

LEG STREAMERS FOR MARKING CHESTNUT-CAPPED BLACKBIRDS *Agelaius ruficapillus* IN ARGENTINA

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RESUMEN. Se condujeron estudios de campo y cautividad para evaluar el uso de las bandas plásticas de colores en estudios de comportamiento del Varillero Congo (*Agelaius ruficapillus*) en una colonia reproductiva y en sitios de alimentación vecinos a la misma. En la colonia, las observaciones desde sitios ocultos muestran la utilidad del uso de las bandas numeradas para la colección de datos sobre el comportamiento de los individuos. En los campos de arroz, si bien los números no se pudieron observar, se pudo delinear la distribución de los miembros marcados en la colonia. Se investigaron en condiciones de laboratorio y jaula, dos métodos de adhesión y dos de tipo de tintas para marcado de las bandas.

Techniques to mark birds for individual identification in the field can be very useful in many studies. A number of techniques have been employed, including paint, patagial streamers, leg bands, and leg streamers. Their use has been reviewed by Marion and Shamis (1977) and Day *et al.* (1980). Leg streamers have played an important role in determining local and seasonal movements of Red-winged Blackbirds (*Agelaius phoeniceus*) in the United States (Guarino and Woronecki 1967, Guarino 1968, Cummings 1985). They also have been used to study daily movements of weaver birds (Ploceidae) in Africa (Bruggers 1980, Bruggers *et al.* 1985), and the movements of pelagic seabirds (Gould 1974).

Only a few ornithological studies in Argentina have employed techniques that allow the researcher to observe individually marked birds (Navarro and Bucher 1990; Navarro *et al.* 1992; Fraga 1980, 1986; Martella and Navarro 1992); and in these studies, only numbered and/or colored leg rings were used. We have not found any references to the use of colored leg streamers to mark birds in Argentina. The purpose of this paper is simply to describe the use of leg streamers, which were employed to supplement behavior studies of radio-equipped Chestnut-capped Blackbirds in a breeding colony and rice fields in Santa Fe Province, Argentina (Zaccagnini *et al.*, unpubl. data). Chestnut-capped Blackbirds have long been implicated as pests to rice in this region of Argentina (Pergolani de Costa 1950).

Blackbirds were mistnetted in approximately a 0.125-ha breeding colony adjacent to a 45 ha rice field on a 250-ha rice scheme on the San Joaquin Ranch in San Joaquin, Santa Fe. The colony, comprising about 320 nests, was established in a stand of Arrowroot (*Thalia geniculata*). A total of 168 birds (64 males and 104 females) were caught between 20 and 26 Jan 1993 and tagged with 1- x 4-cm streamers cut from an orange, nylon-impregnated, polyvinyl chloride material. Prior to catching and marking the birds, a hide was erected in the blackbird breeding colony. Streamers were attached by slipping a 5-mm (internal diam.) numbered, aluminum bird band through a 4-mm diam. round or diamond-shaped hole or a 4 mm slit in the streamer. Streamers were numbered on both si-

des with a Berol Permanent Marker (G25), made in the United Kingdom. Birds were released at the colony immediately after marking. The condition of the streamer, marker ink, and bird was recorded for all marked birds that were recaptured during mistnetting. Over the next 2 months until 18 Mar, the occurrence of marked birds was noted in the colony, rice scheme, surrounding fields, and pre-roosting assemblages while the authors were collecting data for this and the previously mentioned research (Zaccagnini *et al.*, unpubl. data).

No problems with the streamers were expected in this study as these kinds of leg streamers and attachment methods had been successfully used on other species in the past (Bruggers 1980, Bruggers *et al.* 1985). However, as will be described later, a few birds recaptured soon after marking had their halluces caught in the ring attachment location of those streamers with the 4-mm diam. holes. A follow-up aviary study was therefore conducted to investigate ways of overcoming this problem for this species. In early Mar 1993, blackbirds were captured from pre-roosting assemblages in mistnets and transported to a 2- x 2- x 2-m aviary at the Instituto Nacional de Tecnología Agropecuaria (INTA) Experimental Station in Paraná, Entre Ríos Province, Argentina. Birds were maintained on a diet of millet and rice and allowed to acclimate to aviary conditions until 7 Apr. Twentyfive birds (15 males and 10 females) were then marked with leg rings and streamers (n = 20) or leg rings (n = 5) only. Ten birds each were marked with streamers with either 5 mm long slits or 5-mm diam. holes. In addition, the streamers were numbered with two different kinds of indelible ink; Pelikan Marker No. 710 (made in Argentina) or Carter's Marks-A-Lot (made in the USA). Streamer and number presence and wear were checked after 19 days and then at about 2-week intervals until mid-June.

Nineteen streamer-marked birds (15 females and 4 males) were recaptured in the mistnets at the colony between 1 and 4 days after the original capture and marking date. Of these 19 birds, the halluces of 4 were caught in the attachment hole; 3 in the diamond-shaped holes; and 1 in a round hole. No such problem was observed with streamers attached with straight slits. The terminal edge on 2 of these 19 streamers had begun to fray. The only other visible problem noted was that the ink on four of the streamers had become faded and worn after only 4 days.

Two marked birds were also collected on 1 Feb from a pre-roosting staging area, and another streamer was recovered on 15 February from the rice scheme. All three streamers were in excellent condition. Although the marking ink on the last streamer was faded, it could still be easily read.

Rec: set 1993; acep: set 1994

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Numbers on the streamers of birds seen up to 10 m from the hide in the colony were easily readable using 8 X 30 binoculars, permitting individual identification. Data on these birds provided information on attendance in the colony, role of sexes in incubating and in feeding young, polygamy and territory size among males (Feare *et al.*, unpubl. data). From the hide, the fraying of the ends of some streamers and the fading of ink, mentioned above, were apparent. However, when streamers were back-lit against the sun, the vinyl streamer material was translucent and the ink on both sides of the streamers was visible, making the streamer numbers unreadable.

Between 22 Jan and 18 Mar, when field observations of birds marked with streamers ended, birds with leg streamers were seen 66% of the observation days. Three birds were seen just before or on 18 Mar, indicating that birds could have retained streamers for at least 1 to 2 months.

Of the original 25 captive birds, 7 had escaped by 26 Apr. The remaining 18 birds were observed until 10 Jun, when the enclosure test ended. Data are discussed for these 18 birds. The hallux of only 1 of 6 birds with the slit marker attachment, but 3 of 6 birds with the hole attachment, was found caught during this study. Fraying was apparent for both attachment methods and became prevalent about 1-1 1/4 months into the study. By 10 Jun, 4 of the streamers had fallen off. Overall, it appeared that Carter's Marks-A-Lot ink faded more rapidly than Pelikan Markers, but Pelikan Markers tended to smear. Carrying streamers did not appear to affect the feeding behavior or weight of caged birds. The average weight of six birds weighed on 10 May (mean = 32 g \pm 1.9 SD) and again on 27 May (mean = 34 g \pm 2.1 SD) was not significantly different ($P < 0.05$; t-test). Likewise, no birds with streamers and one bird with only a band died during the 64-day study period.

These leg streamers proved very useful for behavioral observations in the colony and surrounding rice fields. The streamers did not appear to have an adverse effect on the behavior of the birds. Tagged females and males were observed feeding young the day of tagging, and tagged males continued to display, further suggesting that these kinds of behaviors were unaffected by the presence of leg streamers. Colored leg rings, including red, also did not measurably affect reproductive success in studies of Red-winged Blackbirds (Beletsky and Orians 1989). Nonetheless, the possible impact of the bands and streamers needs to be more thoroughly evaluated as color marking has been shown to affect behavior in some (Metz and Weatherhead 1993, Burley *et al.* 1982, Hagan and Reed 1988) but not all (Cristol *et al.* 1992) species of birds.

The problems with the hallux becoming caught in diamond-shaped and round holes indicated that slits should be used when attaching the streamers to the rings. Further investigations are needed to assess the ability of Chestnut-capped Blackbirds to carry larger, more visible, vinyl leg streamers, such as those used for studies on Red-winged Blackbirds (Cummings 1985). Birds with streamers were quickly picked out in flocks 20-30 m distant without the aid of binoculars. However, it was not possible to read the streamer numbers of these birds. Thus the movements of individuals could not be tracked using leg streamers alone. Identification of individuals away from the colony might also be facilitated using different colors of streamers (Feare 1978) rather than marking streamers with ink letters or numbers.

The results of the cage observations suggest that improvements in design of leg streamers and choice of marking-

/number materials are needed for studies exceeding a month. Although the numbers on the streamers had faded considerably by the end of the study, they could still be read. Additional evaluations are needed of larger streamers that have more width between the hole and the edge to which the ring is attached. It is likely that larger leg streamers, such as those attached to Eared Doves (*Zenaidura macroura*) in Dec 1991 in a 10- x 15-m outdoor aviary at INTA, Parana, and which were still retained by these doves in Apr 1993, might even be applicable for blackbirds.

ACKNOWLEDGMENTS

Pilaga S.A. Ganadera for providing certain funding, including logistical and accommodations support for M. Serra and S. Canavelli, during this study at San Joaquin. J. Adams, Inspector, and D. F. Peart, Farm Manager, were especially helpful in supporting these studies. The participation of Dr. E. Gill was made possible through a Winston Churchill Travelling Scholarship and the Royal Society, and the Percy Sladen Memorial Fund financed the participation of Dr. C. Feare. INTA/Parana Experimental Station provided funds for participation of M. E. Zaccagnini in field and cage experiments. The participation of Dr. R. Bruggers was funded by the USDA through a Denver Wildlife Research Center sabbatical program.

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Hornero 14: 48-52

OBSERVACIONES Y COMENTARIOS BIOGEOGRAFICOS SOBRE LA AVIFAUNA DEL ESTE DE LA PROVINCIA DE SAN JUAN, ARGENTINA

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ABSTRACT.- New records and biogeographic comments on the avifauna of eastern San Juan Province (Argentina Republic). New data on the subtropical avifauna of the E region of San Juan Province are given. 18 of 35 species mentioned in this paper lack well documented previous records, and the information on the remaining 17 is scarce. Comparison of these results with available biogeographic literature allow us to confirm penetration in San Juan of a subtropical ornithogeographic flow, which follows xerophytic wood relics of Mountain and Western Chaco districts. This penetration occurs within a wide transition with Monte scrublands.

INTRODUCCION

Se dispone de escasa información sobre la composición de la avifauna sanjuanina. En lo que respecta al sector E de la provincia, se han publicado sólo registros aislados (Nores & Yzurieta 1982; Haene 1987).

Muchas de las especies observadas en 7 campañas efectuadas no tenían citas concretas previas, aunque en algunos casos se las haya mapeado o dado por supuesta su presencia en San Juan por estar en las provincias limítrofes.

Un conocimiento más completo de la avifauna provincial ayudará a definir el esquema biogeográfico de la región y mejorará así la planificación del Sistema Provincial de Areas Naturales Protegidas, actualmente en ejecución en San Juan.

AREA DE ESTUDIO

La mitad E de la provincia de San Juan está ocupada mayormente por la provincia biogeográfica del Monte, caracterizada por los arbustales de zigofiláceas (*Larrea*, *Bulnesia*, *Plectrocarpa*). Sin embargo, hasta la porción media E de la Sierra de Valle Fértil se produce una ingresión de la provincia biogeográfica Chaqueña, hallándose dos distritos de la misma: 1) El distrito Occidental, que presenta en esta porción S una fisonomía de un bosque abierto con *Aspidosperma quebracho-blanco* y especies del género *Prosopis*, no encontrándose ya elementos arbóreos del género *Schinopsis*; 2) el distrito Serrano, que aunque empobrecido en esta área marginal de su dispersión, cuenta con elementos característicos, como el horco-quebracho (*Schinopsis haenkeana*), sólo presente en las quebradas del sector comprendido entre Astica y Las Tumanas, y en menor medida en las quebradas vecinas. Este sector SW de la Provincia Chaqueña, que abarca hasta los Llanos riojanos, la porción E de San Juan ya detallada, el N

de San Luis y parte del W de Córdoba, conforma una amplia franja ecotonal con la provincia del Monte.

Para las denominaciones biogeográficas se ha seguido en general a Cabrera & Willink (1980). En el mapa de la Figura 1 se presenta un esquema biogeográfico del E sanjuanino, y se incluyen también las localidades nombradas en el texto, con referencia del depto. provincial al que pertenecen. Dicho esquema se elaboró en base a Roig (1982), más los detalles aportados por Ragonese & Piccinini (1976), Roig (1963) y uno de los autores (E. Haene). también se tuvo en cuenta la regionalización de San Juan que propusieron Ceí & Castro (1978) para la herpetofauna, en la que reconocen una unidad "subtropical" en la región centro-E de influencia chaqueña. Este último trabajo, junto a la delimitación ornithogeográfica de Olrog (1963), son los dos únicos antecedentes zoogeográficos que consideran a este sector sanjuanino con un carácter chaqueño.

METODOS

Las observaciones se realizaron en: nov 1986 por E. Haene; nov 1988 por F. Moschione; ene 1989 por S. Krapovickas y E. Haene; nov 1989 por S. Krapovickas, D. Gómez y E. Haene; oct 1990 por J. C. Chebez y E. Haene; ene 1991 por C. Bertonatti y M. Carbonell; feb 1991 por E. Haene. De aquellas especies que tenían escasas citas, se comunican observaciones adicionales de mar 1992 realizadas por C. Ostrosky y E. Haene, jul 1992 por A. Bosso y E. Haene, ene 1993 por S. Heinonen, J.C. Chebez y E. Haene y ene 1994 por E. Haene. Se dan a conocer los registros de aquellas especies consideradas de interés por tener ninguna o pocas menciones previas para San Juan y de las que, con algún antecedente, carecían de citas concretas.

Se utilizan las siguientes abreviaturas: ad = adultos; ej= ejemplares; fot= fotografiado; juv= juveniles. Las siglas usadas para las localidades se detallan en la Tabla 1.

Rec: oct 1992; acep: nov 1994.

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