

THE ELEPAIO

Journal of the
Hawaii Audubon Society



For the Better Protection
of Wildlife in Hawaii

VOLUME 33, NUMBER 6

DECEMBER 1972

AGONISTIC BEHAVIOR OF THE RED CRESTED CARDINAL

By Henry J. Yuen

The Red Crested or Brazilian Cardinal (Paroaria coronata) /P. cucullata or P. cristata/ is one of many species of birds successfully introduced into the Hawaiian Islands. P. coronata, hereafter referred to as the cardinal in this paper, was first released on Oahu and on Kauai in 1928 (Munro, 1960). By 1970, the cardinal had extended its Hawaiian range to include the islands of Maui (Ord, 1967) and Hawaii (note by Baldwin, ELEPAIO, 22:63). Its native range includes southern Brazil, eastern Bolivia, Paraguay, Uruguay, and northern Argentina (De Schauensee, 1966).

The family Emberizidae includes six subfamilies, one of them Emberizinae (Mayr and Greenway, 1956). The genus Paroaria is in the subfamily Emberizinae which also includes towhees, sparrows, buntings, and longspurs (Tordoff, 1956a; Andrew, 1956b). Fringillidae is considered to be the common stock for the nine-primaried oscines which include Emberizinae (from which Parulidae, wood warblers, are thought to be derived; Tordoff, 1954a).

This paper presents three aspects of the cardinal's agonistic behavior: postures, possible derivations, and associated calls. Two situations are considered: conflicts centering on the established territory and conflicts involving individual distance. The typical habitat of the cardinal includes scrub type woods and landscaped urban areas. Most of the observations were made on the University of Hawaii campus which is typical of the latter habitat. This study began in the spring of 1968 with observations made on about 18 pairs and concluded in the fall of 1970 with in-depth observations made on two pairs of cardinals.

Terminology: Many workers cite Scott and Fedricson (Physiol. Zool., 24:273-309, 1951) for the original definition of agonistic behavior as involving attack, escape, threat, and submissive tendencies. "Tendencies" is defined in terms of the frequency a behavior is observed, whereas "intensity" refers to the differences in the performance of the act (Russell, Mead, and Hayes, 1954). Moynihan (1955a) defines display as the "peculiarly standardized and often exaggerated performances, including all vocalizations and many movements and postures, which have become specialized and modified as social signals or releasers" (see also Tinbergen, 1948). Intention movements (see Daanje, 1951), redirected activities, ritualized higher intensity intention movements, and displacement activities (Moynihan, 1954; Frazer, 1961; Clark, 1970) are then components of a display (Moynihan, 1955a).

Morris' (1956) terminology for feather postures will also be adopted. Body feathers pressed against the body giving a slim appearance is described as sleeked; normal appearance, as relaxed; partial feather erection with smooth appearance, as fluffed; and full feather erection with ragged appearance, as ruffled. Similarly, Hinde's (1952) definition of fighting, involving only display and combat as involving the actual physical contact, will be adopted. Bird calls and song are described as accurately as possible but only to distinguish the various calls of the cardinal.

Comparisons with other species are made with caution "because of the great difficulty of representing bird notes in words, and because of the same note made by different ornithologist may differ remarkably, especially when the writers are of different nationality" (Hinde, 1952).

PLUMAGE

Plumage has an indirect role in display, especially in the Head-Up display. The cardinal has a bright red crest, head, and throat which contrast with a white breast and abdomen. The upperparts of wing, back, and tail are gray. Both sexes look basically alike but upon close inspection the female has a duller red color (Bates, 1963; Rutgers, 1964). Juveniles have brown feathers instead of red. Their gray feathers also have some brown in them. The brown feathers are replaced in about six months. Typical crest position of the fledgling is erect and spread. The plumage is brown. Plumage of first year bird molting with orange-red in forehead, auricular, and throat regions. Erection of crest at this age is not as far forward as in the fledgling. When plumage is red with dark brown streaks through crest, it is raised only in display in independent birds.

TERRITORY

Intraspecific conflicts: The cardinals appear to occupy and defend the breeding territory throughout the year. The territories observed are large, about 7,500 to 10,000 square meters and overlap considerably. Boundaries are defined by the behavior of the cardinals rather than by physical landmarks. When the bird encounters another of the same species, they will show either aggressive or escape tendencies in their postures and displays. In familiar surroundings, closer to the nest site, the bird will show more aggressive tendencies and herein will be referred to as the defender. In unfamiliar surroundings, far from the nest site, the bird will show more escape tendencies and will be referred to as the intruder. In the course of the fight, the birds move back and forth, into and out of familiar surroundings, or their territories. Their behavior changes reflecting their familiarity with the surroundings. A given bird may show more aggressive tendencies in response to its rival's showing more escape tendencies. This happens when it is backed closer to its nest site by its rival. As this gradually happens, the bird is changing from intruder to defender and the fight will eventually reverse its direction of movement, away from the nest site. A cardinal may defend its territory or intrude into another's alone or as one of a pair. Juveniles may also be involved in a fight.

Head-up: This display is given as the defending bird(s) approaches the intruder(s). As the cardinal walks toward or as it perches between short flights to the intruder(s), it stretches its neck so the head is held up high and flexes its legs so the body is upright. The feathers are sleeked except for the crest which is erect and spread. The neck region is slightly thickened and the bill is slightly open. The bird is oriented toward the intruder. ...

Sleeked feathers, extended legs, neck and head, and a raised body with the bird facing the stimulus (rival) are thought to be derived from intention movements for flight (Hinde, 1955-1956; Marler, 1956a). The thickened neck is thought to be derived from intention movements to peck. In such a conflict of attack and escape tendencies, the bird is said to exhibit threat displays (Hinde, 1953).

As a consequence of the stretched neck, the cardinal's red plumage from crest to throat is exhibited in the head-up display. Lack's (1965) description of the English Robin (*Erithacus rubecula*) display is fitting: "the red breast...is stretched and so held that the intruding Robin sees as much of it as possible" (referring of variations of the Robin's head-up posture depending on the rival's position: above, same level as, or below the displaying Robin). In one rare instance, a cardinal was seen hanging upside down, presumably displaying to the other cardinals fighting above it. ...

Wheet-cheer-up: Cardinals in the head-up display may give this call especially if its rival is not moving to another perch, remaining in a given spot. This call sounds like a conglomeration of "cheer-up" from the advertising song (see Berger, 1961), parts of the rapid-whistle call, plus other notes like "wheet" and "chip". ...When giving the wheet-cheer-up call, the cardinal generally faces its rival.

Rapid-whistles and spread-tail-ruffle: Rapid-whistles are heard between members of a pair especially if their rival(s) is moving about with short flights or by walking.

The birds giving the call may also be walking or flying short distances toward, around, or away from their rival(s). When they actually give the call, the cardinals stop walking or flying, turn toward their mate, spread their tails, and ruffle their breast and abdomen feathers. The birds appear as if they were squatting with the head withdrawn because of the feather erection. The bill is lowered to the breast and then slowly raised while the call is given. Two members of the pair may give the call simultaneously or they may show different intensities of the spread-tail-ruffle (one may just open its bill).

When the members of the pair get as close to each other as they do while giving the rapid-whistle call, they normally give open-bill displays. The spread-tail-ruffle does appear as high intensity open-bill i.e., greater extent of feather erection as well as the spread tail. Open bill and feather erection are not associated with aggressive tendencies. It does not resemble interpair aggressive postures (e.g., head-forward does not have feather erection) and is thought to inhibit attack between members of the pair when they are close together (Hinde, 1955-1956; Andrew, 1956a).

The call itself is also heard between the members of a pair while the nest is being disturbed (e.g., mirror held over nest) or when the birds are looking for a nest site. The association of the call with the nest site and with territory fighting suggests Tinbergen's (1959) description of choking in gulls (*Laridae*).

Combat: The cardinal may charge on the ground or from a perch and engage in what Andrew (1956c) describes in *Emberiza* as breast-to-breast combat, flying into the intruder with feet forward. Actual combat, however, is rare and only three times was a pair of cardinals seen grappling with each other, in one instances, over 20 feet in the air. Aerial combat is apparently common with Yellowhammers (*E. citrinella*).

Displacement feeding: Fights involving two pairs of adults usually end with one pair in displacement feeding. That pair will eventually leave the area without further displays or calls. In fights involving one adult and one or two juveniles, the adults are usually seen leaving the area after displacement feeding.

Chase: If one of the birds fighting starts to fly away from the area, even if because a pedestrian is approaching, one or both of its rivals will pursue. The pursuing adults rarely catch up and if the first bird stops and perches, so will the pursuer(s). When the pursued resumes flying, the chase continues at whatever pace the first bird is flying.... Similar chases are described in *Emberiza* (Andrew, 1956c) and in the Redstart (*Steophaga ruticilla*) which Ficken (1962) suggests may be a ritualized behavior.

Crouch: Juveniles, recently fledged, will flatten themselves to the ground in encounters with displaying adults, usually as a result of being caught in the midst of a territory fight. The rival adults will jump on the backs of fledglings crouching, and peck.

Upright: One adult fighting with two others may give this display: ruffled-erect posture, open-bill facing upwards. Since a caged cardinal placed in an established territory will also give this display, upright is probably given by an intruder, who for some reason, cannot escape. (See fluffed-head-back below)

Fluffed-head-back: Independent juveniles straying into neighboring territory, give this display to the defending adults. The juveniles raise and spread their crests, fluff their breast and abdomen feathers, and remain motionless with their heads back on their shoulders and tails lowered and spread.

Morris (1956) found that in the thwarted escape of Zebra Finches, fluffing of the feathers inhibited other birds from attacking, and that subordinate birds, low in the peck order, were in a fluffed posture much of the time. Hinde (1955-1956) points out that a fluffed posture is assumed whenever a bird is cold, sick, or resting and is, therefore, a displacement activity in an extrinsically thwarted escape.

Interspecific conflicts: Postures described below are those seen in conflicts involving the nest site and predator reactions.

Drooped-wing-ruffled and hiss: From this posture, cardinals chase Mynahs (*Acridotheres tristis*), birds about two inches larger than themselves, from the ground area below the nest. The cardinal raises and spreads its crest, ruffles its feathers, flexes its legs so the body leans forward, and droops its wings, i.e., primaries are spread. The cardinal then flies into the Mynahs with a hiss call. In this posture,

as well as in others, the cardinal does not necessarily orient itself towards its adversary. A cardinal, for instance, has been seen in the above posture with its back to the Mynahs, head and tail turned to the same side, looking over its shoulder. It took off to attack from this orientation.

Trailed-wing-fluffed: This posture was observed when the cardinals chase Sparrows (Passer domesticus), birds about an inch smaller than themselves, within the trees from the nest site. The cardinals fluff their feathers, raise their tails slightly, and trail their wings, i.e., the wing tip is lowered below rest position without the primaries being spread (Andrew, 1956c).

Cur-lee: This call is heard from an adult outnumbered in a conflict, e.g., by two rival adults in a fight or by two or more Mynahs. (A juvenile may also give this call when encountering an adult in a head-up display.) After the cur-lee is heard, another adult usually arrives, probably the mate of the lone bird, and joins the lone adult. One or both adults may give the rapid-whistles call at this point. The cardinals may then continue fighting with display followed by displacement feeding and one pair leaving the area. They may, instead, show displacement feeding immediately after the rapid whistles call, again with one pair leaving the area. In the conflict with the Mynahs, one of the two cardinals may attack or both may show displacement feeding without attacking.

Sleeked-upright: When a cardinal is on the ground and a small animal, dog or cat, is in the area, it will sleek its feathers, extend its legs so the body is upright, and stretch its neck so the head is held up high. The cardinals will freeze in this position while watching the animal. This posture has intention movements of flight or escape (Andrew, 1956a).

Freeze: This posture is probably a reaction to a Frigatebird (Fregata minor palmerstoni) passing overhead. The birds flex their legs so the body tends to the horizontal, withdraw their heads with the throat area bulging; head is turned to a side so the bird looking up with one eye. Scanning while freezing and a lowered breast are escape intention movements. Lowered neck and head, sleeking, and freezing are intention movements to hide and facilitate concealment (Marler, 1956a).

Chip and tail-flick: Chip is a high pitched note heard when the cardinals are "flushed". The cardinals raise their crests, flick their tails, watch the "predator", and show displacement bill wiping. If the cardinals are forced to remain in the trees for a period of time because of a predator's presence, they may also show displacement grooming. Crest raising precedes fear responses in many other species: buntings, tits, Chaffinch, sparrows (Zonotrichia), Passerina, and Carduellinae (Andrew, 1956a).

Tail-flicking is also seen when the cardinal is flushed and after the cardinal lands. Andrew (1956b) explains post landing tail flicks as the result of a conflict between a tendency to continue flying and another tendency to remain still and look around. Tail-flicking in the frightening situation is similarly explained as a conflict of tendencies to fly and to remain.

The cardinals raise and then lower their tails as part of a preparation for normal takeoff. In a conflict of tendencies, movements like raising and lowering of the tail, tail-flicking, are seen without the bird actually taking off. Daanje (1951) refers to such movements as intention movements.

Andrew (1956b) has applied intention movements such as the tail-flick in systematics and has found evidence to support Tordoff's classification of Paroaria as an Emberizinae. Most Emberizinae tail-flick up-down with a large vertical amplitude especially if the species forage as a flock while moving through the branches. Andrews suggest that the tail-flick may function as a social signal among the bush feeding Emberizinae, probably coordinating flock movements. As expected, P. dominica, P. larvata, and P. capitata all were found to tail-flick up-down with a large vertical amplitude. Andrew made his study on birds after they landed, following flights to various perches unalarmed. The cardinal does not tail-flick in the above specified situation. When it does tail-flick, in frightening and escape situations, it is in the opposite manner, down-up, with a large vertical amplitude. The cardinal forages either alone or with its mate and mostly on the ground. Tail-flicks are inconspicuous in birds feeding on the ground and have no signal function.

For those two reasons an up-down tail-flick should not be expected, and is not observed in the cardinal adults as they fly from branch to branch unalarmed. This is consistent with Andrew's findings that ground dwelling buntings may tail-flick in the opposite manner of bush feeding buntings, or may not tail-flick at all, depending on how little they fly while foraging on the ground.

INDIVIDUAL DISTANCE

Birds of many species have been found to defend an area around themselves, which moves with them without topographical references. As an example, in a flock of feeding Least and Semipalmated Sandpipers (Erolia minutilla and Ereunetes pusillus), peeps will give a head-forward type display when they get too close to each other. Condor (1949) defines this behavior as maintaining an "individual distance". Condor lists many other examples and the distances they keep from each other....Marler (1956b) describes the distance where there is an even chance of fighting and tolerance as the 50% distance. Marler has found that a bird in familiar surroundings is more likely to attack to defend its individual distance than if it was in unfamiliar surroundings. Birds in submissive postures were found to be tolerated at closer distances (Stokes 1962a) just as birds were tolerated at closer distances if they approached in a horizontal plane than in a vertical plane. ...Threat postures, Stokes concluded, are conservative in evolutionary divergence. The individual distance is maintained for the efficient competition of, encouraged by, and restricted to limited supplies (Marler, 1956b).

...The general conclusion...was that the action of a bird following a specific posture depended on a combination of external and internal stimuli which were only partially reflected in the postures and therefore cannot convey absolute signals (Stokes, 1962a). Dunham adds that a bird's motivation can change before it acts following the other bird's behavior.

Waiting: If adults, plus juveniles with them, are feeding from the same food source, e.g., a large cookie, a feeding tray, they will feed only one at a time. If the other birds are waiting close to the feeding bird, they wait with mild fluffing and open-bill. Stokes (1962a) describes similar behavior in Blue Tits and has found that birds with raised crest and feathers tend to wait for an opportunity to feed and will not attack. Even with an open-bill, they are not potential threats to the feeding bird. For the feeding bird to attack the above waiting bird is to risk still a third bird feeding in both their places. The aggressive but hungry birds tended to stay and continue feeding while "appeasing" the rival with an open-bill instead of attacking (Moynihan, 1955b).

Avoidance: Cardinals foraging together will pick up their food, if it is possible, and run off into an "unoccupied direction" especially if the other cardinal is approaching and they have to spend time manipulating their food, e.g., opening sunflower seeds. They run off with horizontal bodies and tail with sleeked crests; all flight intention movements. As a result, the cardinals foraging together are feeding about a foot or more apart from each other.

Open-bill and esk-esk: The 50% distance for the cardinal is about nine inches, about two inches more than a body length. When another cardinal approaches closer than the 50% distance, a cardinal will open its bill, raise its crest and head, and fluff its feathers. At five inches apart, the cardinal will lower its head and give a soft esk-esk call. By now, the approacher will also have its bill open and both birds will freeze. After a few moments of no movement, the approacher will quickly move into the opposite direction and the two birds resume their activities. Similar graded intensity display is described in the House Finch (Carpodacus mexicanus) (Thompson, 1960), Rose Breasted Grosbeak (Dunham, 1966), and the Red Crossbill (Loxia curvirostra) (Tordoff, 1954b), the latter without fixed distances for response.

Supplanting: Hinde (1952) describes this as a bird approaching another, which is feeding, causing the feeding bird to leave and feeding in its place. The juvenile cardinals, as they begin to molt, will approach adults in a supplanting attack: raised crest and fluffed feathers. Hinde also reports juvenile Tits becoming more aggressive toward food once they become independent and will exhibit combat and head-forward threat postures.

Head-forward: When the approaching juvenile is about four inches away, the

adult turns and orients its entire body toward the juvenile. Both birds face each other. They flex their legs so their bodies are low and horizontal, may or may not raise their crests, and will fluff their feathers. The birds lower their heads as much as possible, open their bills and shake their heads back and forth, snapping at each other's bills. One bird will eventually get up and leave. The bird that stays appears to have its head lowest and facing the rival, i.e., highest intensity of the head-forward display. At the moment, if both birds give full intensity head-forward displays, there is no indicator to predict which bird will leave and which bird will stay or even who gets the food regardless of staying or leaving.

The general description of the head-forward display is very common and perhaps is universal in passerines (Andrew, 1961)...The various species differ in details and frequencies.

Andrew (1956c) considers the head-forward display derived from the following intention movements: open-bill, forward-head thrust, and facing rival are derived from biting movements; lowered body, lowered head, and flexed legs are derived from flight intention movements. There are no other flight intention movements like tail flicking or sleeking. The conflict of attack and escape is thought to motivate the threat display. Marler (1956a) describes additional attack intention movements: steady binocular fixation, body oriented toward the rival, and a thickened neck. Marler considers indirect gazing as an escape intention movement, which is seen in a low intensity head-forward display.

Raised-crest-bite: This is an interspecific supplanting attack at a food source. The cardinals raise and spread their crests, extend their heads forward, open their bills and rush into who ever is competing for the same food. The cardinals may or may not actually bite, but usually succeed in sending the other birds away: Barred Doves (Geopelia striata striata), Sparrows (P. domesticus), Mynahs, and, with some difficulty, American Cardinals (Richmondia cardinalis). The juvenile cardinals in turn have been supplanted by sparrows in addition to having their food simply taken away.

SUMMARY

Red crested cardinals are native to South America and were introduced into Hawaii. The cardinal is a member of the subfamily Emberizinae. The agonistic behavior of the cardinal is described along with associated calls. Possible derivations of the displays from aggressive and escape intention movements are discussed. Emphasis is on displays associated with territory conflicts and individual distance. The territory is considered as the area around the nest site. The boundaries are defined by the bird's behavior upon meeting another cardinal. Most displays are considered as the conflict between aggressive and escape tendencies. Individual distance is described as the area around the bird, which is defended by the bird. Some of the displays discussed are also described and found common in other species. One such element, tail-flicking, is discussed based on Andrew's (1956b) use of behavior in systematics.

Excerpts of LITERATURE CITED

- Andrew, R.J. 1956a. Fear responses in *Emberiza* spp. *Anim.Behav.*, 4:125-132
 1956b. Intention movements of flight in certain passerines and their use in systematics. *Behaviour*, 10:179-204
 1956c. The aggressive & courtship behavior of certain Emberizines. *Behaviour*, 10:255-308
 1961. The displays given by passerines in courtship & reproductive fighting: a review. *Ibis*, 103:315-348
 Clark, Jr., G.A. 1970. Avian bill-wiping. *Wilson Bull.*, 82:279-288
 Daanje, A. 1951. On locomotory movements in birds & the intention movements derived from them. *Behaviour*, 3:48-98
 Ficken, H. 1962. Aggressive behavior and territory in the American Redstart. *Auk*, 79:607-632
 Hinde, R.A. 1952. Behavior of the Great Tit (*Parus major*) & some other related species. *Behav. Suppl.*, 2:1-201
 1953. The conflict between drives in the courtship & copulation of the Chaffinch. *Behaviour*, 5:1-31

- Hinde, R.A. 1955. The courtship & copulation of the Green Finch (Chloris chloris) Behaviour, 7: 207-233
 1955-1956. A comparative study of the courtship of certain finches (Fringillidae). Ibis, 97: 706-745
- Harler, P. 1956a Behavior of the Chaffinch (Fringilla coelebs). Behav. Suppl., 5
 1956b Proximity as a cause of aggression. Anim. Behav., 4: 23-30
- Mayr, E. & J.C. Greenway, Jr. 1956. Sequence of passerine families (Aves). Breviora, 58: 1-11
- Morris, D. 1956. The feather postures of birds & the problem of the origin of social signals. Behaviour, 9: 75-114
 1957. Typical intensity & its relation to the problem of ritualization. Behaviour, 11: 1-12
- Moynihan, H. 1955a. Some remarks on the original sources of display. Auk, 72: 240-246
 1955b. Types of hostile display. Auk, 72: 247-259
- Russell, W.H.S., A.P. Mead & J.S. Hayes. 1954. A basis for the quantitative study of the structure of behavior. Behaviour, 6: 153-205
- Stokes, A.W. 1962a. Agonistic behavior among Blue Tits at a winter feeding station. Behaviour, 19: 118-133
 1962b. The comparative ethology of Tits at a winter feeding station. Behaviour, 19: 208-218
- Tinbergen, N. 1948. Social releasers & the experimental methods required for their study. Wilson Bull., 60: 6-51
- Tordoff, H.B. 1954a. Relationships in the New World nine-primaried Oscines. Auk, 71: 273-289

The following cover letter by William P. Mull dated 28 September 1972 and 40-50 copies of the article "Hawaiian Birds 1972" (THE WILSON BULLETIN, Vol. 84, No. 2, June 1972, pp. 212-222) were mailed to the Hawaii's Congressional delegation, relevant officials and members of agencies and commissions at federal, state and local levels, and national and local conservation organizations:

In the enclosed article, "Hawaiian Birds 1972" (The Wilson Bulletin, Vol. 84, No. 2, June 1972), ornithologist and conservationist Dr. Andrew J. Berger outlines the status of native birds in Hawaii and takes State and Federal agencies to task for attitudes, policies and actions that he regards as misdirected--in terms of conservation of Hawaii's native bird species. As Dr. Berger states, he has chosen "to speak out" frankly because the survival of remaining native Hawaiian ecosystems is at stake.

Since the article is concerned directly with a subject of major importance to the Hawaii Audubon Society, we have obtained a few copies for distribution to people who would be interested in reading it and who might otherwise not be aware of it. Since the substance and thrust are explicit, we pass it along without comment--other than to point out that it went to the publisher in January 1972. Later, the State Legislature passed and the Governor signed into law (on May 16, 1972) Act 49--which is designed to afford greater protection to the native birds and ecosystems Dr. Berger discusses.

Conscientious implementation of Act 49 by the State Department of Land and Natural Resources could substantially improve the chances for survival of presently endangered native Hawaiian bird species. The Hawaii Audubon Society is working toward specific, constructive proposals for effective implementation of Act 49 and would welcome any comments or suggestions that might help us in this endeavor.

Field Trip by Wayne Gagne: 8 October 1972 to Kanehoa-Hapapa Trail

Fourteen members and guests made the pleasant trek to the summit of Puu Kanehoa. This 4-5 mile trail follows a long ridge behind Kunia to the crest of the Waianae Range. It goes through mixed exotic plantings, mostly of Eucalyptus, on the lower half and graduates to almost wholly native mesic forest in the upper half, ending with sweeping views of Lualualei of the leeward Waianae.

Several branches of natural history were given their due: botany, ornithology,

malacology, and biological control, among others. When birds weren't commanding our attention there was always some other object to provide some insight into nature, Hawaiian style. Even kama'aina were a little skeptical at the beginning when promised views of the 'ili-ahi (sandalwood), conventional wisdom having led some to believe these trees to be practically extinct. But they were there along with a host of other native plants, and even on the summit of Puu Kanehoa where we had our lunch, we had the blue flowered 'ala'ala-wai-nui-pohina-wahine at our feet and the na'ena'e-pua-melemele a little down slope, resplendent with masses of bright yellow. It would also be difficult to find a trail on Oahu where native tree snails in such numbers could be so easily seen.

But to return to birds; we left plovers and doves foraging in recently fallowed pineapple fields and immediately encountered the ubiquitous white-eye and the linnet in the exotic forest. Higher up the 'elepaio was most prevalent and was as inquisitive as ever, perching just beyond hand's reach. On our return later in the afternoon the 'apapane came to life, taking nectar from the 'ohi'a-lehua. The 'amakihi was the least frequently seen. In a poorly lighted situation, a couple of us viewed what we interpreted might possibly have been a recently fledged 'amakihi, as it appeared to have the nestling fuzz mixed with the adult plumage, but all this at a distance of about 75 yards. Kentucky cardinals signalled our return to contemporary Hawaii as we approached the pineapple fields on our way home.

ALOHA to new members:

Mrs. Douglas Nagoshi, 2118 Date St, #308, Honolulu, Hawaii 96814
Rick Warshauer, PO Box 192, Volcano, Hawaii 96785
Mrs. Kammy Wong, 1318 Artesian St, Honolulu, Hawaii 96814

1972 Christmas Bird Count

The Honolulu Christmas bird count is scheduled for Sunday, 17 December 1972. The count is conducted within a circle 15 miles in diameter, centered close to Nuuanu Pali. This same area has been covered each year since 1954. General coordinator will be William P. Mull, with groups assigned to territories as follows:

- Group A: Kaelepulu Pond, Kawainui Swamp, Kailua residential area, and Kaneohe Marine Corps Air Station
- Group B: Aiea Trail
- Group C: Keehi Lagoon, Salt Lake, and Nuuanu Valley
- Group D: Punchbowl and Tantalus
- Group E: Manoa Valley, Manoa Falls Trail, and downtown Honolulu
- Group F: Kapiolani Park, Zoo, and Ewa side of Diamond Head
- Group G: Diamond Head Crater (inside) to Paiko Lagoon and Kuapa Pond including the residential area

All members and guests are welcome to participate in the count. Please call William Mull, 988-6793, to arrange meeting place and time.

Full details and discussion of count plans will be given at the annual meeting.

HAWAII'S BIRDS, a field guide, is available for \$2.00. Send in your orders to Book Order Committee, Hawaii Audubon Society, PO Box 5032, Honolulu, Hawaii 96814.

Reprint permission is granted if credited as follows: from THE ELEPAIO, Journal of the Hawaii Audubon Society.

DECEMBER ACTIVITIES:

- 11 December - PLEASE NOTE DATE. Annual meeting at the Waikiki Aquarium Auditorium at 7:30 p.m. Program for the night: (1) Preparation & Preservation of Hawaiian Feather Work by John Topolinski (2) Elect officers (3) Work out details of the Christmas bird count.
- 17 December - Christmas bird count

HAWAII AUDUBON SOCIETY EXECUTIVE BOARD:

President-LtCol Charles G. Kaigler, Vice-Pres.-William P. Mull & David Woodside
Secretary-Mrs. Mae E. Mull, Treasurer-Miss Christine Jones
Board Members-Wayne Gagne & Robert Shallenberger

THE ELEPAIO: Editors-Miss Charlotta Hoskins & Miss Unoyo Kojima

MAILING ADDRESS: P.O. BOX 5032, Honolulu, Hawaii 96814

DUES: Regular-\$3.00 per annum, Junior(18 years and under)-\$1.00 per annum, Life-\$100.00

HAWAII AUDUBON SOCIETY MEMBERSHIP LIST

Honorary Life

E.H. Bryan, Jr. - Honolulu, Hawaii
 Charles M. Dunn - "
 Grenville Hatch - La Jolla, California
 Thomas R.L. McGuire - Honolulu, Hawaii
 W. Michael Ord - Agana, Guam
 Mrs. Harold R. Pedley - Carmel, California
 Margaret Titcomb - Honolulu, Hawaii

Life

Dr. Paul H. Bladwin - Colorado	Mr. & Mrs. William P. Mull - Honolulu
Mrs. Brooke Clyde - California	Mrs. George C. Munro - New Zealand
Mr. & Mrs. Samuel A. Cooke - Honolulu	Noah K. Pekelo, Jr. - Molokai
Miriam N. Davis - Molokai	Mrs. John C. Plews - Honolulu
Frances C. DeGear - California	Mrs. C. Dudley Pratt - "
Mrs. Whitney H. Eastman - Minnesota	Thomas W. Reese - Massachusetts
Mrs. Melvin Gallagher - Kauai	Mrs. Herbert M. Richards - Honolulu
Thelma Hensley - Oahu	Chandler S. Robbins - Maryland
Dr. Alden D. Hinckley - Virginia	Gordon B. Ruser - Illinois
Charlotta Hoskins - Honolulu	Mrs. Sue W. Thomas - Honolulu
Mrs. Violet Kuulei Ihara - Honolulu	Dr. Miklos D.F. Udvardy - California
James D. Jacobi - Hawaii	Ronald L. Walker - Oahu
Edgar Kincaid - Texas	John T. Waterhouse - Honolulu
Warren B. King - Virginia	David H. Woodside - Oahu
Mrs. Mitsuko Kirito - Kauai	HSPA Experiment Station - Honolulu
J. den. Macomb, Jr. - Illinois	Wallace Alexander Gerbode Foundation -
Dr. Norman H. Meller - California	California
Nicholas Mitchell - Hawaii	

Junior

Bo Alexander - Honolulu
 Robert Clancey - Oahu
 Gregory Cone - Honolulu
 Tracey Griner - Michigan
 Beth Hazzard - Honolulu
 Hunter Johnson - Oahu
 Damien Horigan - Honolulu
 Anita Maria Kristan - Connecticut
 Naomi Kuba - Oahu
 Kathi Macdonald - Honolulu
 Barbara Mull - Honolulu
 Carolyn Phillips - California
 Danny Skinner - New Jersey
 Jimmy Tahan - California
 Althea Toma - Honolulu
 Lance Uchida - Honolulu

Regular - Honolulu

Elaine H. Abe	Joy C. Harwood	Hazel Peppin
William P. Alexander	C. Florence Hendrycy	Rusty Perry
Dr. Walter J. Arnell	G. A. Hicks	Lt Gen Oliver S. Picher
Edward Arrigoni	Larry Hirai	Mr.&Mrs. Charles J. Pietsch
Janet E. Bell	Mr.&Mrs. Ernest G. Holt	William W. Prange, Jr.
Francis L.P. Benevides, Jr.	Mr.&Mrs. Thomas J. Horigan	Thane K. Pratt
Shirley D. Bennett	Alice G. Horn	Gene Renard
Dr. Andrew J. Berger	Aileen M. Ichijo	Mrs. Mary E. Riggs
Mrs. Barbara K. Bird	Leroy Ing	Mrs. Mary Roberts
Dr. Earl L. Bishop	Christine Jones	Mrs. Ruth R. Rockafellow
Mrs. Jesse E. Blackwell	Mrs. Margaret H. Kai	Marvin L. Sanders
Mrs. Gerald L. Bolton	Gordon E. Kauffman	Mrs. Martha R. Scruton
Irma Botsford	Neill Kawasaki	Miriam E. Sinclair
Paul Breese	Maurice V. King	Margaret L. Smith
William Y. Brown	Unoyo Kojima	Nelle Smith
Dr. Elizabeth B. Carr	Noel L.H. Krauss	Mrs. Thelma Warner Smith
Laura C. Casey	Alphonse Labrecque	Kathleen Soo
Alys J. Chong	Dr. Charles H. Lamoureux	Walter R. Steiger
Patrick Conant	Shirley H. Lewis	Kurt Steinwascher
Mrs. Virginia Cone	Alex L. MacGregor	Wilbur Stuhlman
Dr. John W. Cooper	Mr.&Mrs. Milton Manhoff	Roxanne Sullivan
Jerry Corn	Mrs. A.O. Marrack	James F. Temple
Dianne & James Coughlin	Mrs. Viola H. McLaughlin	Charles Van Riper, III
Mr.&Mrs. William L.Cromley	Dr. John C. Milnor	Dr. Arthur W. Ward
Mrs. Helen Delaney	Susan G. Mondon	Eleanor Westendorf
Mrs. Helen D. Devereux	Steven Montgomery	Lyndon Wester
Marvin K. Devereux	Marjorie Morris	Fred White
Laura A. Draper	Mrs. William J. Mullahey	Harry Whitten
Dr. C. Robert Eddinger	Hector C. Munro	Dr. G. Causey Whittow
Evan Ellman	Mrs. George Murdock	Dr. William Wingfield
Susumu Fujii	Dr.&Mrs. William A. Myers	Mrs. Kammy Wong
Wayne Gagne	Mrs. Douglas Nagoshi	Mrs. Esther H. Wright
Robert W. Gardner	Mrs. Walter K. Nakanishi	Glenn T. Yamashita
Mrs. Howard Gottschalk	William Neill	Julia K. Yoshida
Ann L. Halsted	Carl N. Nielsen	Dr. Alan C. Ziegler

Regular - Rural Oahu

John J. Allen-Aiea	Mr.&Mrs. Robert C. Hanson-P.C.	Mrs. Anne Powlison-Kailua
Mrs. Mabel R. Becker-Kailua	Mrs. William C. Hodge-Kailua	Clarence A. Pretzer-Kaneohe
Mrs. H.A. des Canavarro-Kaneohe	Patty Lu Kaliher-Waimanalo	Hiroshi Tagami-Kaneohe
Mrs. H.C. Cunningham-Aiea	Eugene Kridler-Kailua	Mrs. R.M. Vanderburgh-Kaneohe
Timothy K. Earle-Kailua	John C. McCain-Kailua	Mrs. Russell Wright-Kaneohe
Mrs. William G. Gorst-Kailua	Donald D. Mitchell-Kaneohe	Mrs. Nancy F. Yauger-Kailua

Regular - Other Islands

Mrs. Louis W. Aidem-Molokai	Barbara H. Davis-Kauai	Mr.&Mrs. G.A. Schattauer-Hawaii
Mrs. Robert K. Baldwin-Hawaii	Amy Greenwell-Hawaii	Dr.&Mrs. David R. Sears-Kauai
Winston E. Banko-Hawaii	Geoffrey Haines-Maui	Mrs. Dorothy Thompson-Hawaii
Russell W. Cahill-Maui	Mrs. Violet Hansen-Hawaii	Dr. P. Quentin Tomich-Hawaii
Myrna Campbell-Kauai	Derral Herbst-Kauai	Dr. Alfred S. Tong-Hawaii
Donn Carlsmith-Hawaii	Mary Musgrove-Hawaii	Alan S. Tyler-Hawaii
Mrs. E.C. Cluff, Jr.-Kauai	Mrs. William J. Paris-Hawaii	Rick Warshauer-Hawaii
Sheila Conant-Hawaii	Mrs. Patricia C. Peacock-Hawaii	

Regular - Out of State

Dr. Dean Amadon-NY
 Walter E. Benning-NY
 Fred P. Bosselman-Ill
 Robert A. Brewer-Cal
 Donald Brock-Cal
 James R. Butler-Va
 E.H. Campbell, IV-Ore
 Douglas T. Cheeseman, Jr.-Cal
 Martha Chestem-Md
 Roger B. Clapp-Va
 Mr. & Mrs. Charles Cline-Cal
 Dr. Robert H. Cooper-Ind
 Salon D'Andree-Mass
 William P. Dunbar-NY
 Elizabeth Dyer-Del
 William J. Edgar-Mich
 Dr. William H. Elder-Mo
 Jane G. Eliason-NJ
 Mrs. M.W. Evans-Mass
 Dr. R.A. Falla-New Zealand
 Dr. F.R. Fosberg-DC
 Mrs. Bertrand Fox-Mass
 Mrs. G.D. Fraser-Fla
 Dr. & Mrs. Hubert Frings-Okla
 Mrs. Kenneth D. Gardner-Cal
 CDR J. Richard Gauthey-Va
 Mrs. Eleanor Gilje-Minn
 Mr. & Mrs. Virgil L. Griner-Mich

Nelson Hall-Okla
 Robert Hansen-Cal
 Philip K. Hathaway-Mass
 Lt Col & Mrs. Charles G. Kaigler-Cal
 Karl W. Kenyon-Wash
 Hermann Kind-Ohio
 Joseph E. King-Ga
 Mrs. I.A. Klevens-Wash
 Margaret M. Kocsis-Conn
 Mrs. Annette C. Koon-Tex
 George Laycock-Ohio
 Dr. Spence Malecha-Ill
 Dr. Alfred J. Marston-NY
 Mrs. David J. Martin-Canada
 Mrs. Ethel M. Matheson-DC
 H.R. McKenzie-New Zealand
 Mrs. Joseph E. McNett-NY
 C.W. Morehen-Canada
 E.W. Mudge, Jr.-Tex
 Linda May Mull-Cal
 Mrs. Louis F. Nobrega-Cal
 Mr. & Mrs. C. Turner Nearing-Ill
 Gard Otis-Mich
 Dr. Roger T. Peterson-Conn
 Jerome J. Pratt-Ariz
 Roy T. Puckey-NJ
 Dr. & Mrs. Robert L. Pyle-Md
 Mrs. Mary E. Reyes-Mass
 Hannah T. Richards-Colo

Dr. Frank Richardson-Wash
 John Richardson-Ill
 William S. Robinson-Ore
 Mrs. Donald P. Russell-NH
 Mr. & Mrs. Frederic S. Shaffer-Ohio
 Robert Shallenberger-Cal
 Euphie G.M. Shields-Cal
 Joseph H. Siphron-NY
 Capt & Mrs. L.S. Smith, Jr.-Cal
 Mrs. Nina Dean Steffee-Fla
 Helen M. Stooddy-Wash
 Mrs. Clyde K. Stroburb-Cal
 John W. Swanstrom, Jr.-Ill
 Lawrence J. Taylor-Neb
 Mrs. S.F. Thomas-Cal
 James A. Tucker-Tex
 G. Bernard Van Cleave-Pa
 Mrs. Owen H. Wangensteen-Minn
 Dr. Richard E. Warner-Canada
 Wilfred W. Weddendorf-Cal
 Steve West-N Mex
 Mrs. Helen Whorton-Kans
 Mrs. Ann E. Wissler-Utah
 James R. Wolf-Pa
 Lorrin W. Wong-Ohio
 Mrs. Mary E. Woolley-NY
 Henry Yuen-Alaska
 Mrs. B. Theodore Zartman-Pa
 Mrs. Robert E. Zekekar-Cal

Institutions

Amer Mus of Nat Hist-NY
 Aud Nat Soc-DC
 Bishop Museum-Hon
 British Museum-Eng
 City of Ref Nat Hist Park-Haw
 Coll of Wm & Mary-Va
 Colo State Univ-Colo
 Del Mus of Nat Hist-Del
 Denver Mus of Nat Hist-Colo
 Dept of Planning-Hilo, Haw
 Div of Fish & Game-Hon
 Ft Shafter lib-Hon
 Haleakala Nat Park-Maui
 Hanahauoli Sch Lib-Hon
 Harvard Univ-Mass
 Haw Loa Coll Lib-Oahu
 Haw Public Lib-Haw
 Haw Nat Hist Assn-Haw
 Haw Prep Academy-Haw
 Haw State Lib-Hon

Haw State Lib-Kaimuki Br
 Kapahulu Br
 Hickam Base Lib-Oahu
 Hon Advertiser-Hon
 Honolulu Zoo-Hon
 HSPA Exp Sta-Hon (LIFE)
 Kailua Library-Oahu
 Kamehameha School-Hon
 Kauai Pub Lib, Hanapepe
 Kapaa
 Waimea
 Kauai Pub Lib Assn, Ltd
 Des Mammiferes-France
 Leeward Community Coll-Oahu
 Lyman K. Stuart Observ-NY
 Maui Pub Lib, Wailuku
 Kahului
 Lahaina
 Makawao
 McCully-Moiliili Lib-Hon

McGill Univ Lib-Canada
 Molokai Pub Lib-Molokai
 Nat Audubon Soc-NY
 Oceanic Inst Lib-Oahu
 Palama Settlement-Hon
 Patuxent Wildlife Res Cen-Md
 Peabody Museum-Conn
 Pa State Univ-Pa
 Plant Industry Adm-Hon
 Point Reyes Bird Ob-Cal
 Simon Fraser Univ Lib-Canada
 Smithsonian Inst-DC
 Univ of Calif-Berkeley
 Los Angeles
 Univ of Guam
 Hawaii
 Kansas
 Michigan
 Waikiki Aquarium-Hon
 Wallace Alexander Gerbode
 Foundation-Cal (LIFE)