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GEOGRAPHIC VARIATION IN THE BUZZARD *BUTEO BUTEO* (LINNAEUS, 1758): MID-ATLANTIC AND WEST MEDITERRANEAN ISLANDS (AVES: ACCIPITRIDAE)

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ABSTRACT

This study analizes the geographic variation in *Buteo buteo* from the mid-Atlantic and Mediterranean islands, based on an external morphological analysis of 143 museum specimens. I review the taxonomic status of these populations. Dimensions and plumage characters show the subspecies *B. b. rothschildi* (Azores) and *B. b. arrigonii* (Sardinia) are clearly subspecifically distinct. *B. b. insularum* (Canaries) has diagnostic plumage differences sufficient to recognize its subspecific status. *B. b. harterti* (Madeira) is similar to nominate *buteo* in all variables compared. *B. b. bannermani* (Cape Verdes) is similar in plumage to nominate *buteo*, however, there is inadequate material to make any judgment on its taxonomic status. Three specimens examined, one from the Cape Verdes, one from the Canaries, and one from Madeira, resemble the Long-legged buzzard *B. rufinus cirtensis*. I suggest that the North African populations of *B. rufinus cirtensis* wander to these offshore islands of the mid-Atlantic.

INTRODUCTION

The Buzzard *Buteo buteo* (Linnaeus, 1758) is widely distributed throughout the Palearctic region including several Atlantic and Mediterranean islands. These island populations are taxonomically problematic, mainly owing to lack of material and the confusing individual variation within the species. Swann (1919) gave the populations from the archipelagos of Madeira, Azores, and Cape Verde islands subspecific status naming them *harterti*, *rothschildi*, and *bannermani*, respectively. The Canary Buzzard is called *B. b. insularum* Floericke, 1903, and the race of Corsica and Sardinia *B. b. arrigonii* Picchi, 1903.

In recent years the taxonomic positions have been juggled about. Vaurie (1961) critically investigated the island races and concluded that none should be recognized. Brown & Amadon (1968) followed Vaurie. Stresemann & Amadon (1979) accepted only four out of the five island races. After examining all the Palearctic species in the genus *Buteo*, I attempt to review these island races. This paper re-analyses the morphological characteristics; a review of the systematics is offered.

MATERIAL AND METHODS

Linear measurements were taken in millimetres from museum specimens: wing length, flattened and extended; wing tip, from tip of longest primary to primary 1, taken with dividers; tail, from insertion of central rectrices,

with dividers; exposed culmen without cere, calipers; tarsus, length taken with dividers; middle toe, straight line from base of claw to base of toe; hind claw, straight line from tip of claw to base of toe, with calipers; p10 to p7, length of emarginated portion of primary, with dividers. The following statistics were calculated: wingdepth, wing length minus wing tip; tail-wing ratio, tail length by wing stated in fraction; culmen-wing ratio, culmen divided by wing; tarsus-wing ratio, tarsus divided by wing.

Specimens in the following museums were studied: British Museum (Natural History), Tring [BMNH]; Rijksmuseum voor Natuurlijke Historie, Leiden [RMNH]; Zoologisch Museum, Amsterdam [ZMA]; Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn [ZFMK]. Altogether 143 skins of *Buteo buteo* and 32 of *Buteo rufinus cirtensis* were used for comparisons.

Colours used in plumage descriptions are specific colours depicted and named in Smithe (1975). Colour of soft parts was taken from specimens labels. In referring to tail patterns, the description *vulpinus*-like is used. This refers to a tail pattern similar to that depicted in fig. 1b, where the bands are reduced, thinner than the interband area, and the ground colour is either grey or silver brown, or tawny (cf: Glutz von Blotzheim et al., 1971: 524; fig. 1, bv1 & bv2).

In the analysis of measured and calculated variables single factor analysis of variance (fixed effects model) was employed. Student-Newman-Keuls (SNK) multiple range test was used to distinguish homogeneous subsets of ranked means. Student's T-test was used to establish significance of differences between male and female.

Statistical methods used are outlined in Zar (1974) and data were analysed using subroutines available through the Statistical Package for the Social Sciences (Nie et al., 1975).

In many instances the names *B. zimmermannae* and *intermedius* are referred to. These names represent the East European populations now considered as *B. b. vulpinus*. For some time the nomenclature was rather muddled until the technically dubious name *B. buteo vulpinus* Gloger, 1833 acquired general acceptance. Refer to Hartert (1914; 1922) for descriptions and nomenclature.

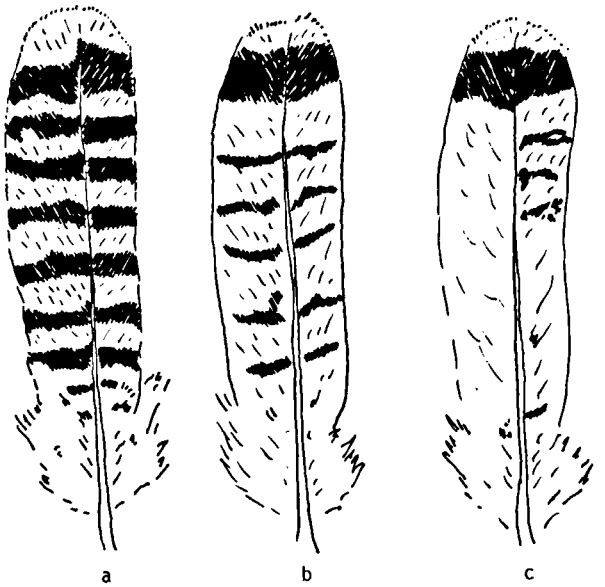

Fig. 1. Adult tail pattern in *B. b. insularum*: (a) *buteo*-like (b) *vulpinus*-like (c) unique for *insularum*.

RESULTS

Plumage variation

In general the island populations show similar variation in adult plumage patterns to nominate *buteo* (T. G. Brom in Cramp & Simmons, 1979). Some show slight differences in pattern but differ mostly in colour. Immature patterns are indistinguishable.

The Madeiran Buzzard *B. b. harterti* is similar in plumage pattern and colour to nominate *buteo*; in most specimens the pattern is of the "typical" *buteo*, dark breast and barred belly. In only some cases does it show some characters tending towards those of "*intermedius*". In flight these characters are white base of primaries (white "windows"), and a broad band on the trailing edge of the underwing. However, the underside and back are identical to nominate *buteo* in pattern and colour.

Stresemann & Amadon (1979) considered populations from Spain known as *B. b. hispaniae* von Jordans as the same subspecies as those on Madeira. As in *harteri* I could not find any significant plumage differences between *hispaniae* and nominate *buteo*. Despite the fact that most tail patterns are similar to nominate *buteo* many are more grey or tawny with wide dark bands.

The buzzards from the Canary Islands *B. b. insularum* have a variable plumage similar to nominate *buteo*. I was able to distinguish three plumage types. One similar to nominate *buteo* in pattern, solid breast and barred belly separated by a light gap. The pattern colour is usually burnt umber as compared to fuscous in nominate *buteo*. Another type has less barring of the belly (horizontal blotches or incomplete broad bars), and the tail is *vulpinus*-like. The third type is not commonly found in nominate *buteo*. In this type the underparts are longitudinally marked, with a pattern colour of burnt umber and a ground colour of cream to buffy-yellow. Also some individuals show a tail pattern not found in nominate *buteo*. This tail is silver-brown, tawny on the outer edges of the feathers and has an almost complete reduction of bands except for a wide subterminal band (fig. 1c). This type of tail was found in males only, perhaps it is a sexually dimorphic plumage character.

I inspected three specimens of *B. b. bannermani* (Cape Verde Islands). The type specimen and an adult female are similar in plumage pattern and colour to nominate *buteo*. The third specimen is an immature male moulting into a "rufous" morph. This morph is not found in nominate *buteo*, and hence this specimen is probably representative of populations from northern Africa of the Long-legged Buzzard *B. rufinus*. However, as will be later discussed distinguishing the smaller race of the Long-legged Buzzard *B. r. cirtensis* and the rufous morph of the Steppe Buzzard *B. b. vulpinus* is difficult.

The Azores Buzzard *B. buteo rothschildi* is much less variable in plumage. The breast is generally broadly streaked earth brown, representing an almost solid dark area; the belly shows a pattern of streaks, blotches and incomplete bars. The ground colour is cinnamon to cinnamon-cream with the colour of the pattern fuscous edged tawny. The tail can also differ from nominate *buteo*. Some tail patterns are not significantly different, being light chocolate grey with dark bands, but many are cinnamon-tawny with dark bands, widest subterminally.

The buzzards found on Corsica and Sardinia *B. b. arrigonii* are similar to nominate *buteo* but approach *vulpinus* (*intermedius*). The most common plumage type has a solid fuscous breast and the rest of the underparts barred. Some feathers are edged chestnut or tawny. The ground colour is usually cinnamon-cream. The tail is *vulpinus*-like, rectrices silver-grey tinged tawny, silver-brown, or rufous-grey. Bands usually thinner than interband area, bases white. Pale plumage type is longitudinally streaked ventrally, and flanks and thighs are solid fuscous edged chestnut.

Morphometric analysis: Dimorphic characters

Statistics calculated from measurements of all variables for all taxa under discussion are shown in Table I. Males average smaller than females in all variables, except tarsus-wing ratio. In all groups the wing was found to be significantly longer in females (Table V). I presumed that the data are normally distributed and there was homogeneity of variances (unpubl. data). All variables were tested but not included in this analysis, mainly due to the small sample sizes which would lead in the rejection of the null hypothesis when it is true.

Morphometric analysis: One-factor analysis of variance

Sample localities were compared using univariate analysis of variance which resulted in statistically significant differences among sample populations. Results are depicted in Table I along with an associated multiple range test (SNK). In the analysis, I included 16 specimens of *B. b. vulpinus*, and 30 breeding specimens of nominate *buteo* from the Netherlands and Germany.

TABLE I. Measurements (in mm) of *Buteo buteo* subspecies from the mid-Atlantic and Mediterranean islands, including breeding samples from western Europe; Netherlands & W. Germany (unless stated, values include adult and immature measurements). Results of analysis of variance is also depicted. Vertical lines represent non-significant subsets of group means, (SNK multiple range at probability level 0.05).

WING LENGTH

Male			*Female*		
Taxon	$\bar{x}$ (SD; N)	min-max	Taxon	$\bar{x}$ (SD; N)	min-max
arrigonii	353(5.8;14)	343-360	vulpinus	365(15.5; 6)	348-382
vulpinus	358(9.2;11)	348-374	arrigonii	374(9.9;11)	359-389
rothschildi	358(11.8;11)	341-368	rothschildi	379(12.6; 6)	366-400
hispaniae	369(5.9; 6)	365-379	insularum	394(8.2;11)	380-408
insularum	374(6.7; 7)	365-386	hispaniae	394(10.6; 7)	381-412
harterti	385(8.2;12)	370-396	harterti	406(14.0; 4)	388-422
buteo	386(10.7; 6)	373-403	buteo	402(13.1;15)	373-422
$F = 22.8$; $p < .000$; $df = 77$			$F = 11.5$; $p < .000$; $df = 59$		

WINGTIP

Male			*Female*		
Taxon	$\bar{x}$ (SD; N)	min-max	Taxon	$\bar{x}$ (SD; N)	min-max
rothschildi	122(5.9; 8)	114-131	rothschildi	129(4.7; 4)	123-134
arrigonii	122(3.1; 5)	117-124	arrigonii	129(7.2; 5)	123-137
harterti	127(5.7; 9)	120-133	harterti	132(4.2; 2)	129-135
buteo	128(4.4; 9)	124-136	insularum	132(4.0; 8)	125-137
vulpinus	131(2.4;10)	129-135	vulpinus	133(7.2; 5)	123-140
insularum	131(4.3; 4)	127-137	hispaniae	135(8.7; 4)	123-143
hispaniae	132(4.2; 3)	127-135	buteo	135(7.5;13)	119-147
$F = 7.63$; $p < .000$; $df = 65$ (adult values)			$F = 0.89$; $p < .526$; $df = 51$ (adult values)		

TAIL

Male			*Female*		
Taxon	$\bar{x}$ (SD; N)	min-max	Taxon	$\bar{x}$ (SD; N)	min-max
vulpinus	183(5.0; 7)	175-190	vulpinus	189(5.8; 5)	183-195
rothschildi	184(7.7; 8)	177-200	rothschildi	193(5.0; 5)	188-201
arrigonii	186(5.8; 5)	177-191	arrigonii	193(6.7; 6)	182-202
hispaniae	194(4.3; 5)	190-199	hispaniae	199(6.3; 7)	192-206
insularum	205(4.2; 5)	201-211	harterti	205(15.4; 3)	188-218
harterti	207(7.0; 9)	196-216	insularum	211(5.4; 9)	202-219
buteo	210(7.2;13)	201-225	buteo	220(7.7;14)	206-230
$F = 18.5$; $p < .000$; $df = 76$ (adult values)			$F = 12.1$; $p < .000$; $df = 59$ (adult values)		

CULMEN

Male			*Female*		
Taxon	x̄ (SD; N)	min-max	Taxon	x̄ (SD; N)	min-max
vulpinus	20.2(1.2;10)	18.7-22.2	vulpinus	21.2(1.0; 6)	19.4-22.0
buteo	21.4(0.8;15)	20.1-22.6	buteo	23.3(1.0;14)	22.2-25.8
rothschildi	21.8(0.9;11)	20.2-23.7	harterti	23.5(1.3; 3)	22.7-25.0
hispaniae	21.9(0.6; 6)	21.1-22.7	rotschildi	23.7(1.0; 6)	22.0-24.7
arrigonii	22.1(0.8;14)	21.2-23.3	arrigonii	23.9(0.8;10)	22.1-25.0
harterti	22.5(0.9;11)	20.9-23.7	insularum	24.1(0.8;11)	22.8-25.7
insularum	22.7(0.8; 7)	21.0-23.5	hispaniae	24.1(1.2; 7)	22.8-25.5
F = 8.97; p < .000; df = 73			F = 7.73; p < .000; df = 56		

TARSUS

Male			*Female*		
Taxon	x̄ (SD; N)	min-max	Taxon	x̄ (SD; N)	min-max
arrigonii	71.7(2.0;14)	67-74	vulpinus	72.0(0.9; 6)	71-73
vulpinus	71.7(1.4;11)	70-75	arrigonii	72.6(1.8;11)	71-77
hispaniae	72.0(1.8; 6)	70-75	hispaniae	73.0(1.7; 7)	71-75
rothschildi	73.6(1.5;11)	71-76	rothschildi	74.7(3.0; 6)	72-80
insularum	73.9(2.4; 7)	71-78	insularum	75.4(2.3;11)	72-79
harterti	75.5(2.3;11)	70-78	harterti	75.8(2.2; 4)	73-78
buteo	76.1(2.7;15)	76-81	buteo	76.9(2.1;15)	73-80
F = 8.87; p < .000; df = 74			F = 7.52; p < .000; df = 59		

HINDCLAW

Male			*Female*		
Taxon	x̄ (SD; N)	min-max	Taxon	x̄ (SD; N)	min-max
vulpinus	20.9(0.6;11)	19.6-21.6	vulpinus	21.6(0.9; 6)	20.3-22.6
buteo	22.0(1.1;15)	20.8-24.1	buteo	23.5(1.0;15)	21.3-25.2
arrigonii	22.4(1.0;14)	20.4-23.7	arrigonii	23.8(1.2;10)	21.5-25.4
rothschildi	23.1(2.2;10)	20.3-27.7	rothschildi	24.8(0.9; 6)	23.4-26.0
harterti	23.9(1.0;11)	22.8-26.4	harterti	24.8(1.4; 3)	23.4-26.1
insularum	24.0(0.8; 7)	23.0-25.0	insularum	25.4(1.4;11)	23.4-28.0
hispaniae	24.1(1.2; 6)	22.0-25.1	hispaniae	26.6(1.4; 7)	25.0-29.0
F = 9.87; p < .000; df = 73			F = 13.0; p < .000; df = 57		

MIDDLE TOE

Taxon	*Male* x̄ (SD; N)	min-max	Taxon	*Female* x̄ (SD; N)	min-max
vulpinus	33.4(1.6;10)	31-36	vulpinus	33.4(1.3; 5)	32-35
arrigonii	34.4(1.7;14)	32-38	arrigonii	35.5(1.7;10)	32-39
hispaniae	35.4(0.9; 5)	34-36	harterti	36.5(0.7; 2)	36-37
buteo	35.4(1.2;14)	34-38	buteo	37.4(1.6;13)	34-40
harterti	35.7(1.9;10)	32-39	rothschildi	37.4(1.3; 5)	35-38
rothschildi	36.2(1.1; 9)	34-37	hispaniae	37.4(1.6; 7)	35-40
insularum	37.3(0.8; 7)	36-38	insularum	38.2(2.0;10)	35-41
F = 6.79; p < .000; df = 68			F = 6.27; p < .000; df = 51		

WINGDEPTH

Taxon	*Male* x̄ (SD; N)	min-max	Taxon	*Female* x̄ (SD; N)	min-max
vulpinus	227(7.0;10)	218-239	vulpinus	234(8.9; 6)	224-242
arrigonii	229(5.4;14)	220-236	arrigonii	244(10.3; 9)	227-262
rothschildi	236(9.9;11)	219-257	rothschildi	246(5.4; 4)	238-251
hispaniae	238(6.4; 4)	229-244	hispaniae	256(8.4; 5)	248-269
insularum	243(4.7; 6)	238-250	insularum	262(7.7;10)	249-271
harterti	257(9.4; 9)	245-275	buteo	268(9.1;14)	254-283
buteo	259(8.1;10)	251-273	harterti	269(16.3; 2)	257-280
F = 28.07; p < .000; df = 63			F = 15.27; p < .000; df = 50		

TAIL-WING RATIO (%)

Taxon	*Male* x̄ (SD; N)	min-max	Taxon	*Female* x̄ (SD; N)	min-max
rothschildi	51.7(1.7;11)	48.6-54.0	rothschildi	51.4(2.1; 6)	49.2-54.5
vulpinus	52.2(1.4;11)	49.9-53.8	hispaniae	51.4(1.8; 7)	49.2-54.2
hispaniae	52.7(0.8; 6)	51.9-53.9	harterti	51.4(3.5; 4)	46.4-53.9
harterti	53.9(1.5;11)	50.5-55.1	vulpinus	52.2(2.4; 6)	49.9-56.7
buteo	54.3(1.6;14)	51.9-57.8	arrigonii	53.1(2.1;11)	50.7-56.3
arrigonii	54.5(2.3;14)	50.0-57.7	insularum	53.9(2.3;11)	49.5-56.9
insularum	55.5(1.1; 7)	53.9-56.9	buteo	54.5(1.6;15)	51.8-56.8
F = 6.67; p < .000; df = 73			F = 3.61; p < .008; df = 59		

CULMEN-WING RATIO

Male			*Female*		
Taxon	x̄ (SD; N)	min-max	Taxon	x̄ (SD; N)	min-max
buteo	.056(.002;15)	.053-.059	buteo	.058(.002;14)	.054-.061
vulpinus	.057(.002;10)	.053-.061	harterti	.058(.002; 3)	.056-.059
harterti	.059(.003;11)	.053-.062	vulpinus	.058(.003; 6)	.055-.062
hispaniae	.060(.002; 6)	.058-.062	insularum	.061(.002;11)	.057-.066
insularum	.061(.003; 7)	.056-.064	hispaniae	.061(.003; 7)	.057-.066
rothschildi	.061(.002;11)	.056-.064	rothschildi	.063(.002; 6)	.059-.064
arrigonii	.063(.002;14)	.060-.066	arrigonii	.064(.009;10)	.060-.067
F = 14.96; p< .000; df = 75			F = 9.17; p< .000; df = 56		

TARSUS-WING RATIO

Male			*Female*		
Taxon	x̄ (SD; N)	min-max	Taxon	x̄ (SD; N)	min-max
hispaniae	.195(.004; 6)	.188-.200	hispaniae	.185(.007; 7)	.178-.197
harterti	.196(.005;11)	.186-.204	harterti	.187(.007; 4)	.179-.193
buteo	.197(.008;15)	.186-.211	insularum	.191(.006;11)	.183-.199
insularum	.198(.009; 7)	.188-.210	buteo	.192(.009;15)	.180-.208
vulpinus	.200(.006;11)	.193-.213	arrigonii	.194(.004;11)	.188-.201
arrigonii	.203(.006;14)	.188-.211	rothschildi	.197(.004; 6)	.194-.202
rothschildi	.206(.008;11)	.195-.220	vulpinus	.198(.011; 6)	.186-.210
F = 3.43; p< .005; df = 74			F = 2.59; p< .028; df = 59		

DISCUSSION

Regional size differences

Wing length is here used to indicate size of the bird. Results of one-factor anova reveal that the different taxa come from a population distribution among which there are at least 3 population means. The samples of *arrigonii*, *vulpinus* and *rothschildi* can be grouped and separated from *buteo* and *harterti*. The groups *hispaniae* and *insularum* cannot safely be assigned to a particular group. This is due to the overlapping of homogeneous subsets (multiple range test).

These data (Table I) indicate that size decreases in a southerly direction (fig. 2) from continental Europe to the Cape Verde Islands. The populations of some Mediterranean islands and of the Azores (*arrigonii* and *rothschildi*) are small and similar in size to the eastern race *vulpinus*.

Origin of groups

Most of the mid-Atlantic island populations exhibit more or less characters of *buteo-vulpinus* intergrades. Olsson (1958) reported that buzzards from northern Sweden, which show *vulpinus* characters, migrate south as far as northern Africa. Birds with these characters ('*intermedius*') are know to migrate over Gibraltar. Moreover, Olsson (1958) stated that second-year *vulpinus* from northern Sweden may over-summer in the winter area.

I postulate, at least for the Madeiran, Canary and Cape Verde Archipelagos, that these

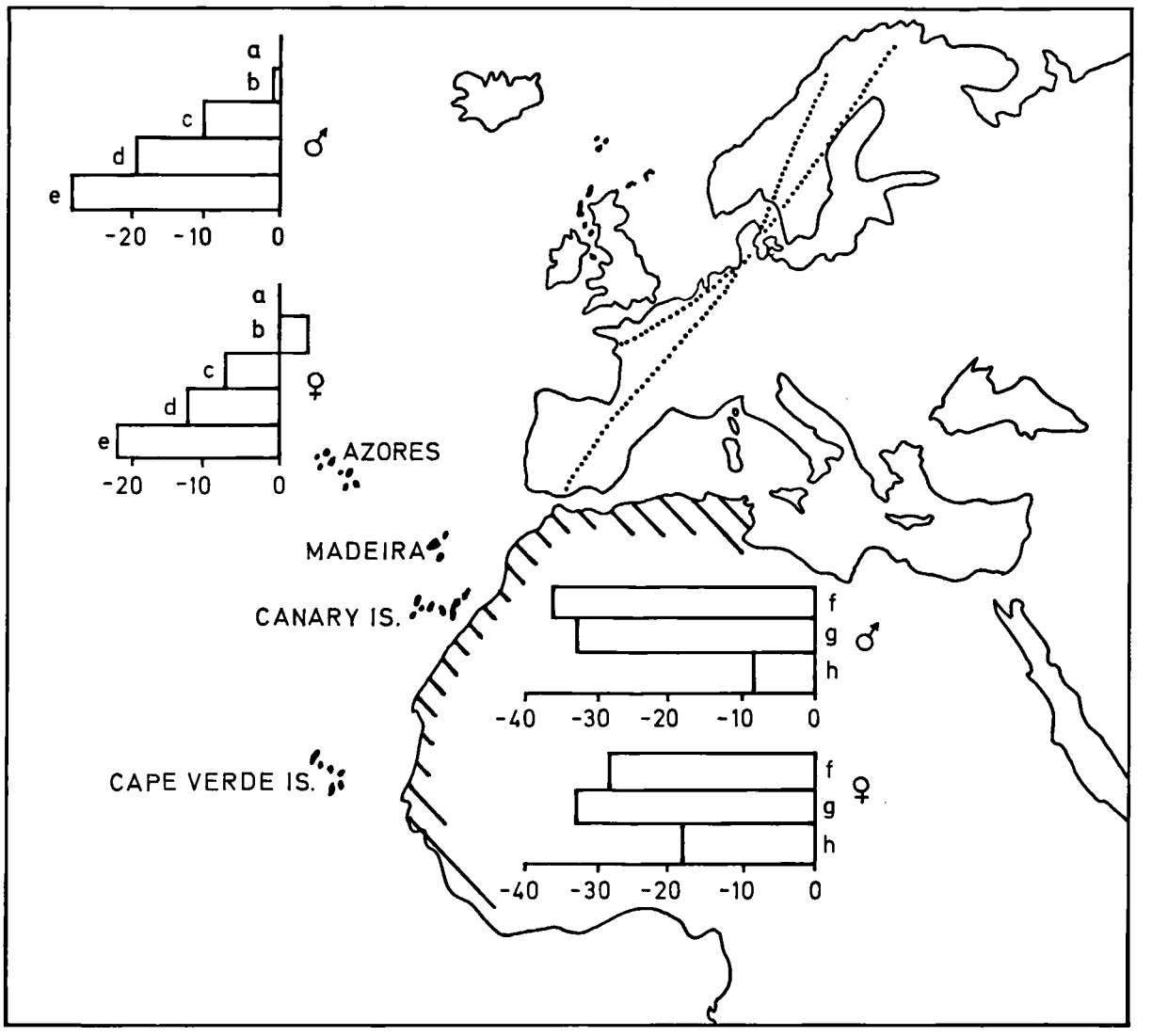

Fig. 2. Geographic variation in wing length, and distribution of groups. (1) Bar graphs represent differences in wing length of groups from nominate *buteo*; a = *buteo*, b = *harterti*, c = *insularum*, d = *bannermani*, e = *rothschildi*, f = *vulpinus*, g = *arrigonii*, h = *hispaniae*. (2) Dotted lines represent *buteo* migration pattern (Olsson, 1958) and hatched area represents North African wintering area (Brown et al. 1981).

populations may have been colonized by buzzards from continental western Europe, and probably by individuals from Scandinavia. Further, these populations are probably still influenced by immigration. The Azores are marginal in respect to this pattern of migration. The population is probably rarely influenced by immigration as supported by its stable plumage pattern.

The population from Sardinia and Corsica can be said to have affinities to eastern populations of *B. b. vulpinus*.

SUBSPECIES ACCOUNTS

Buteo buteo buteo (Linnaeus, 1758)

Buteo buteo harterti Swann, 1919

Swann (1919): 43. [Holotype in Amer. Mus.], ♀ ad., Type locality: Madeira. Type not examined.

Table II. Measurements taken for *B. b. bannermani*, [() = own data], and those of de Naurois (1973). * = worn plumage.

Mus. no.	Locality	Date	Sex	wing	tail	culm.	w/t
M.P.1966-910	Santiago	11.II.1965	M.imm.	345	191	20	1.81
M.P.1966-909	Santiago	9.IV.1965	M.ad.	366	189	23	1.93
BM.1911.12.23.435	Boa Vista	-.II.1897	M.imm.	344	175	21	1.96
			M.imm.	(345)	(186)*	(21.6)	(1.86)*
BM.1911.12.12.436	Santiago	-.II.1897	F.ad.	387	197	23	1.96
				(389)*	(202)	(23.0)	(1.92)
BM.1919.8.15.148	St. Vicente	26.IX.1913	F.imm.	(375)	(198)	(22.0)	(1.89)
A.M.N.H.	S. Nicolau	5.XI.1897	F.(?)	385	205	25	1.88

From both the analysis of plumage and of structure, the data show that the Madeiran populations do not differ from nominate *buteo*. Hartert (1914) commented that the buzzards from Madeira are larger than those from the Canaries and Azores, but could not be separated from the western European form. Cramp & Simmons (1979) indicated that the race is identical with nominate *buteo*. Stresemann & Amadon (1979) questioningly synonymize *B. vulgaris hispaniae* Jordans 1939 from Spain with *harterti*.

When discussing *harterti*, Bannerman (1965) quotes Swann's (1919) description of a "rufous phase", but this is a misquote and Swann's description is of *B. b. rothschildi*. Though probably not a common occurrence, nominate *buteo* does wander to the archipelago. Bannerman (1965) reports on one example of nominate *buteo* collected on Porto Santo in December. It was believed to have been blown there from the European continent by a prevailing storm. Buzzards are not resident on the north-eastern island of Porto Santo. Camara & Teixeira (1980) list an observation of a *Buteo sp.* from Madeira in 1978.

The islands were probably colonized quite recently by populations from continental Europe. The report of *B. buteo* on Porto Santo indicates that the islands are influenced by continental populations.

In conclusion the Madeiran Buzzard *B. b. harterti* is not sufficiently distinct from nominate *buteo* to warrant recognition as a separate subspecies.

[?] **Buteo buteo hispaniae** von Jordans, 1939

von Jordans (1939): 13-14. Holotype ZFMK A.II.19.a.6x, ♂ ad., 27 April 1935, Linares de Riofrio, Salamanca, Spain, coll. Grün.

Von Jordans (1939) believed that *hispaniae* could be distinguished from the nominate as well as from the smaller races of the Atlantic islands. He described the race *hispaniae* from seven buzzards collected by H. Grün in Spain. According to von Jordans the specimens are consistently dark and small, smaller than *vulgaris* (= nominate *buteo*), but similar to *buteo-similis*. The name *buteo- similis* refers to the population from western Russia presently considered *B. b. vulpinus*. His wing measurements average 374 mm in 3 males, and 390 mm in 4 females. He designated two skins as types; one a grey form, male, Linares, Salamanca 27.IV.1935, and the other a reddish form, male, Mosqueruel 18.IX.1930. I examined them, along with 11 specimens collected by Grün in Salamanca and two from Mosqueruela, eastern Spain. Seven of these were collected between 7 April and 24 August. I have also seen a few other specimens from Spain and Portugal which seem identical to nominate *buteo*. Von Jordans' reddish paratype is a fall specimen (September). It has a rufous tail with thin narrow bands, a diagnostic *vulpinus* pat-

tern. It could most likely be a migrant from the zone of intergradation of *buteo* and *vulpinus*, birds known occurring in Spain (Olsson, 1958). The wing length however, is rather long for *vulpinus*, but to be expected from *intermedius*. At any rate, its appearance is unlike any of the other Spanish buzzards which vary only slightly from the typical nominate. Slight differences, such as the under-tail covert, do not constitute enough reason to subdivide this group. The dimensions of *hispaniae* pose some taxonomical problems. In Table I it can be seen that many variables significantly differ from nominate *buteo*. The wing length of *hispaniae* averages smaller than those from western Europe, but is longer than *arrigonii* and *rothschildi*, and similar to *insularum*. If these differences in dimensions, noted especially in males, is an artifact of the small sample size is not clear. The taxonomy remains problematic and a decision on its status would be arbitrary at the present moment.

[?] **Buteo buteo bannermani** Swann, 1919

Swann (1919): 44. Holotype BM 1919.8.15.148, ♀ imm., 26 September 1913, Sao Vincente near Mindello Bay, Cape Verde Islands, coll. D. A. Bannerman.

Existing material of *bannermani* is scarce. Vaurie (1961) found only a slight difference between this race (one specimen) and the nominate from western Europe. I am in agreement. Bannerman (1930) stated "it is so similar in appearance to our British Buzzard". He went on to say (1968) that it is very rare and unknown in some islands. According to Hartert (1922: 2203) this bird is lighter and less reddish-brown than the other Atlantic island forms, the tail has 9 crossbars and the feet are lighter in build. This description could just as well fit the nominate! De Naurois (1973) concluded that the taxonomic position of the Cape Verde Buzzard is still unsatisfactorily defined although some features resemble those of *zimmermannae*.

De Naurois (1973) suggests that *bannermani* suffers from competition with the Black Kite *Milvus migrans* which has recently invaded the islands. He suggests (1981) that because of this competition some individuals of *bannermani* may wander to parts of continental Africa. Morel & Brown (1981) report specimens of the subspecies *Buteo buteo buteo* and of *B. b. intermedius* from Liberia and Mauritania. De Naurois (1981) believes that these specimens are examples of *B. b. bannermani*.

The buzzards are very rare and the numbers have diminished. They are extinct from Boa Vista and Sao Vicente (de Naurois, 1969). Nørrevang & den Hartog (1982) sighted one bird on June 8 1982 at Brava, and one on June 9 at Fogo. Buzzards have not previously been known from Brava.

I could not find sufficient difference between the buzzards in the Cape Verdes and nominate *buteo*. The resident buzzard is not differentiable from nominate *buteo*. This fact points to recent colonization, supported also by its inability to compete with other raptor species in the islands. To make a conclusion on its taxonomy from a mere five specimens is not valid. From Table II it would appear that the size is extremely small, however, since adults show the typical barring of the ventral portions and coloration of nominate *buteo* it would be unreasonable at present to consider it a geographically unique form, though the range of the subspecies *buteo* may then be considered most curious at the least.

Buteo buteo insularum Floericke, 1903

Floericke (1903): 64. Type locality: Gran Canaria.

B. b. lanzaroteae Polatzek, 1908: 113. Type locality: Lanzarote. Type and original description not examined.

Hartert (1914) and Stresemann & Amadon (1979) believe that there is no difference between *insularum* and *rothschildi*. Bannerman (1963) reports that the bill is heavier than the nominate and the size is smaller. The bill does seem heavier; culmen length differ on average from nominate *buteo* by 1.54 mm (males) and 0.43 mm (females). However, these values do not withstand statistical tests of significance, although culmen-wing ratio in males is propor-

Table III. Three rufous morph specimens from (1) Rabacal, Madeira, (1) San Tiago, Cape Verde Islands, and (1) Allegranza, E. Canary Islands; and measurements of male immature specimens of the subspecies *B. rufinus cirtensis* from northern Morocco.

Mus. no. Sex/Age	wing	wing tip	tail	culm	tars	hclaw	mtoe	p10	p9	p8	p7	wing depth
BM.1914.12.1.315												
♂ [imm]. Madeira	369	130	204	21.0	72	20	32	84	103	105	91	239
BM.1911.12.23.435												
♂ imm. C. Verde Is.	345+	—	186+	21.6	72	24+	36	83	96	—	—	—
BM.1913.10.22.192												
♂ imm. E. Canary	351	124	193	20.0	75	21.1	36	85	101	103	95	227
B. rufinus cirtensis male immature												
BM.1919.12.11.2												
Morocco: C. Lesser Atlas; 29-5	346	118	178+	23.0	74	23	—	86	104	106	93	228
AK 54.44												
Algeria: Djelfa; -8	354	132	185	20.7	71	22+						222
AK 54.43												
Algeria: Djelfa; -8	359	138	185	21.2	78	21.5	36					221
BM.75.4.20.8												
Morocco: Tangiers; -	366	137	196	21.8	75	—	—	—	—	—	—	229
BM.1956.6.N.20.2184												
Morocco: Tangiers; -	376	140	196	22.0	76	24	36	88	106	108	96	236

tionally larger. No other variable could be statistically separated from nominate *buteo*, despite the differences in means.

Polatzek (in Bannerman & Bannerman, 1963) named the buzzards from the eastern Canary Islands *B. b. lanzaroteae* because they were smaller in size, have ashy-blue tails banded with dark brown (fide Bannermann 1963). However, this name has never been accepted. I only examined one specimen from the eastern islands which is discussed below.

Lack & Southern (1949) believe the buzzard's call is similar in form to the nominate's but slightly different in quality, although they admit that only a few were heard and perhaps insufficient to form an accurate judgment. Bannerman (1963) says the call cannot be distinguished from the western form.

In my opinion, this form probably colonized the islands not in the distant past, at least it can not be considered to be an older resident than *rothschildi* is of the Azores. The first inhabitant may have arrived on the islands during periods of glacial activity, as Moreau (1966) points out the ecological setup of Africa was associated with glacial activity, thus woodlands extended into northern Africa. The buzzards then invading the islands remained after the glacial retreat. Another possibility is that the buzzards arrived as migrants from western Europe. The similarity in size and to a good extent appearance would support this. The habitat on the Canaries, especially the western islands is very similar to that of south-western Europe.

Bannerman (1963: 31) gives a description of a "rufous phase" specimen. However, in light of the report and discussion herein of the rufous morphs, and the lack of a rufous morph in the nominate, it seems unlikely that the resident forms exhibit a rufous morph: more likely these are visitors from northern Africa or eastern Europe.

The Canary Buzzard is similar in size to the western European buzzard but can be

distinguished by three major plumage characters. The underparts tend to be streaked even in adults, and in most show less barring. The belly has a cream or almost buff-yellow wash with droplet shapes which are rarely found in the nominate. The tail pattern is quite different, consisting of three types. The males tend to have reduced banding on the tail. The colour is more of an umber brown or burnt umber than the fuscous of nominate *buteo*. Taking these differences into account I would tend, though reluctantly, to conclude that *B. b. insularum* is a valid race of *B. buteo*.

Buteo buteo rothschildi Swann, 1919

Swann (1919): 43. Holotype BM 1904.12.31.386, ♂ ad., 6 April 1903, Reguinho, Terceira, Azores, 1200 ft. coll. W. R. Ogilvie-Grant.

Taxonomically, the Azores race of *Buteo buteo* is still rather controversial. Stresemann & Amadon (1979) synonymize *rothschildi* with *insularum* of the Canary Islands, presumably following Hartert (1914) who stated that the Azores Buzzard did not differ from that of the Canaries. I was able to examine 17 specimens in an attempt to review its taxonomic position.

This race can easily be distinguished from the nominate, and from the other island races. The colour is generally a deep "earthy" rust. The underside can be broadly streaked not only in juveniles as in other races, but also in adults. The structure and proportions differ significantly from nominate *buteo* with regards to wing length, wing tip, tail, and culmen-wing ratio (in males), and wing length, tail, and wingdepth (in females). This subspecies is clearly smaller than nominate *buteo*. The culmen, hindclaw and middle toe are not significantly different, although the latter two average larger.

The local buzzard *Buteo buteo rothschildi* is the only resident diurnal raptor. Hartert & Ogilvie-Grant (1905) had noted from a series of 23 specimens collected by Ogilvie-Grant from various islands between 1000 ft and 2500 ft, that the buzzards are similar to nominate *buteo* but differ in two points. They are distinctly smaller, the wings of males range from 340 to 360 mm and of females 360 to 380 mm. Secondly, they are uniform in colour, being deep brown above, while below they have deep brown "praepectral" and abdominal bands of brown spots divided by a whitish area. They further stated that this pattern does not vary much. They named the buzzards from the Azores *B. b. insularum* because, presumably Hartert, could not see any difference between these buzzards and those from the Canary Islands. Swann (1919; 1930), however, disagrees with this conclusion. Bannerman & Bannerman (1966) added that 10 mounts in the museum at Ponta Delgada show plumage variation matching that in life. They confirmed that the plumage patterns are, on the whole, remarkably uniform. They concluded from this, together with the fact that the islands are not on any regular migration route, that this race appears a stable one.

Bannerman & Bannerman (1966) believed that since no other Accipitrine occurs on the islands the buzzard occurred there since the earliest historic times, their dark plumage and small size establishing them as a distinct race which must have taken centuries to evolve. De Vries (1977) is of the opinion that the reason for the lack of predatory species on the Azores is not the isolation of the islands from any continental land masses because migrants regularly visit them, but is lack of prey species. If, as I am of the opinion, *rothschildi* did colonize the islands long ago, it would be adapted to its ecological niche thus being competitively sound. The most logical relative would be the western European buzzard *B. b. buteo*. However, as shown, *rothschildi* exhibits distinct morphological differences. In size it is more like *B. b. vulpinus* though in plumage it is quite unique. This situation is rather similar to that found in the Socotran Buzzard, whose characters are intermediate between the northern *vulpinus* and the African Mountain Buzzard *B. o. oreophilus* (Frost & Siegfried, 1970). Interestingly enough, in adult *rothschildi*, the underparts are more longitudinally marked than horizontally, therefore not reminiscent of nominate *buteo*. In my opinion this race is a distinguishable taxon

which deserves subspecific status. It is probably an older group compared to the other island races.

Buteo buteo arrigonii Picchi, 1903

Picchi, (1903): 40. Type locality: Sardinia. Syntypes not examined.

The size is substantially smaller than that of the nominate, approaching that of *vulpinus*. Certain characters also resemble *vulpinus* - *buteo* intergrades. The tail has thinner bands and is more tawny with silver-grey or silver-brown interband regions. However, this form shows the confounded variability, all too well known in the nominate. The streaked adults may be representative of the lighter phase. The feet appear to be larger and heavier.

Orlando (1955) believed that the buzzard throughout the Italian region would come under the name *pojana* Savi, 1822, and he synonymized *arrigonii* and *meridionalis* Trischitta, 1939 with it.

Certain specimens from the Italian region have streaked underparts, even in adults. It is these that Orlando (1955) calls *pojana*, though most of the specimens examined by him were from Sardinia or Sicily. Only six of the 43 examples of *pojana* are from the Italian mainland. In Table IV statistics are from measurements reported by Orlando (1955). Several of his specimens are apparently wrongly sexed. Birds from the Veneto region are of medium size, as are those from Lazio. Interestingly enough, specimens from Sicily are almost identical in size and presumably appearance to those from Sardinia. Orlando presents numerous black and white photographs. Some clearly show examples of streaked immatures.

Orlando (1955) seems to have a strong case for reestablishing *pojana* but on closer scrutiny, his own data do not support this. He lists two birds from Veneto as *pojana* which are at the upper limit or above the range of the birds from Sardinia and Sicily. The birds that do not fit *pojana*, which from his own photographs are typical adult and immature *buteo* and which he calls *B. buteo fasciatus* and *B. b. mutans* Vieillot, were collected mainly from the Italian mainland.

Table IV. Values calculated from measurements reported by Orlando (1955), for *B. buteo pojana*.

	males			females		
Sicily	wing	bill	tarsus	wing	bill	tarsus
mean	366	22	72	370	22.6	73.6
min	360	22	72	361	22	72
max	377	23	73	385	23	77
N	3	3	3	6	5	5
Sardinia						
mean	364	23	72	370	23	74
min	352	21	69	350	22	71
max	382	24	77	379	24	78
N	8	8	8	10	10	10
Veneto	392	24	78	389	24	76
Lazio	366			388	24	72

Table V. Student's "t" values, degrees of freedom, and levels of significance for differences in wing between means of both sexes.

Taxon	*Male*	*Female*	*df*	*"t"*	*prob.*
buteo	386	406	12	-2.91	$p < .013$
harterti	385	406	10	-2.05	$p < .068$
insularum	374	394	11	-3.90	$p < .002$
hispaniae	369	394	8	-3.77	$p < .005$
rothschildi	358	379	11	-2.96	$p < .021$
arrigonii	353	374	9	-4.42	$p < .022$

Vaurie (1961) found no difference between specimens from northern Italy, Tuscany and Lazio, and those collected north of the Alps, commenting that the type locality of nominate *buteo* is in fact in the area of northern Italy (Savoy). However he does follow Orlando in synonymizing *meridionalis* with *pojana*. Stresemann & Amadon (1979) followed Orlando (1955) in synonymizing *arrigonii* and *meridionalis* under *pojana*. Specimens from southern Italy or Sicily were not examined by me.

In structure *arrigonii* is more similar to *vulpinus* than to nominate *buteo*. In fact, almost every structural variable tested differed

significantly from nominate *buteo* (Table I). The exceptions are in wing tip (females only), culmen, hindclaw, midtoe, WTR, TWR, and CWR (females only).

The buzzard from the Italian region is believed to be sedentary, and was common at the beginning of this century, though numbers have apparently been severely reduced (Bijleveld, 1974). The subspecies *arrigonii* is resident on Sardinia, Corsica (Moltoni, 1962), and the Tuscany Archipelago (Moltoni, 1954). Moltoni (1940) could not separate the buzzard in southern Italy, province Calabria, from the typical nominate because plumages were so diverse in the latter. However, Moltoni (1964) later indicated that *B. buteo arrigonii* may also occur along with *B. buteo buteo* in southern Italy. Clearly, the taxonomy of the Buzzards from the Italian peninsula deserve further study.

In the light of the differences in size, one would imagine that *arrigonii* should be recognized, although admittedly selecting this form from a series of Buzzards on appearance alone would not be an easy task.

THE LONG-LEGGED BUZZARD *BUTEO RUFINUS CIRTENSIS* ON THE CAPE VERDE, CANARY AND MADEIRA ARCHIPELAGOS

The Long-legged Buzzard *B. rufinus cirtensis* is a little known form distributed in Algeria, Tunisia, Marocco and in scattered populations in Spanish Sahara. It was hitherto not reported from the mid-Atlantic archipelagos.

I suggest that three "rufous" specimens, one from the Cape Verde Islands, one from the Canary Islands and one from Madeira, belong to the forms *B. rufinus cirtensis* or *B. b. vulpinus*. On size and appearance the three specimens stand out from the other specimens from the islands.

The resident populations of *B. rufinus cirtensis* from the Moroccan Lesser Atlas are noticeably smaller than other populations further East. The reader should refer to the immature female [= male] BM1919.12.11.2 in Table III which was collected in Morocco, Central Lesser Atlas during the breeding season (May) along with BM1919.12.11.1, a female shot from its nest. The collector, Lynes (1920) commented on its "freak" size, and said it is a light plumage young bird moulting into fall adult plumage, and the ovary quite small. I have examined it. The size of the ovary drawn by the collector on the label indicates that the specimen is probably a male, not a female.

Distinguishing *cirtensis* from *vulpinus* ("rufous phase") is difficult, because of their close resemblance in size and appearance. *Cirtensis* is best distinguished by the paler head contrasting more strongly with the rest of the upper parts, its paler tail, heavier bill, longer tarsus, and more powerful toe and claws (Cramp & Simmons, 1979: 196).

Cape Verde Islands. The bird from the Cape Verdes, is small, and according to de Naurois' (1973) measurements, it does not differ greatly in size of the wing from two other specimens that he measured and identified as *bannermani*. I have not seen the latter two. Nevertheless, the appearance of the bird in question is not typical for the dark island residents, but very similar to *cirtensis* or the so-called "rufous" phase of *vulpinus*.

Examination of this second year male from the Cape Verdes (BM1919.12.23.435), and the precise description of its outer appearance is complicated by the heavily worn plumage intermixed with freshly emerged contours. Closely inspecting the new feathers, especially on the breast, one sees a pattern of broad streaks of dark brown with a ground colour of cinnamon-tawny. The neck is lightly streaked and contrasts with the rest of the underside. Measurements of this bird are listed in Table III along with *cirtensis* for comparison.

The bird (Cape Verdes) has a lighter head and neck. The toes and claws are large. The tarsus and culmen are small but well within the range for *cirtensis* (Cramp & Simmons, 1979;

Table III). Attention should be drawn to the design of the tail. The Moroccan specimen (BM1919.12.11.2) shares the strongly banded tail pattern with the bird in question. Apparently immatures have banded tails, which show variation from silver or grey-brown, sand coloured to brown. The reduction of width and number of bands and the colour change to a more rufous probably occurs with age. Typical *cirtensis* has a paler uniform tawny or rufous tail in adults. At any rate, a more detailed examination of *cirtensis* and *vulpinus*, and more importantly, *cirtensis* and *rufinus* is planned. Preliminary, it can now be concluded that the specimen BM1919.12.23.435 from the Cape Verdes, identified as *B. buteo bannermani*, was misidentified and now should be treated as *B. rufinus cirtensis*.

Canary Islands. The identity of BM1913.10.22 .192 male immature (*B. b. insularum*) collected in East Canaries, Isla Alegranza is also questionable. The ground colour is a resounding cinnamon-tawny, almost deep rufous, the rest of the underparts with droplet streaks, the flanks solid brown, the back edged tawny, and tail is obscurely banded. The primary tips are strikingly pointed, which is suggestive of immature *vulpinus* or *cirtensis*.

Here again, the problem in distinguishing *cirtensis* and *vulpinus* is paramount. The culmen and hindclaw lengths are small. Measurements are within the ranges of *cirtensis*, and *vulpinus* thus one cannot safely identify the bird.

Madeira. The specimen from Madeira is similar to the above two. The underside is cinnamon-tawny, only obscurely patterned with dark shaft streaks. The primary tips are pointed and banded white on the underside of the webs. The tail pattern is similar to *cirtensis*, however, the length of tail is rather long for *cirtensis*. The tarsus is also a bit short as are the middle toe and hindclaw. The identification of this specimen remains problematic, but it certainly is not *harterti*.

De Naurois (1981) suggested that tropical bird species visit the Cape Verdes from Africa. According to Morel & Browne (1981) *B. rufinus cirtensis* migrates south of its known breeding range. They report it occurring south to Mauritania. Thus, *cirtensis*, especially immature birds, could conceivably visit these islands. Further, breeding populations of it are recorded from northern Spanish Sahara, adjacent to the Canary archipelago.

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