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MOBBING CALLS OF THE PHAINOPEPLA

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ABSTRACT.—When mobbing potential predators, male Phainopeplas (*Phainopepla nitens*) utter smoothly upswept vocalizations, unlike the harsh, staccato mobbing calls of other birds and mammals. A Phainopepla repeats this call as it approaches the bottom of its diving arc over the predator. We suggest that these calls do not serve to attract additional mobbers to the scene. Rather, they appear to emphasize the diving attacks directed toward the predator.

Birds and mammals commonly call while harassing or "mobbing" potential predators. Mobbing calls are usually characterized by wide frequency-spectra, sharp onset and termination, and rapid repetition, giving them harsh or click-like qualities (Marler 1955, 1969). These acoustic characteristics enhance the ability of potential mobbers (and predators) to locate the source of the sound (Marler 1955, Konishi 1973, Owens and Goss-Custard 1976, Shalter and Schleidt 1977, Shalter 1978).

Most published discussions of mobbing calls emphasize the interspecific similarity in their acoustic structure, especially when compared to the songs of the same species (e.g., Marler and Hamilton 1966). Indeed, the emphasis on presumed convergence on a single acoustic structure for mobbing calls even extends to non-avian species, including a primate (Vencl 1977) and sciurid rodents (see references in Owings and Leger 1980). In spite of these widespread similarities, we should not expect all birds to arrive at the same acoustic structure in their mobbing calls. First, the average proximity of the caller to other individuals that may be recruited to the mobbing assemblage can vary widely among species, thus favoring long-distance sound conduction in some species but not in others. When communicating over long distances, habitat structure (e.g., vegetation density) and meteorological variables (e.g., air turbulence) may act as selection pressures favoring certain acoustic features over others (for details see Morton 1975, Marten and Marler 1977, Wiley and Richards 1978). Second, the function of mobbing calls may vary across species (Curio 1978). For example, mobbing calls may serve to attract others to the predator so that group action may drive it away. However, mobbing calls can also be predator-directed, that is, a means of harassing or distracting the predator in a manner analogous to the diving attacks commonly performed by mobbers. If mobbing calls are in fact predator-directed, the acoustic structure may reflect this use and one might expect less emphasis on features that enhance their localization.

We describe here a mobbing call that appears to differ from those typical of most birds and mammals. The calls are those of male Phainopeplas (*Phainopepla nitens*) in central California (see Walsberg 1977, 1978, and Willis 1976, for discussions of *Phainopepla* breeding habits and ecology).

METHODS

We recorded mobbing calls of Phainopeplas in May 1979 from a blind at the San Joaquin Experimental Range in the Sierra Nevada foothills, Madera County, California. The habitat is hilly oak and annual-grass savannah at an elevation of about 330 m (see Hutchinson and Kotak 1942, for a detailed description). Recordings were made with a Uher 4400 tape recorder equipped with an AKG microphone (with CE-1 capsule) at 19 cm/s.

Sonograms were made of 16 calls using a Kay 6061B Sound Spectrograph on both narrow- and wide-band settings. The following variables were measured from the sonograms: (1) durations of the fundamental, second and third harmonics, (2) starting and ending frequencies of the fundamental and the higher harmonics, (3) frequency ranges for each harmonic (i.e., highest frequency minus lowest frequency). Because the calls are simple upsweeps (see Fig. 1), the lowest frequency was invariably the starting frequency, and the highest frequency was invariably the ending frequency. Finally, (4) the sweep rate for each harmonic was calculated by dividing the harmonic's frequency range (in kHz) by its duration (in ms), thus expressing frequency change over time.

The Phainopeplas were probably breeding during this period. We did not attempt to check for eggs or nestlings, yet the birds were building nests and chasing away conspecifics.

RESULTS

MOBBING BEHAVIOR

Male Phainopeplas mobbed Scrub Jays (*Aphelocoma coerulescens*) and other potential predators by repeatedly swooping to-

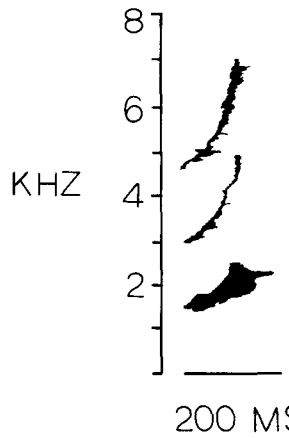

FIGURE 1. Ink tracing of a sonogram of a typical *Phainopepla nitens* mobbing call.

ward them from above and behind, or from the side. Mobbing flights were U-shaped arcs beginning about 1 to 1.5 m above the target. While mobbing, a male's white wing patches were conspicuous against his glossy-black body.

The Phainopepla emitted one call each time it reached the nadir of an arc, just above its target; the call was not given during other portions of the arc. Seven tape-recorded mobbing bouts lasted an average of 93 s (range = 21 to 172 s). During those bouts swooping flights and calls occurred an average of 28.4/min (range = 11.5–48.6/min).

Scrub Jays appeared to be distracted by the mobbing; they usually crouched as the Phainopepla closed in, and they seldom remained long in one place once mobbing commenced. If the jay flew only a short distance, the Phainopepla usually followed and continued its mobbing behavior. However, a longer flight by the Scrub Jay, which may have taken it out of the Phainopepla's home range, usually led to cessation of harassment.

Although mobbing calls were most commonly directed toward Scrub Jays, we heard (but did not record) what sounded like identical calls as Phainopeplas harassed flying Red-tailed Hawks (*Buteo jamaicensis*), and during agonistic interactions with male conspecifics. In the latter case, the calls were emitted as the apparent territory-holder and intruder were stationary or moving short distances in the same tree. During intraspecific interactions the vocalization was not always associated with the swooping flight as it was during interactions with other species.

Phainopeplas engaged in mobbing were occasionally joined by pairs of Western Kingbirds (*Tyrannus verticalis*); then both species would vocalize (see Fig. 2). Kingbird mobbing behavior differed from that of Phainopeplas in that kingbirds called even while perched near the Scrub Jay or while hovering near it. Also, both members of a kingbird pair joined in the mobbing whereas only male Phainopeplas were seen mobbing (see Davis 1941, and Smith 1977 for descriptions of *Tyrannus* agonistic behavior).

ACOUSTIC STRUCTURE

A typical Phainopepla mobbing call is illustrated in Figure 1, and data on mobbing-call acoustic parameters are provided in Table 1. Phainopepla mobbing calls consist of three harmonics (rarely four) that sweep up in frequency from beginning to end. There were no abrupt frequency deflections in the calls. Progressively higher harmonics, however, swept up faster than the lower harmonics, owing to the shorter durations and greater frequency ranges of successively higher harmonics (see Table 1). These calls sounded like mellow, brief whistles, not at all harsh, raspy or click-like.

DISCUSSION

The mobbing call of *Phainopepla nitens* appears to be unusual in at least three ways. First, its low repetition rate contrasts sharply with that of a sympatric passerine, the Western Kingbird (see Fig. 2), and with other birds. Second, predator-directed Phainopepla calls are associated with a specific component of their mobbing behavior, namely, the swooping flight toward the target, whereas kingbird calls (and apparently

TABLE 1. Acoustic parameters of *Phainopepla nitens* mobbing calls. Data are means and standard deviations (in parentheses) for 16 sonographed calls.

	Fundamental	Second harmonic	Third harmonic
Duration (ms)	163 (16)	114 (15)	104 (13)
Starting frequency (kHz)	1.50 (0.10)	2.91 (0.12)	4.72 (0.15)
Ending frequency (kHz)	2.38 (0.12)	4.45 (0.26)	6.62 (0.17)
Frequency range (kHz)	0.88 (0.13)	1.55 (0.24)	1.90 (0.27)
Sweep rate (kHz/ms)	0.0054 (0.001)	0.0136 (0.003)	0.0183 (0.003)

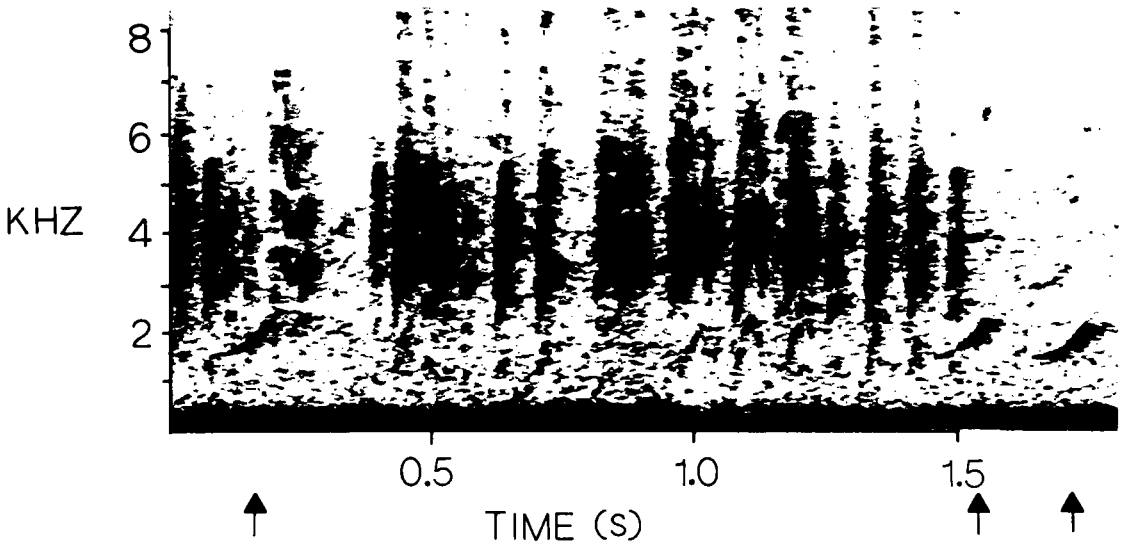

FIGURE 2. Sonogram of mobbing calls of Western Kingbirds and a Phainopepla while mobbing a Scrub Jay. The Phainopepla calls are pointed out with arrows below the time axis.

those of other birds) occur in a wider variety of situations during mobbing, such as while hovering or flying near the predator, flying toward it, or while perched nearby. Finally, the Phainopepla calls lack the sharp frequency deflections ("chevrons") often found in mobbing calls of other species and readily seen in the kingbird calls of Figure 2. The lack of deflections may contribute to the calls' "smooth" sound.

The low repetition rate and the absence of sharp frequency deflections might reduce the ability of recipients to localize the caller from relatively great distances. This may not be important, however, because the vocalizations may serve to warn only the mobber's mate (who would normally be nearby) of the presence of a potential enemy (either predator or rival male). Alternatively, the call could be directed at the predator. Because the call is given only as the Phainopepla closes in, the sound may increase the effectiveness of the swooping flight component of mobbing, thus driving the predator away faster. Of course, both mate-warning and predator-harassment functions could operate concurrently; our data are inadequate to discriminate between these or other possible functions (Curio 1978).

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RECENT PUBLICATIONS

Chimney Swifts and Their Relatives.—Margaret Whittemore. 1981. Nature Books Publishers. 169 p. Paper cover. $5.95, plus 59¢ postage. Source: Nature Books Publishers, P.O. Box 12157, Jackson, MS 39211. This is a book about the habits of swifts, aimed for those who share the author's love for these birds. It concentrates on the Chimney Swift and devotes less attention to other members of the family—most of whom are poorly-known. Information has been culled from the literature, the author's observations, and her correspondence with other students of swifts. The writing is chatty and in places anthropomorphic. Photographs, sketches, references.

The Mystery of Migration.—Chief Contributing Editor, Robin Baker. 1981. Viking Press, New York. 256 p. $29.95. This book for general readers offers the broadest possible survey of migration, having redefined the phenomenon to include all living things. It proposes "that all animals migrate from choice and with judgement and not only by instinct; that plants, too, are migrants, moving either as spores or seeds or as whole plants; that man . . . is a migrant; and that exploration, nomadism, emigration, and immigration are as much a part of migration as the classical seasonal to-and-from movements." Chapters are each devoted to different groups of organisms. While the text is comprehensive, informative, and easily readable, at least that on birds is not well balanced or fully up-to-date. The contributions of Baker and his four fellow-editors, all British behaviorists, are not identified. The book is profusely illustrated with maps, drawings, diagrams, and photographs. Regrettably, it lacks references and credits for the original sources of the illustrations; hence, a reader has no way of knowing the basis for the statements or of following up topics of interest.

The Connecticut Warbler.—This is a new "quarterly publication devoted to the promotion of bird study and conservation in the state of Connecticut." Started in 1981, it is the State's first field journal of ornithology. It is edited by Roland C. Clement and published by the Natural History Services Department of the Connecticut Audubon Society. Subscriptions ($6.00) and material to be considered for publication (articles, notes, monochrome photographs, drawings) should be submitted to the journal office, C.A.S., 314 Unquowa Road, Fairfield, CT 06430.

Aves de Costa Rica.—Alexander F. Skutch. 1980. Editorial Costa Rica, San José, Costa Rica. 148 p. Paper cover. 30 colones. This is an introductory book about the birds of Costa Rica, written in Spanish and addressed to the people of that country. It presents one hundred species, describing on one page for each, their appearance, voice, habitat, habits, nesting, and range. The accounts are non-technical yet authoritative. They are illustrated with color and monochrome photographs by John S. Dunning. Like Thurber's *Cien Aves de El Salvador* (noted in Condor 81:156) this book should promote indigenous interest in birds and their protection.