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NOTE ON THE LASTING RESPONSIVENESS OF A KEA
Nestor notabilis TOWARD ITS MIRROR IMAGE

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A mirror image has long been known to influence the social behaviour of birds. Mirror image stimulation is considered an effective and consistent way of provoking prolonged bouts of threat display (Gallup, 1968; Serpell, 1982). There is also evidence that it can have a quieting effect on some birds (Andrews, 1966). Gallup and Capper (1970) showed that some birds will actually prefer a mirror image to conspecifics, a preference that increases over periods of up to 18 days.

At the San Diego Zoo we had the opportunity of observing the behaviour of a Kea *Nestor notabilis* toward its mirror image under conditions of constant exposure over a period of 12 months. Keas are highly social birds, living in flocks of up to 13 animals in mountain forests on the South Island of New Zealand (Clark, 1970). They have been bred successfully in a number of zoos (e.g. Schmidt, 1971; Mallet, 1973; Mitchell, 1981; Sieber, 1983).

In June of 1987, a previously paired eight-year-old male Kea was transferred from the San Diego Wild Animal Park to a solitary cage in the San Diego Zoo to await the arrival of additional Keas from New Zealand. After several weeks in the new location the bird appeared listless, but repeated visits to the hospital provided no indication of parasites or other illness. He remained hunched with his feathers fluffed for long periods and began to pull out his scapular feathers.

On 27th September 1987, we introduced two stainless steel mirrors into the Kea's cage. During the first two weeks the Kea displayed a broad range of responses to the mirrors. From the moment they were in place, the bird went up to them and examined his own reflection. The examination involved a series of brief ^slances toward the mirror image followed by gaze aversion. Initially, the bird appeared mildly aroused, displaying a partial erection of the crown feathers and an erect stance. Later, the Kea's contact with the mirror consisted of periodic, tentative touches with the bill. The mirrors also appeared to elicit 'marking'

behaviour (described by Keller, 1976, at the Zurich Zoo), in which the cheek area between the sere and the orbit is rubbed repeatedly along the substrate.

By the afternoon of the third day, the bird exhibited a different suite of behaviours to the mirrors. He was observed to move deliberately in their vicinity, with his gaze maintained downward and his feathers fluffed. These postures are components of submissive displays, given by subordinate to dominant individuals (Potts, 1977). On the fourth day after introduction, however, the bird was observed to spend his afternoon rest period by preference on the perch next to the mirror, periodically waking up and touching his bill to that of the image.

Twelve months after the initial introduction, the Kea continued to be interested in and to interact with his mirror image, displaying primarily non-aggressive social behaviours. He spent a considerable amount of time looking at himself in both mirrors and commonly slept on the perch in front of one of them. The bird would stand next to either mirror with his body in contact, stare into it, touch it repeatedly with his bill, look away and then repeat the actions. Sometimes he vocalised while touching the mirror, a *meow* call we have observed in juvenile Keas in the field. He then typically adopted a resting posture, remaining in full body contact with the mirror.

The introduction of the mirrors appears to have had a striking impact on the bird's listless state. Reports from keepers indicated that the Kea's appetite was restored after the introduction of the mirrors, and the animal was generally more active. Incidents of feather pulling were generally reduced in frequency. At the end of the 12-month period, the mirrors were removed from the cage and the Kea was introduced to his previous mate. Within 48 hours of the introduction of the female, normal courtship and mating behaviour were observed.

Although mirrors are clearly not a substitute for the company of conspecifics, these observations suggest that the introduction of mirrors can be an effective way to maintain responsiveness in temporarily isolated individuals of highly social species.

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