

Taxonomic problems in African diurnal raptors

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ABSTRACT

Several sets of taxa of diurnal raptors, previously thought to be races, have now been shown to be species, e.g., Imperial Eagles *Aquila heliaca* and *A. adalberti*, Tawny Eagles *Aquila rapax* and *A. nipalensis*, Black-shouldered Kites *Elanus caeruleus* and *E. leucurus*, and Short-toed Eagles *Circus gallicus*, *C. beaudouini*, and *C. pectoralis*, because of differences in plumages, morphology, behaviour, food preferences, DNA sequences, and so on. On the other hand, Archer's Buzzard is most likely a colour morph of Augur Buzzard *Buteo augur*, and not a species. Three sets of allopatric African taxa now considered to be subspecies appear different enough in plumage and other characters to warrant separation as species: Forest and Mountain Buzzards (*Buteo trizonatus* and *B. oreophilus*), the Common Kestrel complex (*Falco tinnunculus*, *F. rufescens*, and *F. rupicolus*), and the African Goshawk (*Accipiter toussenelii* and *A. tachiro*, and perhaps *A. canescens*). Their differences are highlighted. Published differences in the north Africa races *Falco biarmicus erlangeri* and *F. b. tanypterus* of the Lanner Falcon and *F. peregrinoides peregrinoides* and *F. p. babylonicus* of the Barbary Falcon are questioned. The taxonomic status of the Yellow-billed Kite *Milvus migrans parasitus* as a subspecies is agreed to, and the genus of Wahlberg's Eagle *Aquila wahlbergi* is discussed. Further research into the differences of the problematic species listed above is needed; however, we must all first agree on what constitutes a species.

INTRODUCTION

Many species of birds, including the Osprey *Pandion haliaetus* and the Peregrine *Falco peregrinus*, were described initially, often from different areas of the world, as two or more species. Later, taxonomists working with large sets of museum specimens, combined similar taxa that were considered as separate species into races of a single widespread species. Hartert (1912-1921) was particularly active in this consolidation. Later, however, some combined sets of similar taxa were thought to be sufficiently different in plumage, behaviour, biology, and DNA, to again be regarded as separate species. Examples of this are the Spanish and Eastern Imperial Eagles, *Aquila adalberti* and *A. heliaca* (Hiraldó *et al.* 1976; Seibold *et al.* 1996), Steppe and Tawny Eagles, *A. nipalensis* and *A. rapax* (Clark 1992), and Augur and Jackal Buzzards *Buteo augur* and *B. rufofuscus* (Brooke 1975).

Some mergers that were later re-split occurred more recently, for example the combining of the American White-tailed Kite *Elanus leucurus* with the African and Asian Black-shouldered Kite *E.*

caeruleus, based on Parkes (1958), while Clark and Banks (1992) give many reasons why this combination was not valid. Fortunately, this merger was not recognized outside of North America.

Brown (1974) gave alleged inter-breeding of three taxa of *Circaetus* snake eagles as reasons to consider them as one species. However, as pointed out by Clark (1999), all of these can be explained by the breeding of subadult Black-breasted Snake Eagles *C. pectoralis* (shown on plate 14 in Maclean 1993 and p. 161 in Newman 1983) with adults or with another subadult. Plumages of the three, particularly juvenile plumage, are quite different (Clark 1999).

Kemp, in del Hoyo *et al.* (1994), treated the Archer's Buzzard *B. archeri* as a separate species, presumably based on Sibley and Monroe (1990). Clark (1996) presents reasons why it should be considered only as a colour morph of the Augur Buzzard, *B. augur archeri*.

During our field and museum work, and literature searches, as background for the field guide to African raptors that we are preparing, we noted many differences between and among present-day subspecies of three species: *Buteo oreophilus*, *Accipiter tachiro*, and *Falco tinnunculus*. We highlight these differences and couple this information with inferences on likely habitat separation to make predictions on which taxa may qualify for species status. We also identify taxa worthy of further investigation, including DNA analyses. For races of several other African species we find no distinguishing features. Our objective in this paper is to tidy up some 'loose ends' in the classification of African raptors.

SPECIES-LEVEL TAXONOMIC QUESTIONS

The three sets of allopatric Africa taxa that we believe are candidates for possible splitting into 2-3 species, based on further research, are the Forest and Mountain Buzzards *Buteo trizonatus* and *B. oreophilus*, the African Goshawks *A. tachiro* and *A. toussenelii*, and the Common Kestrel complex (*F. tinnunculus*, *F. rufescens*, and *F. rupicolus*).

Mountain and Forest Buzzards

The Mountain Buzzard occurs in high mountains of East Africa, from Ethiopia to northern Malawi and west to the eastern mountains of the former Zaire, usually above 2000m. The Forest Buzzard occurs in forests of the Southern Cape of South Africa. There are few, if any, records in the large gap between their ranges. Kemp, in del Hoyo *et al.* (1994), considered them races but added 'Race *trizonatus* may merit treatment as a full species.' James (1986) advocates making them full species.

From our experiences, they are easily separated by plumages. Both Rudebeck (1957) and James (1986) note striking differences in plumages between the two taxa. Forest Buzzards usually show some rufous tones on their underparts and upper tails. Forest Buzzards (Newman 1983: 171; Sinclair *et al.* 1993: 103) show a pale unmarked area between breast and belly that forms a noticeable 'U' on their underparts, a feature lacking on any Mountain Buzzard. Mountain Buzzards are overall darker, lacking any warm brown or rufous tones (Zimmerman *et al.* 1996: 131). The illustration of adult *B. trizonatus* in del Hoyo *et al.* (1994: 186) looks little like the real bird and appears more like an adult *B. oreophilus* with a white 'U' on its underparts. Juveniles of Mountain Buzzards differ little from adults in plumage, only in tail pattern and intensity of dark markings on leg feathers. However, juvenile Forest Buzzards lack the adults' rufous tones on back and tail, and have a different tail pattern.

A Meinertzhagen specimen in the British Museum of Natural History (BMNH 1965.M.1273) that was clearly an adult *B. trizonatus* was labelled as having been collected within the range of *B. oreophilus* on Mt. Kilimanjaro. See Knox (1993) for an example of Meinertzhagen's habit of stealing specimens and making up false data for their new tags. This specimen was most likely taken from a South African collection. Rudebeck had indicated on the label 'Locality probably South Africa.'

The Mountain Buzzard hunts regularly on the wing, whereas the Forest Buzzard is a perch hunter, yet soars regularly, but not for hunting. Maclean (1993) and Steyn (1992) describe the Forest Buzzard as hunting primarily from perches, whereas we observed Mountain Buzzards in Kenya hunting from the air in the manner of the Booted Eagle *Hieraetus pennatus*.

Allan (1992) presents ring (band) recovery records to indicate that Forest Buzzards are somewhat migratory, moving north in the austral winter. No migration has been reported for the Mountain Buzzard (Brown *et al.* 1982).

Forest Buzzard (currently *Buteo oreophilus trizonatus*) appears to be a different species from Mountain Buzzard (*B. o. oreophilus*). Records from Malawi and Zimbabwe need further investigation to evaluate whether these populations are truly separate. Although there are mountain ranges of the Rift Valley in between the two populations, mountains in Zimbabwe, Zambia and Malawi are generally half the height of the larger mountains in East Africa, so the absence of cool forest conditions in between coastal South Africa and the highlands of East Africa may comprise an effective barrier to these populations.

We suggest that Forest and Mountain Buzzards may have both been derived from ancestral Steppe Buzzard (*Buteo b. vulpinus*) stock. The conditions that would appear to encourage such birds to become resident are cool temperate forest. These conditions are met both on the south coast in South Africa and at high altitude in East Africa. Adoption of sedentary habits by these two taxa (perhaps in the same manner as has recently been reported for the Booted Eagle in Africa) may have occurred at different times.

African Goshawk complex.

The African Goshawk has been considered by some authorities as one species, *Accipiter tachiro* (Wattell 1973; Brown *et al.* 1982; Amadon & Bull 1988) and by others as two species, *A. tachiro* and *A. toussenelii* (White 1965; Louette 1992; Kemp, in del Hoyo 1994). The taxa involved (Wattell 1973; del Hoyo *et al.* 1994) (Fig. 1) are:

1. The *tachiro* group:

A. ta. tachiro - Southern Africa.

A. ta. sparsimfasciatus - Somalia, East Africa.

A. ta. croizati - SW Ethiopia.

A. ta. unduliventer - Ethiopian highlands.

A. ta. pemaensis - Pemba Island.

The races *A. ta. tachiro* and *A. ta. sparsimfasciatus* are barely distinguishable. They differ from all other taxa (except perhaps *A. ta. croizati*, which we have not seen) in larger size and greater sexual size differences and in plumages of adult female (Figs. 2 & 3) and juvenile. Adult females lack the white tail spots shown on the other taxa. The race *A. ta. unduliventer* is much closer in characters to taxa in the *toussenelii* group than to those in the *tachiro* group and should be placed with the former group.

2. The *toussenelii* group:

A. to. macroselides - West Africa.

A. to. toussenelii - Rain forests of Central Africa.

A. to. canescens - Rain forests of upper Zaire R. basin.

A. to. lopezi - Ferdinand Po Island.

The males of *macroselides* are similar to those of *tachiro* but show a stronger rufous wash on their underparts, especially on flanks and leg feathers; however, the adult females are quite different from those of *tachiro* (Fig. 2), and are almost identical to the males (Fig. 1), including having white tail spots (Fig. 3). Adults of *toussenelii* and *canescens* differ little and both sexes have rufous and grey unbarred underparts (Fig. 4).

Kemp and Crowe (1994) offer compelling differences in morphometric data between both adult males and females of *A. tachiro* and *A. toussenelii* to support the two-species advocacy. Progovine (1980) shows a zone of contact between *A. tachiro* and *A. toussenelii* in Central Africa, especially in the eastern part of the Democratic Republic of Congo (formerly Zaire); however, no plumage intergrades have been reported. In this region, the two appear to be separated by habitat preference, with *A. toussenelii* in the rain forest and *A. tachiro* in the cutover edges and second growth.

We suggest that African Goshawks *Accipiter tachiro* and Red-chested Goshawks *Accipiter toussenelii* qualify as separate species, and we expect DNA studies to confirm this. Although *A.*

tachiro is generally considered to inhabit sparser forests than *A. toussenelii*, we do not consider that this habitat difference explains all the differences observed between these two taxa. *A. toussenelii* must inhabit similar sparse riverine woodland in West Africa. We propose that the two must have been separated for an extended period(s) in the past somewhere along the Rift Valley, where today so many similar taxa suddenly diverge (e.g. *A. minullus* / *A. erythropus*). The most likely geographic feature to have split these woodland birds is the arid corridor connecting the Kalahari to the Horn of Africa (Kingdon 1990) which was so prevalent in the cool dry glacial periods. This barrier would have effectively split the forest biomes into a Central and West African component (*A. toussenelii* group) and a South-eastern component (*A. tachiro* group). It would also explain the occurrence of an *A. toussenelli*-type goshawk (*A. to. unduliventor*) inhabiting the forests of Ethiopia (which falls to the north of the arid corridor).

Common Kestrel complex.

The Common Kestrel *Falco tinnunculus* has 5 subspecies that occur on the African continent (del Hoyo *et al.* 1994). They are:

F. t. tinnunculus – north-western Africa and palearctic migrant to sub-Saharan Africa.

F. t. rupicolaeformis – north-eastern Africa, primarily Nile drainage.

F. t. archeri - Somalia, perhaps coastal Kenya.

F. t. rufescens (= *F. t. carlo*) - Highlands of central and eastern Africa.

F. t. rupicolus - Southern Africa north to Angola and southern Tanzania.

The first three races are similar and are not separable in the field, or even in hand, as they overlap in most characters; *F. t. rupicolaeformis* averages brighter than nominate race (Meinertzhagen 1954), and *F. t. archeri* is smaller (Archer & Godman 1937). On the other hand, the last two races, *F. t. rufescens* and *F. t. rupicolus*, are quite different from the nominate race and from each other in plumages, and all are easily differentiated in the field. In particular, the adult females of the three taxa are quite different (Figs. 6 & 7). We believe that certainly *F. t. rupicolus* and possibly *F. t. rufescens* should be considered as candidates for full species status based on the differences listed herein. Further field and DNA work are required for confirmation of *F. t. rufescens* as a distinct species. More details for these potential species are presented:

A. Mountain Kestrel - The African Mountain Kestrel, as *F. t. rufescens* is called by Archer & Godman (1937) and Bannerman (1953), is resident at higher elevations in Central and East Africa, usually breeding on rocky outcrops or cliffs, but recently has descended to lower elevations to breed on buildings in cities near the rain forest, e.g., in Nigeria (Elgood *et al.* 1994).

The Mountain Kestrel is always separable from the nominate race by its overall darker colouration (Archer & Godman 1937; Bannerman 1953); it is not correctly illustrated in Zimmerman *et al.* (1996: 145) nor labelled correctly in Brown *et al.* (1982: 435, the figure labelled 'adult male' is an adult female and that labelled 'adult female' is a juvenile). Adult females are somewhat similar to adult males in that they have grey heads and tails, but with dark barring on their upperparts and more black banding in their tails (Fig. 8). Chapin (1932) noted this, but Bannerman (1953) and Archer and Godman (1937) both stated incorrectly that females had no grey on the head. We have looked at many specimens of *F. t. rufescens* and verified that all adult females had grey heads, as shown in Fig. 8. Juveniles are like adult females but have brown heads (Fig. 8). Brown and Amadon (1968) show only the adult male.

Chapin (1932) mentions that the Mountain Kestrel would seem to be specifically distinct from *F. t. tinnunculus* but for their intergradation in northeast Africa and southwest Arabia. We found no intergrades between *F. t. rufescens* and *F. t. tinnunculus* in the hundreds of specimens from those areas, nor from anywhere else; all specimens from Africa north of the range of *F. t. rupicolus* were either *F. t. tinnunculus*, (including *F. t. rupicolaeformis* and *F. t. archeri*), or *F. t. rufescens*.

B. Rock Kestrel - The Rock Kestrel, as *F. t. rupicolus* has always been called, is resident throughout Southern Africa. There are only a few records of *F. t. tinnunculus* within its range: two from Malawi (Benson & Benson 1977), two from Angola (Traylor 1963), and two from Zambia (Benson *et al.* 1971). Bouet (1955) considered it a full species.

The plumages of the Rock Kestrel are much different from those of Common Kestrels in the *F. tinnunculus* group and from *F. t. rufescens*. Note that Rock Kestrels are not illustrated in Brown and Amadon (1968), Brown *et al.* (1982) or del Hoyo (1994). Plumages of adult males and females differ little and resemble those of adult male *F. t. tinnunculus* in having grey heads and tails and chestnut upperparts, but the brighter chestnut upperparts of *F. t. rupicolus* are less heavily marked, and their underparts are also a bright chestnut that contrasts with nearly unmarked white underwings. Females tend to have more black bands in the central tail feathers (Newman 1983: 193; Sinclair *et al.* 1993: 123). Juvenile Rock Kestrels resemble adults but have brown heads.

Common Kestrels have fewer close competitors, however Rock and Mountain Kestrels in Africa do have (e.g.: *E. caeruleus*, Fox Kestrel *F. alopec*, Greater or White-eyed Kestrel *F. rupicoloides* and the migratory kestrels). Competition with these may explain the narrower habitat preference exhibited by Rock and Mountain Kestrels.

The full species status of Spotted Kestrel *F. moluccensis* and Australian Kestrel *F. cenchroides* is unquestioned, yet if we compare their plumages to the Common Kestrel (Figs. 9 & 10), we find several parallels to the comparison of *F. t. rufescens* and *F. t. rupicolus* with Common Kestrel. In both comparisons, sexual dimorphism of the adult plumages is far less pronounced than in Common Kestrel. In both comparisons the taxa adjacent to the range of the Common Kestrel (*F. t. rufescens* and *F. moluccensis*) have noticeably darker plumage than the Common Kestrel, while the taxa furthest away (*F. t. rupicolus* and *F. cenchroides*) are more chestnut-coloured and less heavily marked.

The plumage differences among Mountain, Rock, and Common Kestrels are no less than the differences among Spotted, Australian, and Common Kestrels. Helbig & Seibold (pers. comm.) found that *F. t. tinnunculus* is closer to *F. cenchroides* than to *F. t. rupicolus* according to mtDNA sequences. *F. cenchroides* is accepted as a distinct species, implying that *F. t. rupicolus* should be as well.

Clearly the Rock Kestrel *F. t. rupicolus* is a species separate from the Common Kestrel *F. t. tinnunculus*. Gene flow between these taxa will be restricted by two ecological barriers for kestrels: the Sahara Desert north of the equator and the Miombo woodlands to the south. In between these two barriers lies the third taxon, Mountain Kestrel *F. t. rufescens*, which appears to be distinct from both and warrants further study, including DNA comparisons, to establish its status.

SUB-SPECIES LEVEL TAXONOMIC QUESTIONS

While taxonomic questions at the subspecies level are not of as great a concern as those at the species level, it is nevertheless important to keep printed descriptions of the different taxa as accurate as possible. We have found that several subspecific differences mentioned in the literature do not hold up to close scrutiny of specimens. These are the differences between the races *Falco biarmicus erlangeri* and *F. b. tanypterus* of the Lanner Falcon; the races *F. pel. pelegrinoides* and *F. p. babylonicus* of the Barbary Falcon; and the races *Aquila n. nipalensis* and *A. n. orientalis* of the Steppe Eagle.

Lanner Falcon

Two races of this species have been described for Africa north of the Sahara, *F. b. erlangeri* for the northwest and *F. b. tanypterus* for the northeast into the Middle East. Published differences between them are size and colouration, with *F. b. erlangeri* being smaller and paler (Cramp & Simmons 1980). However, after having inspected over a hundred specimens of both, we feel that there is a complete overlap in colouration, with some specimens of *F. b. tanypterus* being paler than most of *F. b. erlangeri*. Likewise, while there is most likely a slight clinal variation in greater size from west to east, this is masked by individual size variation. We recommend merging these two subspecies into one.

Barbary Falcon

The Barbary Falcon *Falco pelegrinoides* is thought by most authorities to be a separate species (Cade 1982; Amadon & Bull 1988), but Brown *et al.* (1982) and del Hoyo *et al.* (1994) elected to treat it as two races of the Peregrine *F. peregrinus*. The two races were thought to differ by size and

colouration, with *F. pel. babylonicus* being larger and paler (Cade 1982). However, we have found a complete overlap in plumages from pale to dark, with no consistent feature to differentiate specimens. Cade (1982) postulates that there may be a separation in the ranges in the Middle East, but the range map for this species in Porter *et al.* (1996) shows extensive range in this area. Any size differences between Asian and African falcons may just be according to Bergman's Rule and are not, to our thinking, sufficient for racial distinction. Helbig & Seibold (pers. comm.) found no differences in mtDNA sequences between them. Again we think that *F. pel. pelegrinoides* and *F. pel. babylonicus* should be merged.

Steppe Eagle

Cramp and Simmons (1980) state that, compared to *A. n. orientalis*, *A. n. nipalensis* is larger, with darker adults that more often have rufous nape patches. We have found the same amount of variation of plumages among eastern and western eagles, with no single character that would distinguish either race. All adults had rufous nape patches. Illustrated differences between the races in Sinclair *et al.* (1993: 93-94) appear to be only size differences between sexes; however, Steppe Eagles never have grey upperparts as illustrated. The nominate race (eastern eagles) winters only in Asia, not in Africa as stated. We believe that the racial differences are too small and suggest merging the races.

Yellow-billed Kite

We agree with Brooke (1974) that *Milvus migrans parasitus* is a valid race and not a separate species.

GENERIC LEVEL TAXONOMIC QUESTIONS

Wahlberg's Eagle

This eagle was long thought to be in the genus *Aquila*, mainly because of the dark plumage of most individuals. However Amadon and Bull (1988) placed it in *Hieraaetus*, based on field observations by Smeenk (1974) and other considerations (Amadon 1987), but go on to comment that it is intermediate in characters between these closely related genera. Read Debus (1985) and Amadon (1987) for arguments *pro* and Auburn (1988) for arguments *con* placement in *Hieraaetus*. We concur with Amadon and Bull (1988) that Wahlberg's Eagle is closer to *Hieraaetus* than to *Aquila* in many of its characters; however, we reserve final judgement until DNA evidence is presented.

DISCUSSION

We briefly present arguments why further research into the differences among taxa in three sets of African raptors would most likely verify that each taxon is a full species. These are: Mountain and Forest Buzzards, the Common Kestrel complex, and the African Goshawk complex. Further, we questioned published differences in the north African races of Lanner Falcon and those of Barbary Falcon and Steppe Eagle. More research and insight are needed to determine if Wahlberg's Eagle is an *Aquila*, a *Hieraaetus*, or in its own genus. However, to get complete agreement among taxonomic authorities, we must all first agree on what defines a species.

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Figure 1. African Goshawk taxa. (l to r) Adult female *A. t. macroscelides* (male alike), adult male and female *A. t. toussenelii*, adult male and female *A. t. tachiro*.

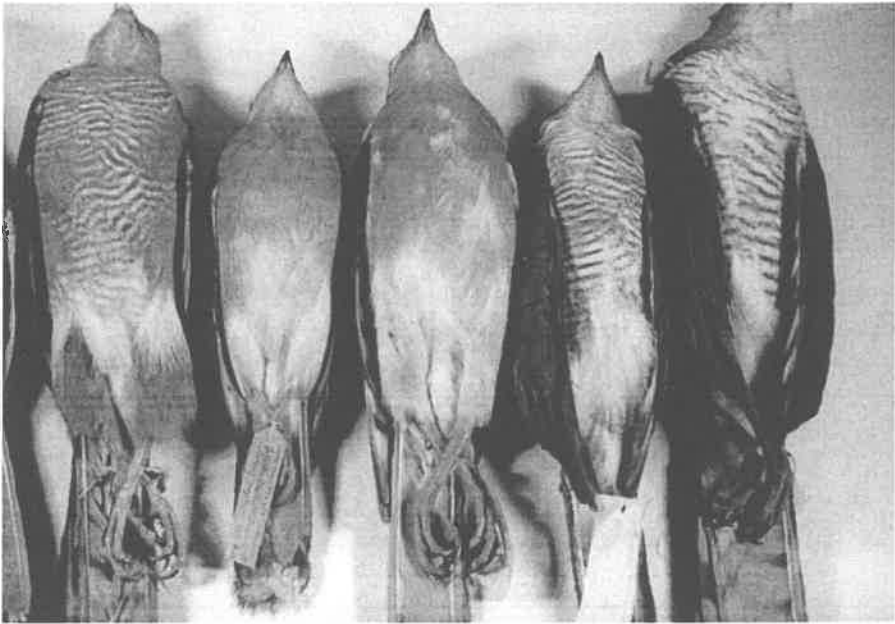


Figure 2. Adult female African Goshawk undersides comparison. Top, *A. t. tachiro*; bottom, *A. t. toussenelii macroscelides*. Latter has more rufous wash.

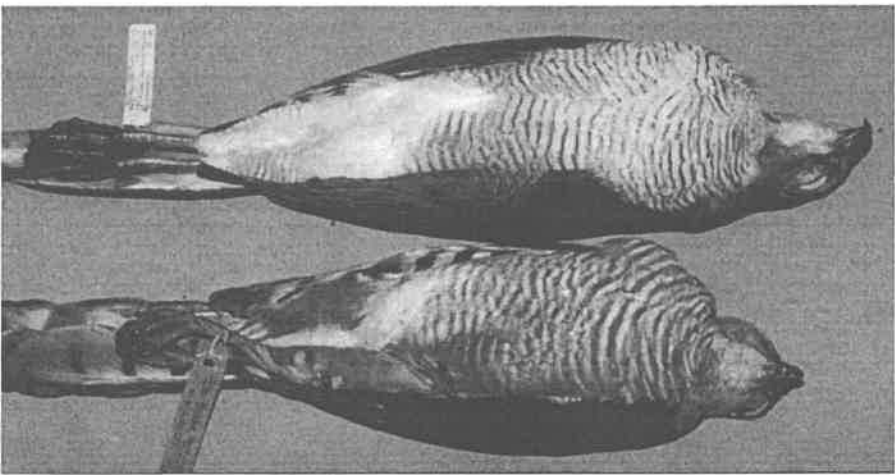


Figure 3. Adult female African Goshawk uppersides comparison. Top, *A. t. tachiro*; bottom, *A. toussenelii macroscelides*. Latter has white tail spots.

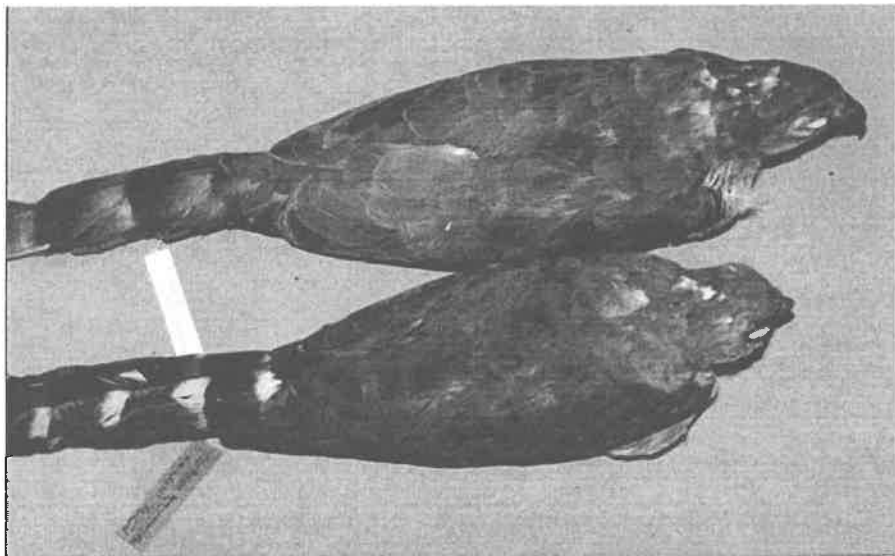


Figure 4. Adult *A. t. toussenelii*. Lacks strong rufous barring on underparts. Plumage of females is like that of males.

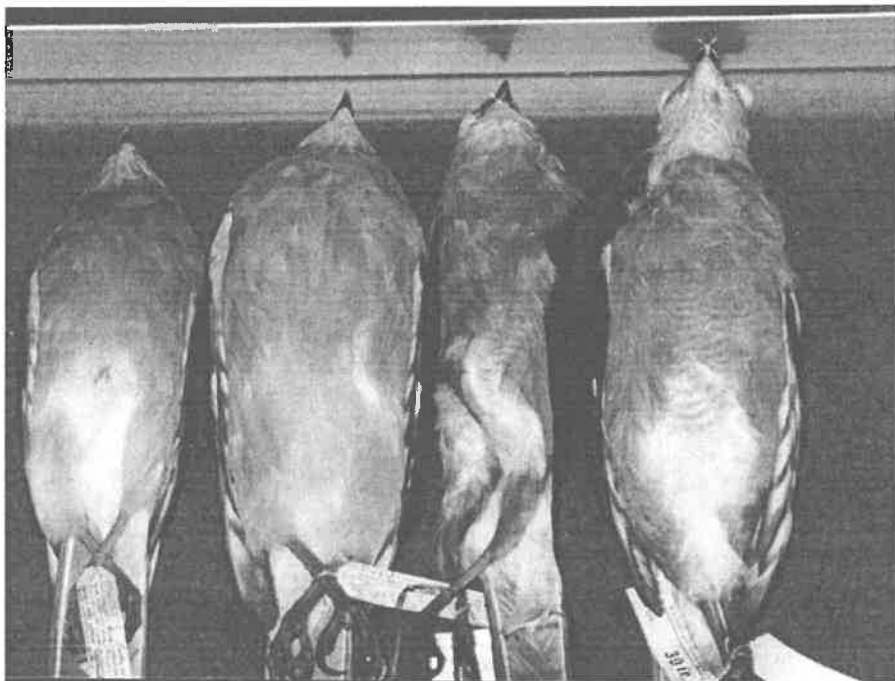


Figure 5. Adult *A. t. toussenelii*. Plumage of females is like that of males.



Figure 6. Comparison of undersides of adult female kestrels: (Top to bottom), *F. t. tinnunculus*, *F. t. rufescens*, *F. t. rupicolus*.

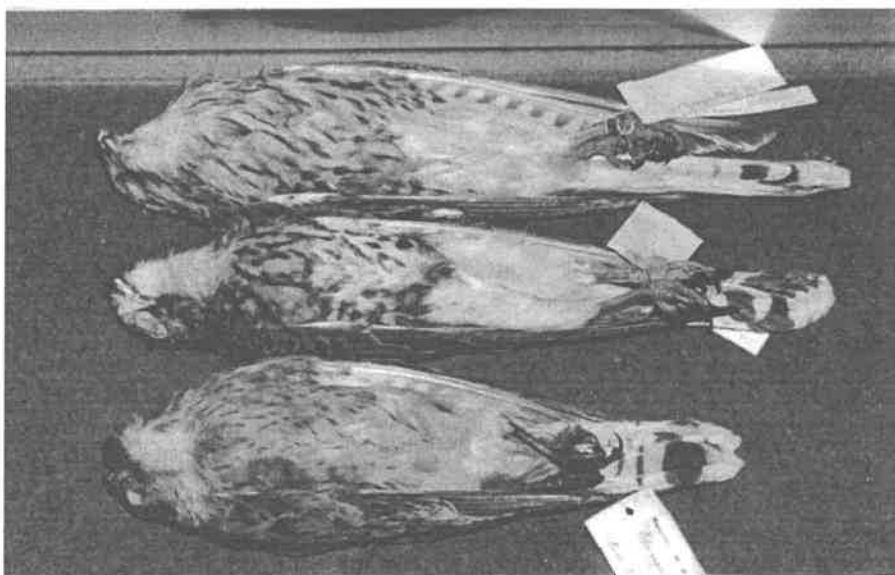


Figure 7. Comparison of uppersides of adult female kestrels: (Top to bottom), *F. t. tinnunculus*, *F. t. rufescens*, *F. t. rupicolus*.

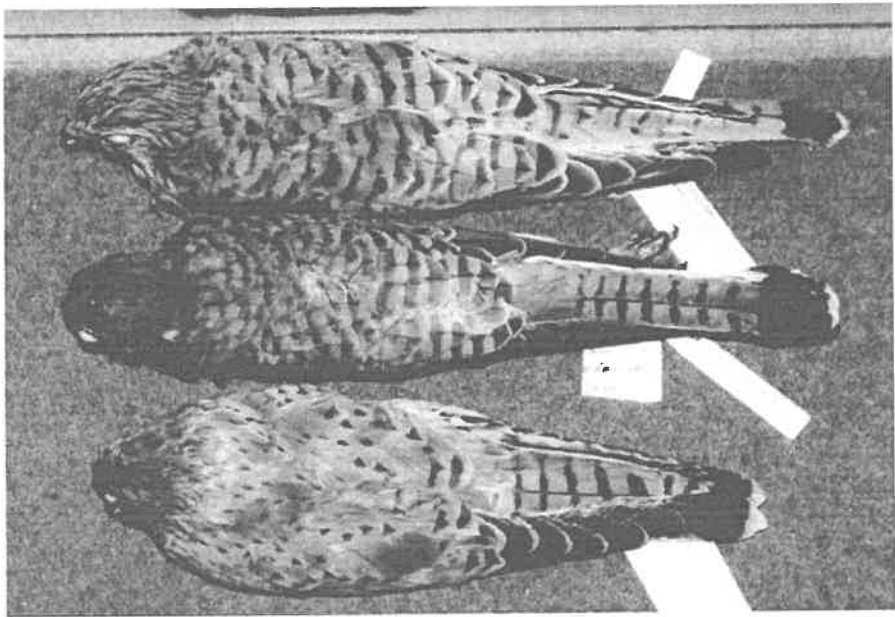


Figure 8. Mountain Kestrels *F. t. rufescens* uppersides. (l to r) Adult male and female and juvenile. Female has grey head.

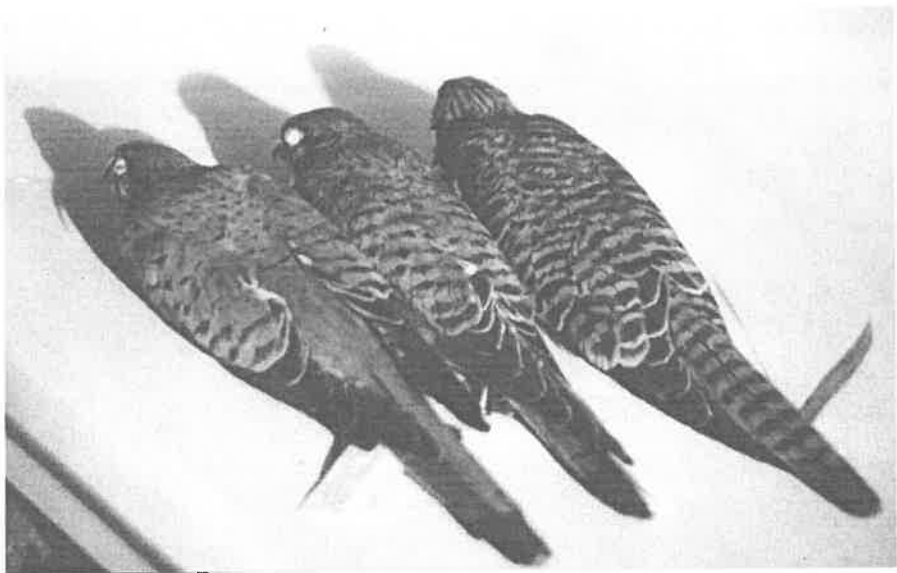


Figure 9. Comparison of undersides of adult female kestrels: (Top to bottom), *F. cenchroides*, *F. moluccensis*, *F. t. tinnunculus*.

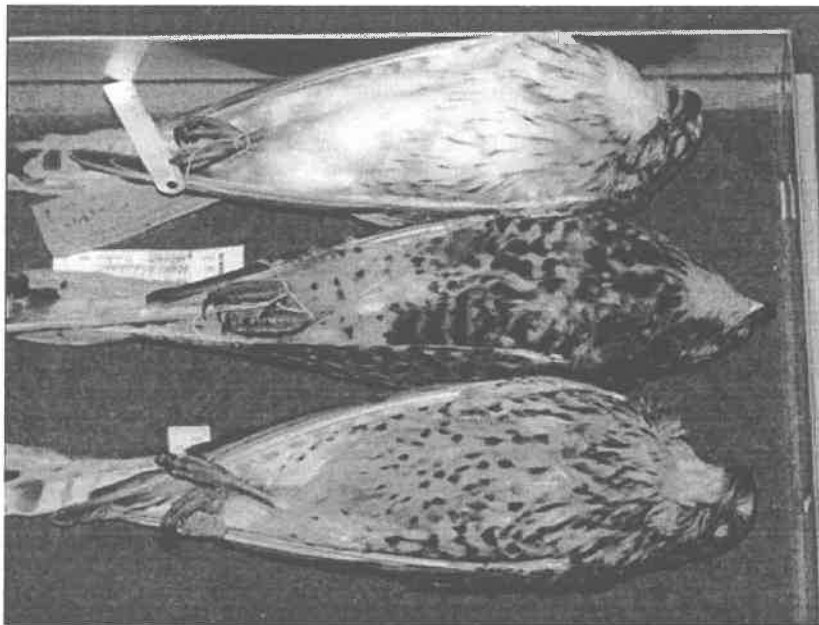
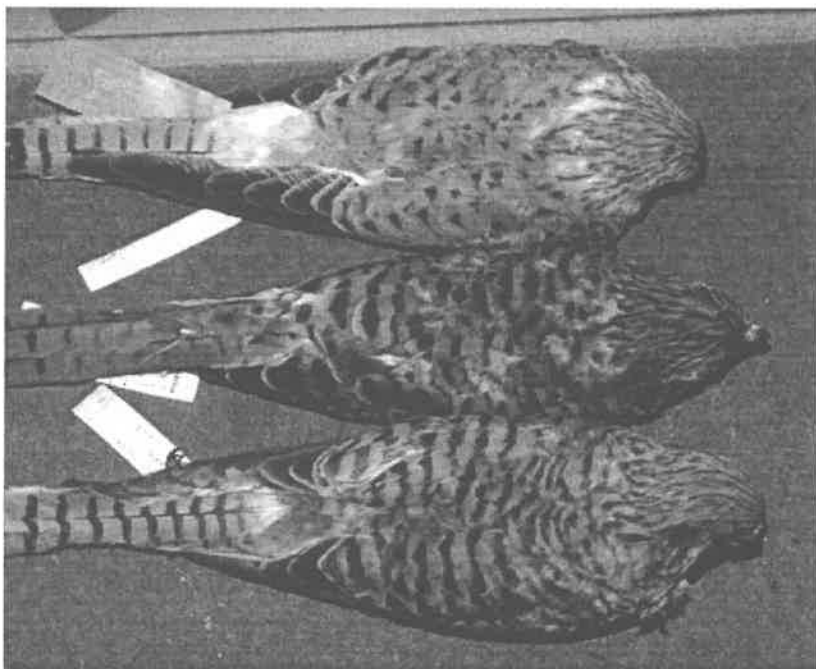


Figure 10. Comparison of uppersides of adult female kestrels: (Top to bottom), *F. cenchroides*, *F. moluccensis*, *F. t. tinnunculus*.



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