USING HAND-REARED BIRDS IN FIELD STUDIES

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The use of tame animals in field studies is a relatively new line of scientific investigation. Trained domestic animals have been used in laboratory investigations for many years, as have wild animals brought into confinement. But the use of free-ranging tame wildlife opens many possibilities for investigating phenomena that are difficult to study with either caged or completely wild animals. Recent studies of this kind have addressed problems in ethology, physiology, and ecology as well as problems in more applied disciplines (Bland & Temple 1987).

We used human-imprinted Himalayan snowcocks *Tetraogallus himalayensis* to assess the relative foraging potential of different alpine plant communities (Bland & Temple 1990). In order to imprint birds onto us we subjected them to a series of treatments during incubation, rearing, and field trials. Details of some techniques were available in the literature (e.g. Hunter *et al.* 1985, Kimmel & Healy 1987); others had to be newly developed.

These treatments began at the onset of incubation. Forty-eight snowcock eggs were set in a Jamesway 252 single stage incubator at 37.5°C (99.5°F). Humidity (wet bulb temperature) was set initially at 29.5°C (85°F) and adjusted periodically to maintain 15% weight loss. Fourteen (29%) of the eggs hatched, and the last chick emerged approximately 45 hrs after the first. We learned later that hatch could have been synchronized more closely by playing recorded brood calls within the incubator during final stages of incubation. Imprinting procedures were initiated as soon as chicks were capable of walking.

Many animal species exhibit an early 'critical period' during which parental bonds are established. The 'imprinting response' is most pronounced in domestic chickens during the period of 12 to 24 hours after hatching. A broader period between 10 and 50 hours is also very important for establishing parental bonds. To ensure good imprinting, we maximized human contact with chicks during the first 48 hrs after hatching. This required day and night vigils on the part of laboratory technicans. According to Hess (1973), the imprinting response is induced by 3 key stimuli: warmth, auditory communication, and enticement to following moving objects - the 'following response'. We provided warmth by holding chicks in our hands frequently. When interacting with chicks we uttered the words "chick, chick, chick" to provide a consistent auditory stimulus. The following response was initially developed with a red ribbon, which we tied around our wrists and coaxed chicks to follow. The tendency to follow such moving objects is an innate behaviour. When the chicks' walking endurance increased we tied the ribbon to our ankle and led the birds down a laboratory corridor. Eventually ribbons were omitted altogether. After 4 weeks we began leading chicks across outdoor lawns twice each day.

From an initial 19 chicks we chose 8 of the most successfully imprinted individuals as our study subjects. Some of the other chicks were so overcome by an innate 'fear response' - which peaks shortly after the imprinting response - that unacceptable force would have been necessary to control them under field conditions. At 8 weeks of age, successfully imprinted chicks were flown 2,100km from our laboratory in Wisconsin to a remote field camp in northeast Nevada, where they were housed in small coops. Within the 1.3-km^2 study area, birds were transported in a special backpack, to which they had grown accustomed from an early age.

Because we planned to use our chicks to assess relative foraging potential of different plant communities, our first field objective was to expose them

to the variety of foods available in Nevada's snowcock habitats. Foraging experiments were not initiated until chicks had foraged freely for several days in a variety of habitats.

It is important to note that we used tame snowcocks to assess the *relative* foraging potential of different foraging habitats, and not to assess such species-specific characteristics as dietary preferences: hand-reared snowcocks could not be expected to behave as wild birds at such a level. We believe it reasonable, however, to expect the foraging rates of tame snowcocks to vary in proportion to those of wild birds presented with a similar range of forage availability. This is especially likely in view of the catholic diet of snowcocks.

Because the variety of plants on which snowcocks forage was limited in Nevada's alpine habitats, and because the foraging substrate was structurally simple, we are confident that our birds developed 'normal' foraging behaviour quite rapidly, and much more rapidly than if the habitat had been more complex or the variety of foods greater. The level at which we distinguished food types in these experiments - grasses versus herbs versus sedges - accounts only for gross differences in lifeform and fibre content.

To verify that our tame birds foraged as efficiently as wild individuals, we compared the foraging efficiency (time to consume 400 pecks of food) of tame and wild birds in comparable habitats. There were no significant differences in a paired-sample comparison of the mean rates at which wild and tame birds fed ($t = 0.30$, $df = 16$, $P > 0.50$). These kinds of comparisons should always be made when tame birds are used as surrogates for wild individuals to show that tame birds have responded in a normal fashion.

The findings of our foraging experiments are reported in detail elsewhere (this volume), but in general we can report here that snowcocks foraged most efficiently on level or slightly-sloping ground and that this effect is due primarily to the % slope of the terrain: while grasses were preferred over sedges and herbs, grasses were less abundant on level or slightly-sloping terrain, and the relative abundance of herbs, though higher on more level terrain, did not appear to influence foraging efficiency.

Our human imprinted snowcocks were extremely useful in studies of the effects of predation-risk on habitat use. Tame birds allowed us to observe foraging behaviour closely without introducing a strong observer bias. Wild snowcocks are extremely wary and flush at great distances when they see a human, making detailed observations of wild birds all but impossible. We feel that tame birds can and should be used to approach many more problems in field ornithology. The technique greatly enhances the efficiency of data collection, and greatly reduces the technological and logistical difficulties encountered when studying free-ranging birds.

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