hive bee, "Beyond this stage of perfection natural selection could not lead."

MOLOTHRUS BADIUS, Vieill. Bay-winged Cowbird.

Molothrus badius, BURM., *La-Plata Reise*, II, p. 495 (Parana and Tucuman). SCL. et SALV., *Nomencl.*, p. 37; HUDSON, *P. Z. S.*, 1874, p. 163 (Buenos Ayres); DURNFORD, *Ibis*, 1877, p. 174 (Buenos Ayres); SCL., *Cat. B.*, XI, p. 338.

Description.—Dull gray, beneath rather paler; wings chestnut; tips of primaries, inner portions of secondaries, and tail blackish; bill and feet black; total length, 7.5 inches; wing, 3.5; tail, 3. Female similar.

Habitat.—Argentina, Paraguay, and Bolivia.

In this species the sexes are alike; the plumage of the body is gray-drab color, with a black spot between the eye and beak; tail dark, the quills cinnamon color; beak and legs black. Azara, describing it under the name of *Tordo pardo roxizo*, says it is a rare bird, so that it has probably increased since his time, as it is now quite common in the Plata district.

The Bay-wings usually go in small flocks, numbering from 10 to 30 individuals, and are not migratory, but in winter they travel about a great deal from place to place without extending their journeys more than a few miles in any direction. They are fond of coming about houses, and are frequently seen pecking at the fresh meat hanging out of doors; and, like other birds of the same tribe, feed chiefly on the ground. They spend a great portion of their time on trees, are familiar with man, and inactive, and in their motions singularly slow and deliberate. Their language is varied. Curiosity or alarm is expressed by trilling notes, and before quitting a tree all the birds of a flock ceremoniously invite each other to fly with long clear notes, powerful enough to be heard a quarter of a mile away.

They also sing a great deal in all seasons, the song being composed of soft, clear, rather sweet notes, variously modulated, uttered in a leisurely manner, and seeming to express a composed frame of mind, all the birds in a flock singing in concert. During the cold season the flock always finds some sheltered sunny spot on the north side of a wood pile or hedge, where they spend several hours every day, sitting still and singing in their usual quiet, soft style.

Their extreme sociability affects their breeding habits, for sometimes the flock does not break up in spring, and several females lay in one nest together; but whether the birds are paired or practice a promiscuous intercourse, I have not been able to discover. They have a great partiality for the large domed nests made by the *Anumbius acuticaudatus*, called *Leñatero* in the vernacular. One summer a flock of about 10 Bay-wings took possession of a *Leñatero's* nest on one of my trees, and after a few days I took 14 eggs from it. Though the birds hopped, chirping around me, manifesting great solicitude, the eggs were quite cold, and had I left them many more would have been laid no doubt; but as they were piled up 3 or 4 deep in the nest they could never have been hatched.

As a rule, however, the flock breaks up into pairs, and then a neat, well-made nest is built in the fork of a branch, lined with horsehair; or, oftener still, a *Leñatero's* nest is seized, the Bay-wings fighting with great spirit to get possession, and in it, or on it, their own nest is made. Like their relations, the common Cowbird, they seem strongly attracted by domed nests, and yet shrink from laying in the dark interior. As a rule, when they have captured a *Leñatero's* nest they break a hole in the side and so admit the light and form an easy entrance. One summer a pair of Bay-wings attacked a *Leñatero's* nest on one of my trees, the fighting was kept up for three or four days, and then at the foot of the tree I found 5 young *Leñateros*, fully fledged, which had been pecked to death and thrown out of the nest.

The eggs of the Bay-wing are 5 in number, nearly round, and densely marked with dusky reddish brown.

Once I observed 2 young Bay-wings following a Yellow-breast, *Pseudoleistes vireseus*, with their usual peculiar hungry cry, and while I watched them they were fed several times by their foster parents. Naturally I concluded that the Bay-winged Cowbird is sometimes parasitical on other species, but I never saw anything afterward to confirm me in that belief, and I believe now that I was mistaken, and that the young Bay-wings were not real Bay-wings, but the young of *Molothrus rufoaxillaris*.