

A Study of Bird Lining in Cyprus

John P. Hubbard

"They have also in the Island a certain small bird much like unto a Wagtaile in fethers and making, these are so extreme fat that you can perceive nothing els in all their bodies: these birds are now in season. They take great quantitie of them, and they use to pickle them with vineger and salt, and to put them in pots and send them to Venice and other places of Italy for present of great estimation. They say they send almost 1200 jarres or pots to Venice, besides those which are consumed in the Island, which are a great number."

For centuries countless small birds have been captured for food on the eastern Mediterranean island of Cyprus. Most of the birds are migrants in passage between Eurasia and Africa, and most are at present taken on small sticks coated with a sticky substance called "bird-lime". The precise toll of birds has never been accurately determined, although there is little doubt that now millions are caught every year. Bird-catching on the island has come to the increasing attention of ornithologists elsewhere mainly as the result of the large number of rings that have been recovered by the liners and published by the Cyprus Ornithological Society. With the increasing awareness of bird lining has also come the realization of the need for conservation measures to control this activity. Although preliminary steps toward conserving birdlife have been initiated by the members of the Society and by the Royal Society for the PREVENTION OF Cruelty to Animals, a detailed study of bird-lining on which conservation measures might be based had never

been carried out on the island. In the late summer of 1967 the suggestion was made that a team of ornithologists from the Smithsonian Institution carry out such a study on Cyprus as part of a larger bird ringing and biomedical program to study the transmission of viruses by migratory birds and their ectoparasites through northeast Africa. After a preliminary survey at the village of Paralimni in southeastern Cyprus in the autumn of 1967 a concentrated study was undertaken there in the spring of 1968.

The site of our studies was the village of Paralimni, which is 5 miles south-southwest of Famagusta, in southeastern Cyprus. The village (elevation 250 feet above sea level) is less than a mile from the Mediterranean, and is situated at the northern end of a peninsula which culminates at Cape Greco, approximately 10 miles southeast of Paralimni (map). The general terrain around the village is level or gently rolling, but southward along the peninsula, east of this ridge, there is a narrow coastal strip of near-level land which is a mile or less wide and about 8 miles long. Most of the land in the vicinity of the village is covered by cultivated fields and orchards (mainly citrus), the former predominating north of the village and the latter occurring mainly southward. Fields and orchards also occupy the coastal strip along the eastern side of the peninsula, but uncultivated vegetation exists over much of the rest of the peninsula, especially on the ridge and in rocky and broken areas. The uncultivated vegetation is largely xeric-adapted forbs and low Mediterranean scrub, but near Cape Greco, there is a tract of juniper (*Juniperus phoenicea*) woodland. There are

also stands of an introduced acacia (*Acacia cyanophylla*) and scattered eucalyptus (*Eucalyptus sp.*) trees throughout the area.

Most of the liming at Faralmani is done in the coastal strip and in the area immediately south of the village. This area of intensive liming totals roughly 10 square miles. Only those sites on which there are trees and other places for birds to perch are used for liming. Favored are small groves of strips of vegetation near open fields or such fresh water sources as cisterns or leaks in pipes. Here one may see a dozen or more lime-sticks in the top and peripheral branches of each small tree. Both cultivated and wild vegetation is used to support sticks, but olives and other open trees are preferred. The sticks are laid horizontally with one or both ends supported by vegetation and the middle free of obstruction. The sticks are usually placed early in the morning (between 3:00 and 6:00 am), just before the birds become active. Since bird-lime is most effective in still, cool, and moderately humid air, the best time for bird-catching is in the morning. Later in the day as it becomes warmer, drier, and often windy, the lime dries out and hardens. Extreme cool temperatures caused by north winds also can undermine the effectiveness of bird-lime, as does precipitation which makes the material dry and rubbery. When unfavorable conditions develop the sticks are removed, but sometimes they are left in place all day, particularly if birds are abundant.

In laying lime sticks the limers expertly position them in attractive places for birds to perch. Often birds come to limed sites of their own volition, but in large groves where only certain trees or areas are heavily limed, periodically the limers beat noisily through the brush

X driving the birds into the oiled sites.

When a bird alights on a limestick it normally flutters upward in an attempt to escape and in so doing it is pulled back by the lime; in the struggle it loses its balance and pitches forward, hanging head downwards (Plate 1). In this position it may remain quietly, but often it continues its fluttering and in so doing it catches its wings and tail on the lime (Plate 2). If the bird continues fluttering the usual result is soiling and loss of its feathers especially the primaries. Strong birds such as Song Thrushes, Turtle Doves and Orioles may become incapacitated for flight by their wild thrashing and feather loss (Plate 3). Other species vary in feather loss depending both on their behavior and plumage characteristics. The stickiness of the lime at the time of capture also influences feather damage.

The limer generally attempts to remove birds from the sticks rapidly after capture to prevent escape and their losing feathers that may soil the sticks. To remove a bird, he grabs it simultaneously by the legs, body, and wing feathers and pulls it free. The bird is then immediately killed, generally by cutting the throat with a pocket knife or biting the head or neck, and is thrown into a collecting basket with other carcasses. Periodically the contents of these baskets are gathered and the birds are plucked and cleaned, either at the liming site or in the village. The prepared birds are either eaten by the villagers or sold to local restaurants which serve them as food.

In preparation for bird-catching each year the villagers make bird-lime and coat sticks with the material. This is done in the late summer and early autumn when the fruit of the Assyrian Plum Tree (*Cordia* *alliodora*, family Boraginaceae) is ready to be used. The villagers

pick clusters of the grape-like fruit when they turn a light orange color. They then either mash the entire fruit or squeeze out the viscous pulp into a container. They add honey and beat the mixture until it forms a froth. They dip sticks into the mixture and spin them until they are coated evenly with a layer of lime, leaving one end uncoated to serve as a handle. Any adhering seeds are removed. In general the sticks used are 18 to 30 inches long and up to an inch in diameter at the large end. Any suitable rod can be used for a lime-stick, but withes of pomegranate and olive are favored in Paralimni. The coated sticks are cured in the sun for a day or two before they are ready to use. Sticks that are not being used are wrapped in bundles and are usually stored or carried in elongated gourds. Properly cared for, the brown-colored sticks are good for an entire season of bird-catching. Limers make lime-sticks both for their own use and for sale. Good limesticks bring 1 to 2 Cyprus shillings in local markets.

Methods

Our approach to this study was, quite simply, to intercept the lined birds before they were prepared for consumption. Initially, in the autumn of 1967, we tried visiting the actual liming sites and recording catches, but the liming proved to be scattered over such a wide area as to involve such a rapid turn-over of birds that we could not study the situation effectively. In the spring of 1968 we opted to have the limers bring their catches to a central place in Paralimni instead, and further, we asked that the birds be brought in alive rather than dead. This arrangement proved to be unacceptable to some

of the limers, mainly because they did not wish to be bothered with live birds that required caging and were liable to escape. The limers who did not wish to cooperate in the study killed and disposed of their birds as they are accustomed to doing without our tabulating their catch.

The limed birds that were brought to us in Paralimni arrived from mid-morning through the evening of the day of their capture, depending on the nearness and the accessibility of the site at which they were limed. In most cases the birds were brought in late in the day after farmers finished their activities in the fields and returned to the village. This meant that in some cases birds that were caught in the morning were not released until the following morning, 24 hours later. The delay in processing birds doubtlessly contributed to overall mortality, although to offset delay we worked evenings to sort birds so that release could take place at dawn, the following morning. Even though sorted and ready for release, we did not free birds at night because we felt that in their disoriented state they would have fared poorly in the darkness.

We sorted the limed birds into holding cages first by species and then by category depending on their condition and intended disposition. Category one consisted of birds that were judged to be in excellent condition and suitable for ringing and release. Category two consisted of birds that were releaseable, but were not in good enough condition to ring. All of the birds in this category could fly, but most were missing feathers or were otherwise imperfect. Birds in category three were those that could not fly, but which could be used for biomedical research or for museum research specimens. Category four consisted of birds that had died or were too weak or damaged to release. Birds in this category were chloroformed, cataloged and discarded.

The odor of chloroform rendered such birds inedible, at least in the opinion of the villagers, and we are certain that they did they did not attempt to retrieve these birds for food.

All of the birds brought to us by the limers were recorded by species, date, sex, age, and other particulars both for the study of liming and for learning more about migration in Cyprus (a detailed analysis of the data is in preparation). Ringed birds were weighed and checked for fat before release, but this was done more to obtain such values for viable birds rather than to reflect natural parameters (in view of the long holding period of our samples). Birds that were used for biomedical research yielded blood samples for an investigation of virus dispersal involving palearctic migrants and their relatives. Specimens, which were taken mainly from unreleasible birds, included skins and anatomical material which is now deposited at the Smithsonian Institution and the British Museum (Natural History).

Most of the birds that were released were freed in the garden of a house we rented in Paralimni and at which we worked and one (Mr. Kenneth Horner) lived. We released birds in Paralimni in order to hasten the process and assure greater survival among the freed birds. Initially we experienced difficulty in convincing some villagers that released birds should be allowed to escape the area, but with the cooperation of the local constabulary and other villagers, recapture was reduced to a minimum level. Very little liming is done in the village itself, because of the scarcity of birds and the scattered nature and the large size of the nearby trees. We are therefore reasonably confident that a large portion of the birds released in the village was spared further persecution. This is particularly true if the birds moved northward (as one expects spring migrants to do), but those that returned to the liming areas south and southeast of the village would have been again exposed to liming. That some of

the birds we released did return to the liming area is attested to by the local recovery of some of our rings in the same season.

Results

In the period of 5 March through 11 May 1968, the limers of Paralimni brought to us a total of 25,201 birds of 99 species (Table). The actual number of liming days represented in this period is 64, which means that we received an average of almost 394 birds a day. The most frequently caught bird was the Lesser Whitethroat (5415) followed by the Chiffchaff (4646) and the Blackcap (3946). Together these three species account for 10,007 birds, or 55.6 per cent of the entire sample. Also taken in large numbers were Redstarts (1325), Orphean Warblers (1062), Whitethroats (676), Willow Warblers (673), Pied/Collared Flycatchers (568), and Subalpine Warblers (654). Other numerous species were the Robin, Hoopoe, House Sparrow, and Pied Wheatear (all 300 to 400); Nightingale and Song Thrush (200 to 300); and Isabelline Wheatear, Spotted Flycatcher, Bonelli's Warbler, Cuckoo, Scops Owl, Masked Shrike, Wryneck, Thrush-Nightingale, Reed Warbler, and Tree Pipit (all 100 to 200). Together, these 29 species total 23,800 individuals, or 94.4 per cent of the sample.

The species most vulnerable to liming were the small to medium sized ones which frequently perch on trees and shrubs. Both species which skulk (e.g., Lesser Whitethroat, Blackcap) as well as those which perch in conspicuous places (e.g., Redstart, Pied/Collared Flycatcher) were caught in large numbers. The presence in our sample of large species such as the Pallid Harrier, Merlin, Barn Owl, Short-Eared Owl, and Long-Eared Owl attests to the strength and tenacity of bird-life.

Of the 25,201 birds examined, 2300 individuals of 49 species were in

excellent condition and were ringed with British Trust for Ornithology rings before release. To date three of these birds have been recovered, including a Hoopoe (Ayia Napa, Cyprus), a White Wagtail (near Vsetin, Czechoslovakia), and a Blackcap (Beirut, Lebanon). A small number of rings and ringed birds were also turned over to us by limers, including ones from England, Sweden, Czechoslovakia, Germany, the Soviet Union, Jordan, Israel, and Nigeria (details to appear elsewhere).

Another 9,456 birds were released without being ringed. These as well as birds that were ringed were cleansed of lime before being freed. The 13,445 birds that were not released were mainly those that were dead, weak, and damaged by lime. Of these birds 2,939 were used in laboratory research and/or prepared as specimens.

Discussion

Although the 25,201 birds brought to us by the limers is a very large figure, it is not the total of birds captured at Paralimni in the spring of 1968. As already stated not all the limers were willing to participate in this study because of the problems of handling live birds. Consequently, although, we know that 30 to 50 per cent of the limers were cooperating with us in our study, the record of birds captured is not complete. However, if we may assume that 30 to 50 per cent participation among the limers also meant that 30 to 50 per cent of the catch was recorded, then we may estimate that 50,000 to 84,000 birds were captured at Paralimni in the spring of 1968. We have no direct proof that these numbers were taken, but as we saw ample evidence that there were additional birds sufficient for local consumption and sale in the bars, we assume the capture of many other birds.

We have some additional indirect evidence that the birds recorded by us constituted significantly less than the total catch. Early in the season we asked the limers to estimate the average daily catch of birds for the entire village in a typical spring season. After lengthy consultation and consideration it was agreed that perhaps a hundred dozen birds per day would be the average daily catch over an entire spring season. Using this figure times the total number of days (64) on which we recorded birds, one arrives at the figure of 76,800 birds for the period. Our sample is about 32 per cent of this estimate, which is in keeping with the fact that only 30 to 50 per cent of the limers brought us their birds.

The limers of Paralimni told us that they take birds from early March through mid-May (but mainly mid-March through late April) and again from late August to early November (but mainly early September through late October). This totals approximately 10 weeks in the spring and 10 in the autumn, of which the most intense periods of liming are about 6 and 8 weeks respectively. Some liming is also carried out through the summer (K. Horner, pers. obs.) in the area, but the limers told us that little or no liming was done in the winter near Paralimni, although elsewhere on the island Song Thrushes are limed in the winter.

Although the limers agreed that the major liming season at Paralimni is in the autumn, they also said that considerable liming has traditionally been done in the spring. On the other hand, Bourne (1963 C. O. S. Bull. No. 15) reported, on the basis of his experience in 1956-58, that little liming was done in Cyprus in the spring. Whether or not a change has occurred in the seasonal activity of liming on the island is difficult to determine. In the spring of 1968 limed birds were on sale not only at Paralimni but in the market at

Famagusta and on the road between Nicosia and Limassol. In addition, Peter Stewart reported liming at that time on the Akrotiri Peninsula, and Paul Neophytou gave us a Pallid Harrier that he obtained from limers near Kormakiti. That spring liming existed before 1968 is reflected in a few recoveries of rings from limed or presumably limed birds, which have been reported by the Cyprus Ornithological Society or which were turned over to us.

There are several reasons for liming being practiced on a smaller scale in the spring than the autumn in Paralimni. Of major importance is the fact that many villagers are busily engaged in farming in the spring and therefore cannot take time to lime birds on a large scale. In fact, most of the villagers we knew to be liming in the spring were older people, who could no longer do heavy work, children, and others who either did not farm or who had time free from their farming due to extra help, small acreage, or crops that were not in need of care (e.g. orchards).

Not only are villagers busier in the spring than in the autumn but birds are both scarcer and less fat in the spring season and therefore less attractive to the limers. The villagers estimated that in the autumn the average daily catch of birds was about four times that of the spring, or 400 dozen birds per day. That birds are also fatter in the autumn than in the spring was demonstrated by our examination of carcasses at the two seasons. The fatness of small birds reflects on their taste (according to the Cypriots), which in turn affects their desirability and price. The difference means that birds in the autumn are two or three times as valuable to the limer as in the spring, the price being 1 shilling to 1/6 (1000 mils) as opposed to 6d (500 mils) per dozen. With four times the birds at double or triple the price it is little wonder

that liming is such an important activity in Paralimni in the autumn. At that season, particularly on weekends and in the evenings, outsiders flock to the village bars to drink beer and eat "ambelopoulya" (Greek for "vine birds," applied to all small birds served fried, broiled, pickled, etc. as snacks and meals) by the dozen. Paralimni has even staged an "ambelopoulya fair" to attract more customers.

The number of birds taken at Paralimni every year is an interesting matter of speculation. As mentioned already the main liming season in the spring is 6 weeks long and the total season is approximately 10 weeks. Six weeks at the estimated 100 per dozen birds per day gives us a total of 50,400 birds and the 4 additional weeks of less intensive liming may swell this to 60,000 or more. In the autumn the main season is 8 weeks and the total is 10 weeks. Eight weeks at 400 dozen birds per day is 268,800 birds with 2 additional weeks increasing it to perhaps 285,000 birds. The annual catch at Paralimni may be 345,000 birds.

One may also apply the estimates of birds captured at Paralimni, at least for the autumn, to Cyprus as a whole to calculate a possible annual toll for the island. This figure will of course be far less accurate than that for Paralimni because our estimates for the rest of the island are purely speculative.

Cyprus has an area of 3572 square miles. Precisely what portion of this is subject to liming is problematical, but conservatively let us assume that only 3 per cent of the total area is subject to prolonged and intense liming in the autumn (e.g., Larnaca, Ayios Theodoros, Paphos areas). Thus we can apply the estimate of Paralimni's catch to 3 per cent of the area of Cyprus (107 square miles). Since Paralimni's liming area is about 10 square miles, the catch for

caged for its beauty or song. Assuming that one has the right to attempt to change the thinking of Cypriots and bring about a scientific and a deeper esthetic appreciation of birdlife among these people, the question arises as to how this can be done. The basic answer seems to be one of education; education at all levels and in a massive dose. At the same time the need also exists for the government of Cyprus to consider controls on liming, which would reduce or at least hold the line against destruction of birdlife while attempts are made to instill acceptance of conservation and perhaps create an appreciation of nature in the population. Before suggesting means of controlling liming, the necessity exists for first examining the effects of and reactions to such a move.

If the 285,000 birds captured in Paralimni each autumn were sold at the standard price of one Cyprus £ per dozen, an income of £23,750 would be realized. Add to this 60,000 birds captured in the spring and sold at 10 shillings per dozen and the annual income from birds reaches £ 26,250. As the people of Paralimni consume part of their catch themselves rather than selling it, not all of this income is realized as calculated here. The loss of income due to local consumption of small birds may be off-set, however, by the fact that many of the birds captured and sold are larger species, which bring up to 10 shillings each. Thus, let us accept £ 26,250 as the basic annual income from birds in Paralimni.

According to figures from the United States Information Service the population of Paralimni is approximately 3600 and the per capita income is £ 120. The per capita distribution of the £ 26,250 in income from birds is about £ 7, or approximately 6 per cent of the total per capita income. Thus if bird liming were banned, the villagers would stand to lose 6 per cent of their income, not

to mention a source of protein in their diet, albeit quite minor and popular sport. While this loss might not seem significant on an overall basis, it would be very unpopular in the village, and for some low income families it could pose a hardship as well. Even assuming that the percentage of families that would be adversely affected by a ban on bird-liming would probably be small, the unpopularity of such a decision, echoed in village after village, would be expected to be great. Even among those Cypriots who consume rather than capture birds one could expect a considerable outcry against a move to deprive them of "ambelopoulya." Such unpopularity in this parliamentary country could amount to a rejection of the idea. Instead of an outright ban on liming the best approach seems one of bringing it under governmental control, concomitantly with education in nature conservation.

To date the scope of education in nature conservancy in Cyprus has been small. Most of the information that has been made available has come from pamphlets and newspapers. In the spring of 1968 additional efforts to provide information were made in a lecture and a television film sponsored by the Smithsonian Institution and the U. S. Information Service. Much more is necessary in order to bring the subject to wider attention, especially in the schools and via the mass media. The above agencies and the Cyprus Ornithological Society are continuing in their efforts to promote conservation on the island, including the training of local people in ornithological work and the issuing of information on birds, conservation, and related subjects. In addition, the government of Cyprus has become increasingly aware of the problems and is now involved in exploring the possibilities of its cooperation and action. Particularly promising are prospects of the development of a nature tourism industry on the island (such as in East Africa), complete with national parks and preserves, tours, and information on

natural attractions. The development of such an industry could have profound effects toward controlling and eventually abolishing the liming industry, since income from tourism would probably far outstrip that from "ambelopoulya." Hopefully in the near future the Flamingos, Mouflon, Eleonora's Falcons, wild-flowers, and other natural attractions of the island will be safe-guarded and will attract as many tourists as now come to see the beaches, ruins, and monasteries.

Recommendations

The following recommendations are a distillation of information and ideas from many sources, including the present study, the Cyprus government, the Cyprus Ornithological Society, and conservationists throughout the world. This list is essentially the same one that I submitted to the government of Cyprus in April 1968. I have not recommended the exclusion of any species from liming because of the problems of identification, enforcement, and the fact that once limed, a bird may have to be destroyed regardless of rarity. In most cases the vulnerable species on Cyprus would be accorded protection on the basis of the geographical restriction of liming herein proposed.

1. Liming should be restricted to those areas where it is a traditional occupation and of significant economic importance to the population. This would restrict liming to the areas such as Paralimni, and keep it from spreading to other parts of the island where it is not well established. Liming would be strictly banned in or near nature reserves.
2. Liming should be seasonally restricted to one month in the spring (15 March 15 April) and one and a half months in the autumn (1 September to 15 October); a one month winter season might also be permitted. (15 December to 15 January). The seasonal periods would allow a portion.

of the early and the late migrants to proceed unmolested and would assure breeding birds an immunity from persecution. Winter and spring seasons would not be allowed in areas where they were not traditional.

3. All limers and sellers of limed birds should require licenses, and the sale or transport of limed birds outside legal liming areas would be prohibited. Curtailment of international traffic in limed birds (mainly as pickles) should be considered, not only in Cyprus, but also in the recipient countries, particularly England.

4. The growing of bird-lime trees should be banned outside legal liming areas and those outside such areas should be cut down; the making of lime and sale or transport of lime or lime-sticks outside the liming areas should also be prohibited.

5. A commission should be appointed to study liming and its control. In addition, an enforcement section should be set up to carry out this control and possibly to function in the control of shooting and other forms of birdlife destruction.

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