

# Determination of the origin of British feral Rose-ringed Parakeets

*Josephine A. Pithon and Calvin Dytham*



*Den Powell*

**ABSTRACT** Four subspecies of Rose-ringed Parakeet *Psittacula krameri* are recognised, two African and two Indian. The likely origin of those individuals living in the wild in Britain was investigated by comparing body measurements and colour characters of 180 museum specimens from throughout the species' natural range with those of British feral specimens and captive individuals. Body length and bill length proved to be the parameters most likely to differ among all four subspecies, while toe and wing measurements also differed between some subspecies. Colour characters were of limited use, with the exception of bill colour, which could be used as a secondary criterion for classifying certain individuals. The British parakeets appear to be of Indian type; their wing and toe lengths are similar to those of the northern subspecies *borealis*, while their bill lengths correspond to those of southern *manillensis*. Since bill colour is highly variable, it is possible that the birds derive from a mixture of the two Indian subspecies.

Rose-ringed Parakeets *Psittacula krameri* established feral colonies in southeast England in the 1970s (Morgan 1993). Since then, a large subpopulation, numbering over 1,000 individuals, has become well established to the west of London, along with two smaller ones, one in southeast London and the other on the Isle of Thanet, in Kent (Pithon & Dytham 1999). The species' natural range extends across northern subtropical Africa and, in Asia, from Pakistan east to central Myanmar (formerly Burma) and south to Sri Lanka (Forshaw 1989; Juniper & Parr 1998). Large numbers of both African and Indian parakeets have been imported into Britain by the pet trade (Inskipp 1975), and the subspecific identity of the feral populations remains uncertain.

There are four subspecies of the Rose-ringed Parakeet. In Africa, the nominate subspecies occurs from Senegambia and south Mauritania eastwards to south Sudan and west Uganda, while *P. k. parvirostris* is found from east Sudan (Sennar district) and north Ethiopia to Djibouti and north Somalia (Forshaw 1989; Juniper & Parr 1998). The two Asian subspecies are separated roughly by latitude 20°N, which crosses the Indian peninsula: *P. k. manillensis* occurs south of this line, and *P. k. borealis* north of it (Forshaw 1989; Juniper & Parr 1998).

The subspecies are distinguished from each other by biometric measurements and by the coloration of the bill and neck-ring. According to the available literature (which is based on small samples), both of the Indian subspecies are larger than the two African ones in terms of their wing, tail and bill lengths and their body weights, and males are also slightly larger than females. The lower mandible of African *krameri* and Asian *borealis* is red and black, while the other two subspecies have an entirely black lower mandible, and *borealis* is thought to differ further in having the head plumage 'suffused with blue' (Cramp 1985; Forshaw 1989). Morgan (1993), who compared the available data with wing lengths and weights of six specimens caught in Surrey, suggested that the British birds were large and seemed likely to be of the northern Indian subspecies *borealis*, a view sup-

ported by observations of bill colour, although the difficulty of obtaining clear views of the lower-mandible colour in the field was stressed. Morgan's (1993) conclusions were tentative, and he highlighted the need for further study of feral parakeets in the hand.

### Museum specimens

A collection of over 200 Rose-ringed Parakeet skins, from the entire native range, is held at the Natural History Museum in Tring, Hertfordshire. We measured the 180 of these skins that were in suitable condition, and took a description of each of them. From the museum label, the location at which the bird was collected, the name of the subspecies and the sex were noted. Mature males, aged three or over, have a neck-ring (Juniper & Parr 1998; Low 1992); for all other specimens, the method used for sexing, such as description of the gonads, was noted. The following biometrics were taken: total length and tail length (summed to provide a measure of body length); wing length; bill length, from tip to cere; and length of the



Richard Chandler

44. Rose-ringed Parakeet *Psittacula krameri* of subspecies *borealis*, Rajasthan, northwest India, December 2000.

(easily accessible) right middle toe. The colours of the neck-ring and the upper and lower mandibles were recorded, and descriptions of eye and foot colours, when given by collectors, were also noted.

### *Live specimens*

In addition to the data gathered from six Rose-ringed Parakeets ringed before 1993 (Morgan 1993), further information was provided by the Hershams and Runnymede Ringing Groups for parakeets captured in Surrey. Several mist-netting sessions were undertaken at two roost sites and in four gardens, enabling more individuals to be caught, measured and described in full. Since wild parakeets may be expected to derive from the subspecies most commonly kept in captivity, and since the sample of live specimens is still relatively small, a number of captive individuals were also measured and described.

### *Assignment of subspecies and sex classes*

Each specimen was given a subspecies code according to the location from which it was collected, irrespective of the name on the museum label. Most of the African skins came from west or central Sudan and from West African countries, and were therefore

assigned to the nominate race *krameri*. The vast majority of the Asian specimens were collected in northern India, from Punjab across to Assam, and in Nepal, and were assigned to *borealis*. The samples of *parvirostris*, from Ethiopia, Somalia and east Sudan, and of *manillensis*, mainly from Sri Lanka, were much smaller.

Almost twice as many males as females were represented in the museum collection. In some cases, individuals had been labelled as female without any proof that this was the case. Three 'sex classes' were therefore created: known males, known females, and those of unknown sex (i.e. females or immature males). In an attempt to classify better the individuals of unknown sex, we carried out one-way analysis of variance (ANOVA) to test the effect of sex class on each of the five biometric variables, followed by post-hoc (least significant difference: LSD) tests to determine any differences between sex classes. Bill, tail and wing lengths were all significantly affected by sex. Moreover, all the LSD tests showed that, for those parameters, specimens of unknown sex were closer in size to known females than to known males. On this basis, all unknowns were grouped together with the females for the purposes of further analysis of sex differences and were termed 'females', although they could have included a proportion of juvenile males.



Richard Chandler

45. Rose-ringed Parakeet *Psittacula krameri* of subspecies *borealis*, Rajasthan, northwest India, December 2000.

### Analysis of skin biometrics

Since live samples of each of the subspecies were not available, it was not possible to determine whether live and dead specimens were similar. The biometrics of museum skins were therefore analysed in isolation. Two-way ANOVAs were performed to test the effects of sex and subspecies on each of the five variables. All biometric variables were significantly affected by subspecies, but only two, tail and wing, by sex; there were no interactions between sex and subspecies, indicating that the effects of sex on body measurements were similar for all subspecies.

For those two parameters (tail and wing lengths) significantly affected by sex, one-way ANOVAs, testing males and females separately, showed that the variables were still significantly affected by subspecies.

For those biometric variables which were significantly affected by subspecies, pairwise comparisons were performed (LSD) to determine the subspecies that could most reliably be distinguished by the relevant measurement. A summary of the results (table 1) reveals the measurements which most usefully divide groups.

Table 1. Summarised results of one-way ANOVA and LSD tests used to distinguish subspecies of Rose-ringed Parakeet *Psittacula krameri* on the basis of five measurements from skins.

\* = significantly different; N.S. = non-significant; - = insufficient data for *parvirostris* females.

Measurement	Indian and African specimens	<i>borealis</i> and <i>manillensis</i>	<i>krameri</i> and <i>parvirostris</i>
Bill	*	*	N.S.
Body	*	N.S.	*
Toe	N.S.	*	N.S.
Tail			
male	N.S.	N.S.	N.S.
female	-	N.S.	-
Wing			
male	*	*	N.S.
female	-	*	-

### Comparison with live specimens

Measurements of six Rose-ringed Parakeets living in the wild in England were obtained from local bird-ringers. A full set of biometrics had been taken of one of these, but for the other five only wing length had been measured. During our study, we also took measurements and descriptions of a further 20 wild individuals captured in west London and of 12 captive specimens. Of the parameters which usefully separate subspecies, body length is likely to be altered by shrinkage in museum specimens, while toe, wing and bill lengths should remain relatively unchanged.

In order to determine which subspecies the live birds most closely resembled, the data for live specimens were plotted against the museum data for those variables which usefully separated subspecies. Fig. 1 suggests that both the wild and the captive parakeets are of Indian origin. Toe and wing lengths indicate that the live individuals are likely to

be of the northern race *borealis*. Bill lengths of captives are also similar to those of the northern Indian race, whereas bill lengths of wild-caught birds are closer to those of southern *manillensis*.

### Colour characters

Most of the plumage and other colour characters examined varied little, and could not usefully be classified in terms of subspecies.

Bill colour was more variable, but all individuals fell into one of two classes: red-and-black upper and lower mandibles, or red-and-black upper mandible with an entirely black lower mandible. There was no difference in this character between sexes<sup>1</sup>. On the other hand, there were significant differences in the frequency of each bill-colour class among subspecies<sup>2</sup>. The majority of individuals of *parvirostris* and *manillensis*

1. Chi-square; d.f. = 1,  $\chi^2 = 0.12$ , N.S.

2. Chi-square; d.f. = 3,  $\chi^2 = 18.5$ ,  $p < 0.01$ .

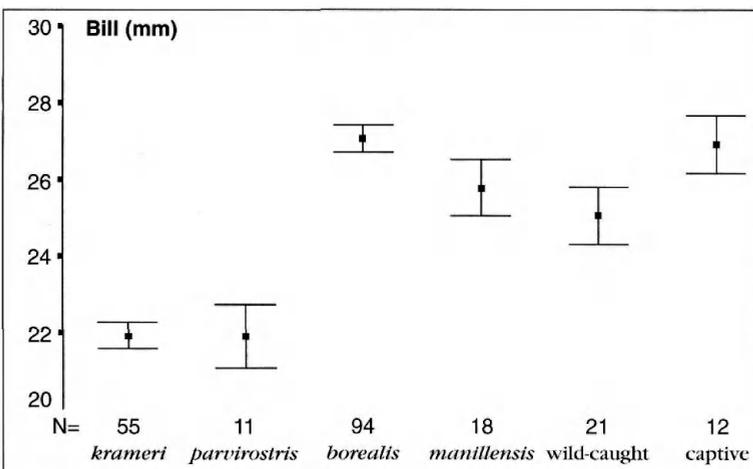
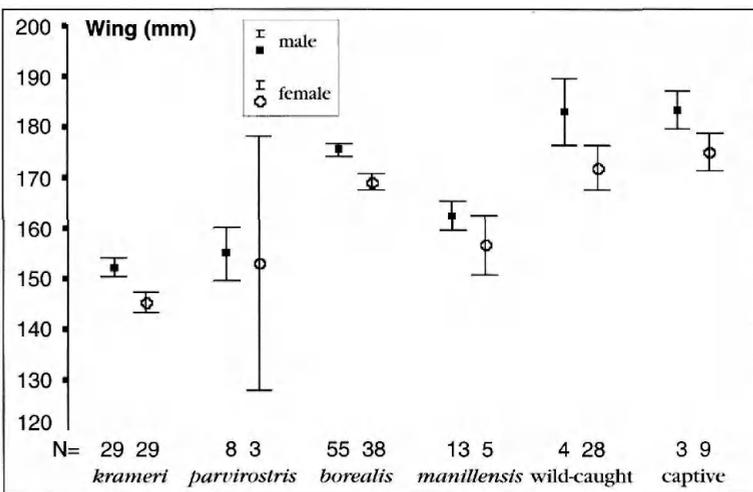
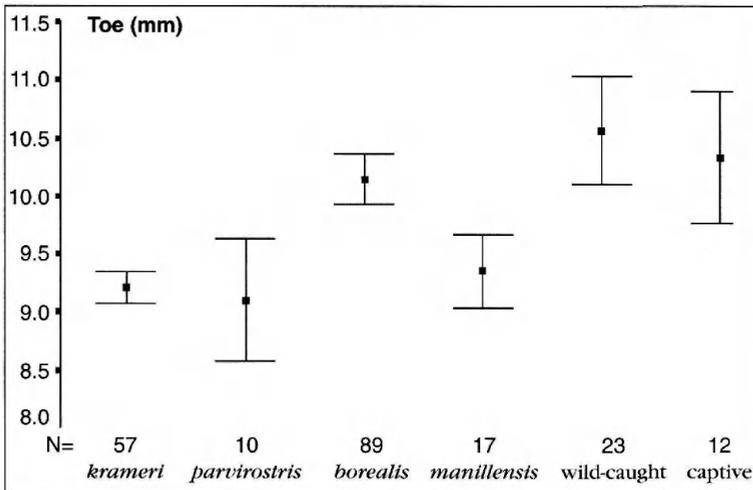


Fig. 1. Mean toe, wing and bill lengths ( $\pm 95\%$  C.I.) of museum specimens (of each subspecies) and of live specimens (of unknown subspecies) of Rose-ringed Parakeet *Psittacula krameri*.

had a dark lower mandible, while the other two subspecies had a mixture of bill types. A mix of the two bill types was found in the live specimens, which, together with their size, indicates again that at least some are of the subspecies *borealis*.

### Conclusions

With the exception of female *parvirostris*, the sample of which is too small to give reliable results, this study of a large collection of Rose-ringed Parakeet skins confirms the differences between Indian and African specimens in wing and bill lengths, as demonstrated previously (Cramp 1985; Forshaw 1989). The high proportion of males in the collection probably reflects a desire among hunters to collect more striking birds, those with a neck-ring. Body length and bill length can be used to distinguish between all four subspecies. Toe lengths of *borealis* are significantly larger than those of all other groups, while tail length differs greatly between sexes, but

not significantly between Indian and African specimens. The two Indian subspecies differ markedly from each other in bill, toe and wing lengths, whereas the two African ones are barely separable on measurements (only their body lengths are significantly different).

Subjective assessments of colour characters are of limited usefulness for distinguishing subspecies of Rose-ringed Parakeet. For example, examination of neck-rings revealed that these varied little: indeed, the character of 'head suffused with blue', ascribed to the subspecies *borealis* (Forshaw 1989), was found in at least one specimen of each of the other three subspecies. In some cases, bill colour may be used to reinforce a subspecies identification, since a large individual with a red-and-black lower mandible is likely to be *borealis* rather than *manillensis*, and a small individual with the same bill type is more likely to be *krameri* than to be *parvirostris*.

The British specimens vary remarkably little, and all are clearly of Indian type. This is surprising in view of the fact that Rose-ringed Parakeets were imported into Britain from both India and West Africa. The apparent absence of any African individuals in the feral west London population may be due to the fact that most African imports occurred in the 1980s (Morgan 1993), some time after Rose-ringed Parakeets had begun to breed regularly in the wild in west London. Indian parakeets have a tendency to produce colour mutations that are highly prized by aviculturists, and many were therefore bred in captivity (Low 1992). They are also perhaps better equipped to survive in a colder climate, as part of their natural distribution extends into mountainous regions; many of the museum specimens originating from India were shot at high altitude, up to 1800 m above sea level.

Wing and toe lengths of the wild and captive Rose-ringed Parakeets indicate that they are of the subspecies *borealis*, but bill lengths of the wild-caught individuals resemble those of *manillensis*. This, coupled with the observation that bill colour is highly variable, suggests that the west

London birds may possibly derive from a mixture of *borealis* and *manillensis*. The major imports of Indian parakeets may have come from areas where the two subspecies mix. Examination of old feral specimens from the Netherlands revealed that they, too, had long wing lengths and variable bill colour, and it was suggested that they might have been introduced from the Bombay area, i.e. at around 20°N (Cramp 1985).

Alternatively, over the 30 years during which Rose-ringed Parakeets have been living in Britain, hybridisation between the two Indian subspecies may have occurred, either in captivity or after escape. The extent to which biometrics vary seasonally is not known, and the possibility that, in the analyses, females included an unknown number of juvenile males is not ideal. The toe, wing and bill lengths obtained in the present study, as well as the similarity between captive and wild-caught individuals, do, however, present rather a persuasive argument.

#### Acknowledgments

The authors would like to thank John Forss, Keith Herber and David Morgan for providing details of parakeet biometrics. We are grateful to the following bird-ringers, who helped by catching and measuring British parakeets: Garry Barker, Andy Baxter, Adrian Blackburn, Richard Denier, Steve Hunter, Phil Prosser and Chris Wright. We also thank Lt Col. & Mrs D. Stenhouse, Mr & Mrs D. Griffin, Mr & Mrs R. J. Riggs and Mrs D. Housely for access to gardens frequented by parakeets. Thanks are also due to staff at the Natural History Museum, Tring, for their friendly assistance. This work was funded by CSL/MAFF.

#### References

- British Ornithologists' Union. 1984. Records Committee: Eleventh Report (December 1983). *Ibis* 126: 440-445.
- Cramp, S. (ed.) 1985. *The Birds of the Western Palearctic*. vol. 4. Oxford.
- Forshaw, J. J. 1989. *Parrots of the World*. Third edition. Blandford.
- Juniper, T., & Parr, M. 1998. *Parrots: a guide to the parrots of the World*. Mountfield.
- Inskipp, T. P. 1975. *All Heaven in a Rage*. RSPB, Sandy.
- Low, R. 1992. *Parrots: their care and breeding*. Third edition. Blandford.
- Morgan, D. H. W. 1993. Feral Rose-ringed Parakeets in Britain. *Brit. Birds* 86: 561-564.
- Pitbon, J. A., & Dytham, C. 1999. Census of the British Ring-necked Parakeet *Psittacula krameri* population by simultaneous counts of roosts. *Bird Study* 46: 112-115.

Dr Josephine A. Pitbon, Department of Zoology and Animal Ecology, University College Cork, Republic of Ireland; [jpitbon@hotmail.com](mailto:jpitbon@hotmail.com) (corresponding author)

Calvin Dytham, Department of Biology, University of York, PO Box 373, York YO10 5YW