

## Comments on the taxonomy of the Bearded Vulture *Gypaetus barbatus* (Linnaeus, 1758)

by

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Taxonomy must reflect the results of systematic analysis. Thus, the taxonomy of the Bearded Vulture (*Gypaetus barbatus*) should be revised following the study of Delibes et al. (1984) on the geographic variation of this species.

The taxonomy of the Bearded Vulture is confused. Up to five subspecies have been recognized, with the following distribution (Swann 1945):

- *G. b. barbatus* (Linnaeus, 1758), North Africa and Arabia;
- *G. b. grandis* Storr, 1784, later named by the priority rule *G. b. aureus* (Hablizl, 1783), Western Asia and Europe;
- *G. b. hemachalanus* Hutton, 1838, India and Himalaya;
- *G. b. altaicus* Sharpe, 1874, central Asia;
- *G. b. meridionalis* Keyserling & Blasius, 1840, Eastern and South Africa.

Other authors have recognized only three or four subspecies. Dementiev & Gladkov (1966) combined *altaicus* with *hemachalanus*. Vaurie (1965), Brown & Amadon (1968), and Glutz von Blotzheim et al. (1971) combined *altaicus*, *hemachalanus*, and *aureus*. Specimens from Egypt and Yemen (Arabia) have been classed as *aureus*, *barbatus*, and *meridionalis* by various authors.

The diagnostic features generally used for subspecific differentiation of the Bearded Vulture are:

- *barbatus*: smaller than *aureus*, lacking the black pectoral band, and with fewer black filoplumes in the chin and throat;
- *aureus*: with a black pectoral band more or less interrupted, with black filoplumes on chin and throat, and usually somewhat larger than *barbatus*;
- *hemachalanus*: like *aureus*, but larger;
- *meridionalis*: smaller than the nominate subspecies, with no black pectoral band, and with featherless legs;
- *altaicus*: larger and lighter-colored than *hemachalanus*.

Because most of the characters used are imprecise, they are of little value for identification of individual specimens, unless large series are available for comparison. Characters such as the pectoral band show great intrapopulation variability (Delibes et al. 1984), and are of no diagnostic value. This induces us to propose here a new subspecific classification for the Bearded Vultures.

### Material and methods

The specimens, sources, and data used are described in Delibes et al. (1984). Each population described in that paper has been considered an operative taxonomic unit (OTU). We compared separately the average body size (represented by the wing length) and the relative frequency of each type of plumage pattern (of the crown, pectoral band, ear tufts, and chin) in each OTU. Similarity among OTUs was calculated with Gower coefficient  $S_G$ , the similarity matrix being examined by a multivariate classification analysis UPGMA to obtain the corresponding phenogram (Sneath & Sokal 1973). Those segregated by a similarity under 0.75 were considered as separate groupings.

### Results and discussion

The phenogram based on wing length distinguishes three groups (Fig. 1) that would correspond to the subspecies *altaicus* (central Asia), *aureus* (Indian to the Iberian Peninsula, excluding Yemen), and *barbatus*—*meridionalis* (all other populations including Yemen). However, because size variation appears to be clinal and related to temperature (Delibes et al. 1984), it is unsuitable as a measure of subspecific variation (Vaurie 1965, Mayr 1969, Selander 1971).

From the phenogram based on plumage patterns, three phenetic groups can be distinguished (Fig. 2) that correspond to the subspecies *aureus* (Eurasia, including Yemen but excluding the Iberian Peninsula), *barbatus*—*aureus* (North Africa and the Iberian Peninsula), and *meridionalis* (Ethiopia and South Africa). Bates (1939) had previously pointed to similarities between specimens from Yemen and those from the rest of Eurasia, and Lavauden (1924) noted the presence in North Africa of individuals with a plumage pattern similar to that of the European specimens.

Although three subspecies of *Gypaetus barbatus* could be differentiated on the basis of plumage, the differences between specimens in the group "*aureus*" and those of the group "*barbatus*" are not well defined enough to make possible the certain classification of individual specimens. In contrast, specimens in the group "*meridionalis*" can always be separated from those of the other groups. For example, any individual specimen lacking ear tufts certainly belongs to the population of Ethiopia or South Africa. Consequently, we propose a classification of the Bearded Vultures that distinguishes only the two subspecies which appear segregated in the phenogram (Fig. 2) by a similarity under 0.4:

- *G. b. barbatus* (Linnaeus, 1758) Syst. Nat. ed. 10, p. 87, ex Edwards "Africa" = Santa Cruz, near Oran, Algeria, fide Hartert: includes all the Bearded Vultures of Eurasia and North Africa.
- *G. b. meridionalis* Keyserling & Blasius, 1840, Wirbelth. Europ. p. XXVIII, South Africa: includes the Bearded Vultures of Eastern and Southern Africa.

The main features of *meridionalis* which distinguish it from the nominate subspecies are its small size, absence of black ear tufts, absence of black filoplumes

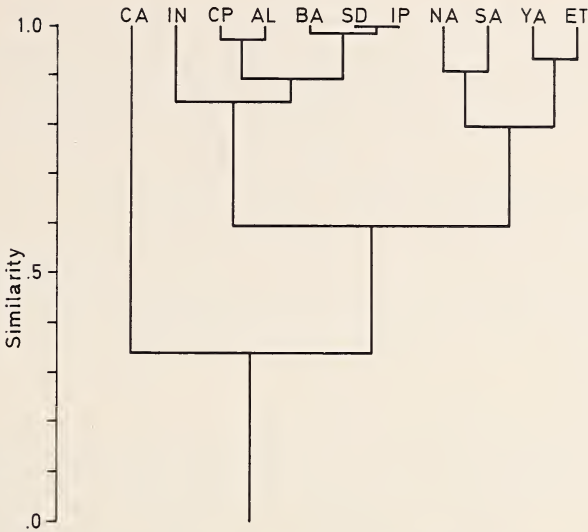


Fig. 1: Phenogram of UPGMA clustering based on the average wing length in each population, as defined by Delibes et al. (1984). CA = Central Asia, IN = India, CP = Caucasus-Persia, AL = Alps, BA = Balkans, SD = Sardinia, IP = Iberian Peninsula, NA = North Africa, SA = South Africa, YA = Yemen, ET = Ethiopia.

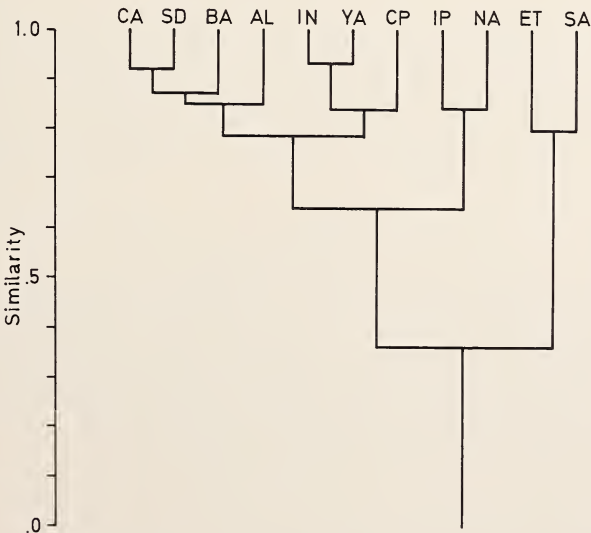


Fig. 2: Phenogram of UPGMA clustering based on the relative frequency of each type of plumage pattern in the crown, the pectoral band, the ear tuft and the chin, in each population. References as in Fig. 1.

on the chin, interocular region (crown) of pure color or only slightly spotted, pectoral band usually absent or incomplete, darker back, and featherless legs. The most useful character is the absence of black ear tufts, which allowed us to distinguish 100 % of the examined adult specimens (69 *barbatus* and 34 *meridionalis*).

Some variation within subspecies occurs. In *barbatus* the average size diminishes clinally southward, with maximum sizes in central Asia and minimum sizes in Yemen. The plumage patterns also vary somewhat. We discerned no geographic variation in plumage patterns of *meridionalis*, but the South African sample is small. South African specimens average larger than Ethiopian ones.

### Summary

Following the paper of Delibes et al. (1984) about the geographic variation in the Bearded Vulture, we propose a new classification of the species that distinguishes only two subspecies: *G. b. barbatus*, including all the Bearded Vultures of Eurasia and North Africa and *G. b. meridionalis*, that includes those of East and South Africa, the most useful diagnostic character being the absence of black ear tuft in *meridionalis*. Clinal size variation is considered an unsuitable measure for subspecific analysis.

### Resumen

Siguiendo al artículo de Delibes et al. (1984) sobre la variación geográfica en el Quebrantahuesos, proponemos una nueva clasificación de la especie, diferenciando solamente dos subspecies: *G. b. barbatus*, incluyendo los ejemplares de Eurasia y el norte de África, y *G. b. meridionalis*, que incluye los de África Oriental y Meridional. El principal carácter para diferenciar ambas subspecies es la ausencia de mechón negro en la oreja de *meridionalis*. La variación clinal del tamaño es considerada poco valiosa para el análisis subespecífico.

### Zusammenfassung

Im Anschluß an den Artikel von Delibes et al. (1984) über die geographische Verschiedenheit beim Lämmergeier schlagen wir eine neue Klassifizierung der Art vor, die nur zwei Unterarten vorsieht: *G. b. barbatus*, die alle Lämmergeier Eurasiens und Nordafrikas einschließt, und *G. b. meridionalis* für diejenigen Ost- und Südafrikas. Das Hauptmerkmal, das diese beiden Unterarten unterscheidet, ist das Fehlen des schwarzen Haarbüschels im Ohr bei *G. b. meridionalis*. Der klinale Größenunterschied wird für die Klassifizierung der Unterarten als nicht maßgebend angesehen.

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