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Systematic Notes on Palearctic Birds. No. 41 Strigidae: The Genus *Bubo*

BY CHARLES VAURIE

The present paper consists of a detailed review of *Bubo bubo*, preceded by a discussion of the relationships of the Eagle Owl (*Bubo bubo* and relatives) to the Pharaoh Owl (*Bubo bubo ascalaphus*), and of a short note on the African Eagle Owl (*Bubo africanus*).

This study is based primarily on the collections of the American Museum of Natural History, which are large, but *Bubo bubo* is a very big bird and is not represented by long series in collections. Usually collectors are quite content when they are able to secure and prepare two or three specimens. Nevertheless, I have seen about 220 specimens of *Bubo bubo* and have examined material of all its races with the possible exception of *tarimensis*, which inhabits a very remote region with an impoverished fauna where few birds of any kind have been collected, and, even so, I suspect that two young birds that I have seen from southwestern Mongolia probably represent *tarimensis*.

It would have been impossible to gather the material I studied without the cooperation of several institutions which lent me critical specimens: the Academy of Natural Sciences of Philadelphia, the British Museum (Natural History), the Chicago Natural History Museum, the Museum of Comparative Zoölogy, and the United States National Museum. These big owls are not the easiest things to pack and ship, and I want to express my appreciation to the following colleagues and their staffs for the trouble I caused them: Mr. R. Meyer de Schauensee in Philadelphia, Mr. J. D. Macdonald in London, Dr. A. L. Rand and Mr. M. Traylor in Chicago, Mr. J. C. Greenway, Jr., in Cambridge, and Dr. H. Friedmann in Washington. Among the

material lent to me were several types. I am also very grateful to Mrs. B. P. Hall of the British Museum for examining for me the type of *hemachalana* and sending me some notes on it and other specimens, and to Mme. Tatiana Gidaspova of the American Museum of Natural History for translating Russian texts.

Bubo bubo

The Eagle Owl is widely distributed in North Africa south to the Sahara and in Eurasia from western continental Europe east to Sakhalin and the southern Kuriles, south to Arabia, the Iranian region, southern India, and southern China. It varies geographically to a conspicuous extent, and many subspecies have been described. Peters (1940, pp. 113–117) synonymized a number of these, but he nevertheless recognized 24, with the reservation that this number was probably excessive. He states: "My own personal feeling is that naming of subspecies in *Bubo bubo* has been greatly overdone, especially in view of the large amount of individual variation and the comparatively small series available from given localities. However insufficiency of material precludes the formation of first-hand opinion on the validity or non-validity of any particular race." Dementiev, who has seen a far greater quantity of material from the Soviet Union than any other author and who has made a speciality of the study of its populations of *Bubo bubo*, recognized (1951, pp. 352–366) 10 races in the Soviet Union and 17 for the species as a whole. Prior to this account, his latest review, he had reviewed the forms of the Soviet Union in 1931 and 1933 (1933b) and published notes on them in 1933 (1933a) and 1934. Johansen (1956, pp. 207–209) has also published valuable comments on the populations of Siberia.

The specimens available to me from the Soviet Union are, of course, very much fewer than those seen by Dementiev, and, with one exception, I have therefore followed his authoritative review of 1951 as far as these populations are concerned. On the other hand, I have very probably examined much more material than he has from western Europe, Africa, China, and southern Asia, so that our reviews become complementary, as the birds from these regions were mentioned only very briefly by Dementiev. Where Dementiev recognized 17 valid subspecies, I have recognized 16, which include *tarimensis*, which is not mentioned by Dementiev, and *bengalensis*, which he does not include in *Bubo bubo* because he considers that *bengalensis* represents a borderline case between species and subspecies, although he does include *ascalaphus* (another borderline case) in *bubo*. I consider that *tenuipes*

and *desertorum*, which are accepted by Dementiev, are not valid. In regard to the 10 subspecies that we both recognize from the Soviet Union, I differ from Dementiev only in that I find that *omissus* from Transcaspia, which he recognizes, is in fact a synonym of *nikolskii*, which he has restricted to southern Iran.

The geographical variation of *Bubo bubo* is very predominantly clinal in character (except where *ascalaphus* and *bengalensis* are concerned) and seems to be correlated chiefly with climatic factors. The birds that inhabit the higher latitudes or altitudes are large, and as a rule those of the more humid regions are darker, browner, less dull, and less pale than those of the more open or arid regions. The birds of the deserts or semi-deserts are very pale, dull, and yellowish, "sandy" in coloration, harmonizing well with their environment. In the northern part of the range, a cline of decreasing color saturation runs eastward from northwestern Europe through Russia to Siberia, to become reversed at the Yenisei, color saturation increasing as size diminishes from north to south in the Far East. In Europe, the populations become smaller and paler from north to south, paler from the Caucasus eastward to northern Iran, and the variation appears to be clinal also from the steppes to the mountains and deserts in Kazakhstan, Turkistan, and Transcaspia.

The pattern of this variation is the normal one for many widely distributed Palearctic species and does not present a difficult taxonomic problem other than the usual one of where to draw satisfactory boundaries between the various races. In other words, we are dealing with primary intergradation, but the populations (*ascalaphus*) of Africa and the Near East present a more difficult and interesting taxonomic problem.¹ *Ascalaphus* is very distinct morphologically from the two races (*hispanus* and *interpositus*) of *bubo* with which it comes into contact and may overlap in distribution, and consequently it is considered to be a distinct species by some authors. I believe that *ascalaphus* and *bubo* are probably conspecific, as there is no doubt that they are closely related, interbreed, and, on the whole, replace each other geographically, but this interesting question is reviewed here as it has never been thoroughly documented and discussed.

Ascalaphus is a much smaller bird than *bubo*, 12 male specimens from Africa (typical *ascalaphus*) having a wing length of 330–368

¹ The affinities of *bengalensis* are with *bubo*, not *ascalaphus*, and are not relevant to the discussion of the relationships of *ascalaphus* and *bubo* presented in this paper.

TABLE 1
WING LENGTH OF *Bubo bubo*^a

Subspecies	N	Measurements
<i>hispanus</i>	1 ♂ ^b	425
	3 ♀	450, 460, 465
	4 ^c	425-475 (448.8)
<i>bubo</i>	10 ♂	430-460 (440)
	10 ♀	460-500 (472.5)
<i>ruthenus</i> ^d	1 ♂	440
	1 ♀	480
<i>interpositus</i>	10 ♂	425-475 (452) ^e
	10 ♀	440-485 (462)
<i>sibiricus</i>	5 ♂	435-475 (452)
	5 ♀	475-500 (488)
<i>yenisseensis</i> ^f	1 ♂	435
	3 ♀	475, 485, 500
<i>jakutensis</i> ^g	1 ♂	490
<i>ussuriensis</i>	7 ♂	430-475 (445.4) ^h
	6 ♀	460-478 (470.5)
<i>kiautschensis</i>	10 ♂	410-448 (430.3) ⁱ
	5 ♀	440-475 (454.5)
<i>tibetanus</i>	2 ♂	450, 460
	2 ♀	495, 502
	1 ♀ ^j	450
	1 ^c	470
<i>hemachalana</i>	11 ♂	430-470 (451)
	8 ♀	470-508 (486)
	1 ^k	501
<i>tarimensis</i> ^l	—	(447)
<i>turcomanus</i> ^m	1 ♂	455
	1 ♀	475
<i>nikolskii</i>	6 ♂	410-430 (419.5)
	5 ♀	420-460 (435)
<i>bengalensis</i>	6 ♂	358-370 (363.5)
<i>ascalaphus</i> ⁿ	12 ♂	330-368 (344.5)
	10 ♀	362-390 (372.5)

^aSpecimens measured by me; see footnotes for additional measurements given by Dementiev.

^bType of *hispanus*.

^cNot sexed.

^dMeasurements of *ruthenus* from Dementiev (1951): 17 males, 430-468 (445.6); 22 females, 471-515 (485.4).

^eThe type of *interpositus* measures 465.

^fMeasurements of *yenisseensis* from Dementiev (1951): 18 males, 443-468 (456); 18 females, 473-518 (487).

^gMeasurements of *jakutensis* from Dementiev (1951): three males, 452-468 (458); five females, 475-495 (484).

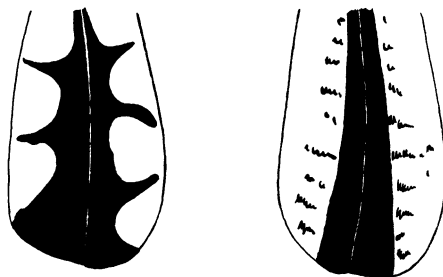


Fig. 1. Pattern of a breast feather in *Bubo bubo ascalaphus* (left) and in the races of the nominate *bubo* group (right).

(344.5) and a tail length of 160–190 (175), as against 425–471 (450) and 230–265 (250.5) in eight adults of *hispanus*, and 425–475 (452), 240–290 (261) in 10 males of *interpositus* (For the measurements of females, see table 1.) The tail is proportionately shorter in *ascalaphus*, being about 50 per cent of the length of the wing, as against about 56 and 58 per cent, respectively, in the other two birds. The tarsus, toes, and claws are relatively weaker in *ascalaphus*, the tarsus and toes relatively less feathered, and the coloration of the tarsus is uniform, not barred with brown as in *hispanus* and *interpositus*. In *ascalaphus*, the feathers of the crown, nape, and breast are bordered laterally with roundish spots which are whitish or pale cream in color and invade the blackish shaft streak, whereas (fig. 1) in all the races of *bubo* the dark pigment is restricted to the region of the shaft only, forming a streak which is almost straight. Generally speaking the pattern of *ascalaphus* appears to be mottled, whereas that of *bubo* appears to be streaked. It is said also that the two owls have a different voice. According to Hartert (1913, pp. 961, 969), the calls of *bubo* are “Uh-huh, huh-huh, oder buh-huh,” whereas those of *ascalaphus* are “bu oder bu, bu, bu.” All these differences suggest that *ascalaphus* and *bubo* may not be con-

^aThe type of “*inexpectatus*” (a synonym of *ussuriensis*) is a male measuring 455.

^bThe type of “*tenuipes*” (a synonym of *kiautschensis*) is a male measuring 435.

^cPerhaps not correctly sexed.

^dType of *hemachalana*, an unsexed specimen, measured for me by Mrs. B. P. Hall.

^e*Tarimensis* was not seen by me, and this average is quoted from Dementiev (1934) who does not mention the sex or number of specimens.

^fMeasurements of *turcomanus* from Dementiev (1951): 20 males, 420–468 (442.5); 17 females, 470–492 (481.5).

^gSpecimens from Africa only; for the measurements and discussion of birds from Palestine, Syria, and Iraq, see text. The type of “*aharonii*” (a hybrid of *ascalaphus* and *interpositus*) measures 410 and is an unsexed specimen.

specific, and several authors, such as Lavauden (1920), H. Heim de Balzac (1926), Cave and Macdonald (1955), and Blanchet (1955), consider them to be separate species, although H. and T. Heim de Balsac [*sic*] later (1954) considered they were conspecific.

Concerning the distribution, both forms occur or have occurred in northern Algeria in the same regions and appear to meet in Palestine. We have no information concerning the present-day distribution at the western end of the range (Algeria and Morocco), but the authors of the nineteenth century make it very clear that both *bubo* and *ascalaphus* inhabited Algeria. Malherbe (1855, p. 14) does not mention *ascalaphus* but states that *bubo* is common in the forests and escarpments ("*lieux escarpés*") of the province of Bône. It is most improbable that such a highly competent author could have confused the two owls. Loche (1867, pp. 100–104) is very explicit. He states that *bubo* is fairly common ("*assez commun*") in Algeria and that *ascalaphus* seems to be about as widespread as *bubo* ("*semble à peu près aussi répandu en Algérie que le Grand-Duc*"). Loche reports *bubo* from Teniet-el-Had, Boghar, and the Djebel Gontas, and *ascalaphus* from Bouçaada [Bou Saâda], the Djebel Zaccar, and the Djebel Balaret. The Djebel Zaccar and the Djebel Gontas are about 80 kilometers southwest of Algiers and only about 10 to 15 kilometers apart. According to Hartert (1913, p. 962) one of Loche's specimens of *bubo* [from Teniet-el-Had] is still in existence in the Milan Museum and is similar to *hispanus*. Rothschild (1918, p. 38) reported a specimen of *bubo*, collected by Paul Dechabert on December 4, 1917, in the forest of Bugeaud near Bône. This specimen, which I have examined, is identical with *hispanus*, as stated by Rothschild, and was collected in the Edough Massif, or from the same region where Malherbe had found *bubo* to be common. Lavauden (1920) has questioned the authenticity of this specimen, stating that the "*silence*" maintained [by Rothschild and Hartert] concerning this specimen and his own private information ("*certain renseignements particuliers*") led him to believe that this record was not authentic. However, Rothschild did report this specimen, as shown above, and it was reported also by Hartert (1921, p. 2194) who, ignoring the equivocal insinuations of Lavauden, remarked that this bird shows that the question of the relationships of *bubo* and *ascalaphus* requires further consideration.

The Rothschild Collection in the American Museum of Natural History contains three specimens of *ascalaphus* from northern Algeria, collected, respectively, at Batna, Constantine, and the Kabylie, two from El Kantara farther south, and three from Morocco, one from

Cape Tres Forcas on the Mediterranean near Melilla, and two from the region southeast of Mogador. The only specimen of *bubo* from Algeria is the one mentioned collected near Bône.

In the Near East, at the opposite extreme of the range, the situation is quite clear. *Ascalaphus* and *bubo* meet and probably overlap in this region, the two forms hybridizing. The hybrids were described as *aharonii* by Rothschild and Hartert (1910, p. 112), although Hartert never acknowledged that *aharonii* represented a hybrid form. He suggested instead (1925, p. 263) that *aharonii* might be a synonym of *ruthenus* (but read *interpositus*, as Hartert believed incorrectly that *interpositus* was a synonym of *ruthenus*). However, the statements made by Rothschild and Hartert when they described *aharonii* (as well as the examination that I have made of its type) leave no doubt that *aharonii* represents a hybrid of *ascalaphus* and *interpositus*. Rothschild and Hartert state that *aharonii* "is by far the most interesting form of Eagle-Owl known to us, inasmuch as it connects the northern Eagle-Owls with the *ascalaphus* group." They had two specimens, the type (which they retained) being "more like a *bubo*," and the other (which they had to return to the collector) being "much more like an *ascalaphus*." A series collected subsequently by Aharoni in Palestine and Syria consists of more hybrids and of specimens similar to both *ascalaphus* and *interpositus*. These specimens were briefly mentioned by Hartert (1925) but never discussed. In view of the interest of this question, I list below all the specimens in the Rothschild Collection from Syria and Palestine with my comments:

1. Gaza, Palestine, December 1, 1916, female, wing, 452, tail, 240; a typical *bubo* in size and color pattern, and probably a winter visitor of *interpositus*.

2. Schoobet el Bum, north Syrian Desert, April 2, 1928, female, 440, 265; color pattern typical of *bubo*.

3. Abu Shushe, "Old Gezer," Palestine, December 27, 1923, female, 440, 245; color pattern of *bubo*.

4. Same locality, October 21, 1912, female, 460, 265; the color pattern is much more similar to that of *bubo*, but the feathers of the nape and breast show a certain degree of cross barring, and the tarsus is less heavily feathered than in *bubo*.

5. Tanaïl, northwest of Damascus, December 19, 1917, female, 425, 250; the wing is too short for *bubo*, especially if the specimen was correctly sexed, but the color pattern is similar to that of *bubo*.

6. Same locality and date, male, 420, 250; same remarks as to size and color pattern as in specimen 5.

7. Same locality, August 29, 1917, male, 423, 220; the measurements are smaller than normal for *bubo*, and the color pattern is intermediate between that of *bubo* and that of *ascalaphus*, but somewhat more similar to that of *bubo*.

8. Wadi Suenit, Jordan Valley, April 5, 1901, not sexed, 410, 220; this is the type of *aharonii*; the measurements are intermediate between those of *bubo* and those of *ascalaphus*, and the color pattern is much more similar to that of *bubo*, although it shows a slight suggestion of the pattern of *ascalaphus*.

9. Same locality, December, 1930, not sexed, 420, 230; intermediate in size and color pattern between *bubo* and *ascalaphus*, but, on the whole, more similar to *bubo*.

10. Gaza, Palestine, February 25, 1911, female, 425, 240; too large for *ascalaphus*, but the color pattern, though it shows a slight suggestion of *bubo*, is much more similar to that of *ascalaphus*. Compare with specimen 1.

11. Palmyra, north Syrian Desert, April 3, 1918, female, 395, 218; the size averages larger than in *ascalaphus*, but the color pattern is typical of *ascalaphus*.

12. Same locality and date, male, 380, 203; the size is larger than in *ascalaphus*, but the color pattern is typical of *ascalaphus*. Compare this specimen and specimen 11 with specimen 2 which is typical of *bubo*.

13. Kanar, Palestine, March 16, 1910, female, 410, 220; size too large for *ascalaphus* but color pattern typical of *ascalaphus*.

14. Rheme, Palestine, April 15, 1910, female, 390, 210; *ascalaphus* in size and color pattern.

15. Rehoboth, near Jaffa, Palestine, October 25, 1923, female, 380, 195; *ascalaphus* in size and color pattern.

16. Dschebe, Palestine, March 23 [no year], male, 365, 195; *ascalaphus* in size and color pattern.

17. Wadi Martaba, south of Beersheba, Palestine, February 2, 1911, female, 350, 190; *ascalaphus* in size and color pattern.

18. Same locality and date, male, 335, 160; *ascalaphus* in size and color pattern.

An additional specimen that I have seen from the collection of the Chicago Natural History Museum is a male collected in November, 1937, at Al Hadithah on the Euphrates in western Iraq; its wing measures 364 and its color pattern is typical of *ascalaphus*.

In my opinion, specimens 1, 2, and 3 represent *bubo*; specimens 11 to 18 and the one from Chicago are *ascalaphus*. The others are hybrids, as they combine to a varying degree the size and color pattern of *bubo* and *ascalaphus*. It is of interest to note that the wing length of specimens 2 and 3 is somewhat smaller than that of female *interpositus*, whereas the wing length of specimens 11 to 18 and of the specimen from Chicago averages distinctly longer than that of typical *ascalaphus* from Africa (table 1). Also, in the north Syrian Desert we find specimens with the color pattern of both *bubo* and *ascalaphus*. One cannot be certain that the birds listed were local birds, but *bubo* is not migratory, especially in the southern parts of its range, and *ascalaphus* is strictly resident. However, vagrants of *bubo* are known, and specimen 1 was probably a winter visitor of *interpositus*.

To summarize, it seems to me that *ascalaphus* is best considered to be conspecific with *bubo*, the conclusion reached by Hartert (1924, p. 17) in his final comment on this question. To be sure, the two forms may overlap (they definitely did so about 100 years ago) at the western end of the range without showing any sign of interbreeding, but in the east, at the opposite end of the range, they apparently do interbreed freely and, moreover, the convergence in size suggests a certain amount of gene flow, although individuals may not show any detectable sign of hybridization in the color pattern.

REVIEW OF THE SUBSPECIES

1. *Bubo bubo ascalaphus* Savigny, 1809, type locality, Upper Egypt, with *desertorum* Erlanger, 1897, type locality, Djebel Sidi Ali ben Aoun, Tunisia, as a synonym. The type locality of *desertorum* is not in southern Tunisia, as stated by Peters (1940), but in central Tunisia in the foothills of the Atlas east of Feriana at about latitude 35° N. by about longitude 9° 25' E.

The characters of *ascalaphus* are discussed above. It ranges from the shores of the Mediterranean south to about latitude 20° N. in Mauretania (Tabrinkout), the regions of Tombouctou, Agadés, Kordofan, and Khartoum, the Sinai Peninsula, and from Palestine and Lebanon eastward to the Syrian Desert, upper Euphrates in Iraq, and the region of Hufuf in eastern Arabia. I suspect that it also inhabits other suitable regions on the Arabian Plateau and in western Arabia.

I am unable to accept *desertorum*. This form is recognized as a valid subspecies by many authors, but it seems to me that this name distinguishes merely the paler individuals of *ascalaphus*. These authors may have been influenced by Hartert, who states that it is "obvious" that *desertorum* is a valid subspecies (1924, p. 17), but he had been most hesitant before this to acknowledge its validity. Meinertzhagen (1954, p. 313) recognized *desertorum* but with the remark that it is "most puzzling, and dependent on climatic conditions," and it is recognized by Peters (1940), who had much trouble also in defining its range, stating that *ascalaphus* and *desertorum* "appear to inosculate, the distribution of the two forms being very closely linked with environment; the former is a bird of the semi-desert areas, the latter one of the absolute desert." This statement is correct only in a very broad sense, as is shown below.

The 38 adults that I have examined show that individual variation is very high in the degree of color saturation and that dark individuals inhabit the desert or arid regions and vice versa. A very striking in-

stance of the lack of correlation between the coloration and the climate is furnished by one specimen from Azazga in the Kabylie in northern Algeria and one from Laghouat in the northern Sahara. The specimen from Azazga is quite distinctly paler than the one from Laghouat, although the region of Azazga is wetter by far, the wettest in North Africa; this region receives an annual rainfall which varies between 1250 and 1500 mm. (about 50 to 60 inches), as against an annual average of less than 250 (about 10 inches) for Laghouat. Specimens from the type locality of *ascalaphus* can be dark or pale, which is acknowledged by Peters (1940). The only specimen that I have seen from central Tunisia (the type locality of *desertorum*) is relatively dark. It matches perfectly some topotypes of *ascalaphus*, and Hartert (1924) acknowledges that specimens from the southern slopes of the Atlas in Tunisia "are not of the very palest form" and states that a specimen from Gabés, much farther south and in the desert, "agrees almost better with paler specimens of the northern darker form," while another from Gabés is pale. Among other instances of individual variation from any one region or locality, I may mention that the specimens from Palestine vary from dark to very pale and that in two birds each from Palmyra in the Syrian Desert and Hufuf in eastern Arabia, one in each pair is clearly darker, although the two from Hufuf average the palest of all. The latter are much paler than those of the southern Sahara despite the statement of Ticehurst and Cheesman (1925, p. 23) that the populations of Hufuf and the Aïr are identical. Pale birds predominate in the more arid regions, but it is very evident that the birds of these regions (Laghouat, Gabés, Ahaggar, Aïr, Egypt, southern Palestine, and the Syrian and Arabian deserts) vary locally in the degree of color saturation. If we consider also the great degree of individual variation, it is apparent that it is quite unsound to recognize more than one subspecies in the populations of the *ascalaphus* type. I accordingly recognize only *ascalaphus* Savigny, very clearly differentiated morphologically from all the races of the nominate *bubo* type.

2. *Bubo bubo hispanus* Rothschild and Hartert, 1910, type locality, Spain. This race is similar to nominate *bubo*, but the ground coloration is paler, less tawny, especially below, and the under parts are also more sharply streaked, vermiculated, and barred. It averages a little smaller (table 1). The range of *hispanus* seems to be restricted now to the Iberian Peninsula but apparently extended formerly to north-western Africa (see above). The population of the Pyrenees is said to be intermediate in characters between *hispanus* and nominate *bubo*.

3. *Bubo bubo bubo* Linnaeus, 1758, type locality, Sweden, with *meridionalis* Orlando (1957, p. 54), type locality, southern Italy, as a synonym. This race is dark, richly colored, and the most tawny, and inhabits continental Europe from about the Arctic Circle in Norway and Sweden, Finland, southern Kola Peninsula, and the Gouvernement of Archangel where it ranges north to about latitude 64° 30' N., southward to Pomerania, central Germany, the Rhineland to south-eastern Belgium, eastern, central, and southern France to Italy and Sicily, and through central and southeastern Europe to Greece. It intergrades with *ruthenus* in northern Russia in the basin of the upper Mezen River and in the eastern parts of the Gouvernements of Gorki, Tambov, and Voronezh, and intergrades with *interpositus* in northern Ukraine.

Orlando states that the birds he has seen from southern Italy and Sicily show a tendency to be smaller than nominate *bubo* and are duller, with a paler ground coloration, and more narrowly streaked. The only specimen that I have examined from southern Italy (Puglie) is not distinguishable from specimens from northern Italy, France, Germany, Scandinavia, and western Russia, but, in view of the clinal variation, I believe that the birds of southern Italy and Sicily probably show a tendency along the lines indicated by Orlando. However, such a tendency would not necessarily be of taxonomic importance, and, until further study, *meridionalis* is best synonymized with nominate *bubo*, as Orlando's comparative material was very insufficient, and he seems not to have been aware of the degree of individual variation shown by nominate *bubo* in northern Europe.

4. *Bubo bubo ruthenus* Zhitkov and Buturlin, 1906, type locality, Promzino, Gouvernement of Ulyanovsk, eastern Russia. This race replaces nominate *bubo* in eastern Russia from about latitude 66° N. in the Pechora Basin south to the upper Don and the lower Volga. It is intermediate in coloration between nominate *bubo* and *sibiricus*, but, judging by the two specimens I have seen, is quite clearly distinct from either. *Ruthenus* should not be confused with *interpositus* (as was done by Hartert in 1925), as *interpositus* is darker than *ruthenus*, distinctly more yellowish, less gray, and its brown pattern is darker, heavier, and more regular. The entire color pattern of *interpositus* is brighter, richer, and more contrasting than that of *ruthenus*, but *interpositus*, though very well characterized, is an intermediate race. This is indicated by its name and, as Rothschild and Hartert (1910, p. 111) stated, it is intermediate between nominate *bubo* and *turcomanus*. However, I cannot agree at all with these authors that *inter-*

positus is more similar to *turcomanus*, as I find that it is undoubtedly much more similar to nominate *bubo*. *Interpositus* resembles *hispanus* somewhat in coloration but is paler, more yellowish, and more sharply and brilliantly patterned with brown.

5. *Bubo bubo interpositus* Rothschild and Hartert, 1910, type locality, Eregli, southern Turkey, with *armeniacus* Nesterov, 1912, type locality, Armenia, as a synonym. This race is discussed in part above and compared to *ruthenus*. It differs from nominate *bubo* by being paler and more yellow, less ferruginous, and by having a sharper brown pattern; from *turcomanus*, to which it shows a certain tendency, by being very much darker and less yellow, and also by being much more sharply and heavily patterned with brown. *Interpositus* ranges from southern Russia, south of nominate *bubo*, with which it intergrades in northern Ukraine, from Bessarabia and the steppes of the Ukraine north to the Gouvernement of Kiev and the region south of Kharkov, eastward to the Crimea, the Caucasus, and Transcaucasia to northwestern and northern Iran (Elburz, region of Tehran, and probably the southern Caspian districts), and through Asia Minor south to Syria and Iraq but not to the Syrian Desert where it is replaced by *ascalaphus*. The latter and *interpositus* hybridize from western Syria south to southern Palestine, as stated above in the general discussion of the relationships of *ascalaphus* and *bubo*.

Specimens from Iraq are not available to me (other than a specimen of *ascalaphus* mentioned above), but I believe Allouse (1953, p. 75) is incorrect in calling the birds of Iraq *nikolskii*. The birds of that country were called *ruthenus* by Ticehurst (1922, p. 416; 1926, p. 106), after he had compared specimens from Iraq with others from Trebizond in Turkey and had showed them to Hartert. However, *interpositus* and *ruthenus* were confused by Hartert with each other, as stated above, and are not synonymous. The birds of Turkey are *interpositus*, not *ruthenus*, and the error of Ticehurst and Hartert was corrected by Steinbacher (1935, p. 382). It is possible, however, that *interpositus* grades into *nikolskii* in southeastern Iraq, as Zarudny (1911, p. 209) states that *nikolskii* is resident in neighboring Khuzistan in Iran, but Allouse (*loc. cit.*) gave no reason for referring all the birds of Iraq to *nikolskii*. I believe that he is not acquainted with *nikolskii* which, until this study (see below), was known from only two specimens in the Leningrad Museum that were collected by Zarudny.

Three specimens that I have seen from the Caucasus and one specimen each from Karaj and Tehran in northern Iran suggest that a cline of decreasing color saturation starts in the Caucasus and continues to

Iran, as these birds become slightly paler than those of Turkey, more yellowish, and more narrowly streaked with brown on the nape and breast. They show a slight tendency towards *nikolskii* but are much more similar to *interpositus*.

The synonym (*armeniacus*) of *interpositus* mentioned above was overlooked by Hartert and Steinbacher and brought to my attention by Peters (1940). *Armeniacus* is a new description of *interpositus* by Nesterov, who was unaware of the existence of *interpositus* described two years earlier.

6. *Bubo bubo sibiricus* Gloger, 1833, type locality, the Urals, with *baschkirikus* Sushkin, 1932, type locality, western Urals in the vicinity of Ufa, as a synonym. This race replaces *ruthenus* in the western Urals and ranges eastward across western Siberia to about the Ob, where it begins to intergrade with *yenisseensis*. Its more typical individuals are found in western Siberia and are the most beautiful and striking of all the Eagle Owls. They are very white, with a much reduced brown pattern, and *sibiricus* is the palest race by far.

Dementiev (1951) mentions *baschkirikus* in the discussion of *sibiricus*. He evidently considers it to be invalid and a synonym of *sibiricus*, although he does not formally synonymize *baschkirikus* with *sibiricus* or any other race. Johansen (1956) states that *baschkirikus* is an intermediate form more similar to *sibiricus*, and this is confirmed by the specimens I have seen from the Urals. Six of seven birds from that region vary somewhat individually in coloration and some show a slight tendency towards *ruthenus*, but taken in series they are much more similar to *sibiricus*. Hence, I believe that the intermediate *baschkirikus* is best synonymized with *sibiricus*, the type locality of which is also the "Urals." The exception consists of a bird that was collected at "Blagoslovenka" by Zarudny on December 5, 1888, and that is identical with a true specimen of *turcomanus* from the Kirghiz Steppes. I have not found Blagoslovenka on my maps, but, judging by the coloration of the specimen, I suspect it is somewhere south of Orenburg. The other six specimens are: one collected in the "vicinity of Ufa" on September 13, 1891, which is probably a paratype of *baschkirikus* as it was labeled *baschkirikus* by Sushkin himself and formed part of his collection; four collected in the Urals in 1911 at some unspecified date or locality; and one from Orenburg itself taken on September 27, 1887.

7. *Bubo bubo yenisseensis* Buturlin, 1911, type locality, Krasnoyarsk, with *zaissanensis* Khakhlov, 1915, type locality, Saur Range south-east of Zaisan Nor, as a synonym. This race is darker than *sibiricus*,

more grayish and also more tawny, and its dark pattern is better developed than in *sibiricus* but less regular than in the European populations; it differs also from the latter by being considerably paler throughout. *Yenisseensis*, according to Dementiev (1951), inhabits central Siberia from about the Ob eastward to Lake Baikal, north to about latitudes 58° to 59° N. on the Yenisei, south to the Altai, Tarbagatai, the Saur Range, and Tannu Tuva and Khangai in north-western Mongolia, grading into *sibiricus* near Tomsk in the west and into *ussuriensis* in the east at the Koso Gol in northern Mongolia.

The zone of intergradation in Mongolia seems to be very extensive, however, and is not restricted to the region of the Koso Gol. Kozlova (1932, p. 592) reports an intermediate population from the Tola River Valley, east and northeast of Ulan Bator (about 565 kilometers southeast of the Koso Gol), and I have examined two adult specimens that were collected also in the Tola River Valley but southwest of Ulan Bator, one of which is intermediate in coloration between *yenisseensis* and *ussuriensis*, and the other identical with a topotype of *yenisseensis*. These two specimens were collected by the Central Asiatic Expeditions of the American Museum of Natural History, one on May 22, 1922, 30 miles east of Tsetsenwang (the specimen identical with *yenisseensis*), and the other on May 30, 1922, 40 miles southwest of Tsetsenwang, a locality near the Tola River Valley, about 180 kilometers southwest of Ulan Bator. These two specimens were breeding, and the bird taken on May 30 was a female with young, and one of the young that was only a few days old was collected also.

The female taken on May 30 differs from the topotype of *yenisseensis* and the specimen collected on May 22 by being more yellowish throughout and darker above and below and would seem to correspond to the intermediate specimens mentioned by Kozlova. She states that these are intermediate between *yenisseensis* and *dauricus*, but *dauricus* is also an intermediate form which Dementiev (1951) believes is best synonymized with *ussuriensis*; he states that, although *dauricus* is somewhat paler, it does not differ constantly from *ussuriensis*.

The three specimens of *dauricus* that I have seen are quite uniform and are distinctly paler than the good series of *ussuriensis* available to me, but the difference is relatively slight, and I therefore follow Dementiev in synonymizing *dauricus* with *ussuriensis*. Little would be gained by recognizing nomenclaturally this slightly differentiated intermediate form. Nevertheless, *dauricus* is of interest because, together with the birds from the Tola River Valley discussed above, it shows that apparently all the populations of northern Mongolia from

the Koso Gol eastward to southeastern Transbaicalia and neighboring northwestern Manchuria are intermediate in character to a varying degree between *yenisseensis* and *ussuriensis*. This type of geographical variation renders a division for nomenclatural purposes somewhat arbitrary, but in my opinion the birds from the Tola River Valley westward are best called *yenisseensis*, and those from southeastern Transbaicalia eastward, *ussuriensis*. The three specimens of *dauricus* that I have seen consist of an adult collected in southeastern Transbaicalia on the Onon River and is therefore a virtual topotype, as *dauricus* was based on a specimen from nearby Kulusutai, and two other adults collected not very far from the Onon at the Dalai Nor (called also Hulun Nor on some maps) in extreme northwestern Manchuria.

I have not seen specimens from the Saur Range and follow Dementiev (1951) in synonymizing *zaissanensis* with *yenisseensis*.

In southwestern Mongolia from eastern Khangai south to at least the region of Tsagan Nor and perhaps to the Gobian Altai, *yenisseensis* is replaced by an unnamed race which appears to be related to the pale and yellow populations (*tarimensis*) of eastern Sinkiang; perhaps it is not separable taxonomically from the latter. This unnamed form was mentioned by Kozlova (1932, p. 592) who had two adults from the Ongiin-gol River valley in eastern Khangai. She says, "perhaps [they] belong to a new race [but] I am unable to describe it owing to the scantiness of material." The birds of southeastern Khangai are mentioned also by Dementiev (1931, p. 368), who quotes a detailed description of their characters supplied by Kozlova from the manuscript notes of Sushkin. It is of interest to mention, therefore, that there are two birds in the collection of the American Museum of Natural History that probably belong to this unnamed form. They were collected on June 30, 1925, at the Kholobolchi Nor, not far from the Tsagan Nor, in the region north of the Orok Nor and south of the southern slopes of eastern Khangai. Unfortunately the birds are not fully grown, as they are still downy below, with traces of down on the crown, but the nape and back are almost fully feathered and are pale and very ochraceous buff, almost dull orange, and narrowly streaked with dark brown.

8. *Bubo bubo jakutensis* Buturlin, 1908, type locality, Yakutsk. This race differs from *yenisseensis* by being darker above and more heavily marked with brown, but the dark pattern is more diffused, less sharp, than in *yenisseensis* and, according to Dementiev (1951), it is whiter below and more heavily vermiculated than *yenisseensis*. It inhabits northeastern Siberia, from southern Yakutia north to about latitude

64° N., west in the basin of the Vilyui to the upper Nizhnyaya Tunguska, and east to the coast of the Sea of Okhotsk from Magadan south to the Gulf of Udskeya. It has been reported farther north, from the regions of Elgen on the upper Kolyma and of Yeropol on the upper Anadyr, but the Eagle Owl is not found in Kamchatka or north of the Verkhoyansk Range.

The only specimen that I have seen from the breeding range is a young female collected near Yakutsk on August 31, 1925, and in this juvenal plumage it is very buffy throughout and heavily barred below, considerably darker than an adult would be. In addition, I have examined also an adult female which appears to be a specimen of *jakutensis*. It was collected on January 15, 1940, at Anta in northern Manchuria, and its coloration corresponds to the diagnosis of *jakutensis* given by Dementiev. Its wing length measures 490, a measurement (see table 1) that corresponds better to the measurements of female *jakutensis* than to those of female *ussuriensis* in which the wing length averages 470.5 in the birds I have measured, but 483 in those measured by Dementiev (1951). The other birds that I have seen from northern and central Manchuria, some of which were collected during the breeding season or labeled "resident" by the collector, are *ussuriensis* and are quite distinctly darker with much more extensive and diffused markings than the specimen from Anta. They consist of eight specimens, and among these is a female with a wing length of 475 that was also collected at Anta but on March 5, 1939, or at the beginning of the breeding season.

I have discussed the specimen taken at Anta in January, because no migratory movements have been reported for *jakutensis*. However, although the Eagle Owl is not migratory, some individuals from the northern populations wander during the breeding season, and I believe that this specimen is an individual of *jakutensis*, the race that inhabits the coldest part of the range of the species.

9. *Bubo bubo ussuriensis* Poliakov, 1915, type locality, southern Ussuriland, with the following synonyms; *borissowi* Hesse, 1915, type locality, Sakhalin; *dauricus* Stegmann, 1929, type locality, southeastern Transbaikalia; *inexpectatus* Bangs, in La Touche, 1932, type locality, "Chiu Lung Shan" [= Nine-Dragons Hills, near Peking], northern Hopeh; and *inexpectatus* Dementiev, 1933, type locality, Manchuria. This race differs from *jakutensis* by being much darker throughout, and it is darker than *yenisseensis* also. The brown markings on the upper parts of *ussuriensis* are much more extensive and diffused than in *jakutensis* or *yenisseensis*, with the result that the white markings

are much less conspicuous in *ussuriensis* than in the other two races. The under parts are also more buffy, much less white, and more heavily streaked and vermiculated in *ussuriensis*, and its measurements (table 1) are also a little smaller. *Ussuriensis* ranges from southeastern Siberia, south of the range of *jakutensis*, southward through eastern Transbaicalia, Amurland, Sakhalin, Ussuriland, and Manchuria to northern Shensi, northern Shansi, and northern Hopeh, and, according to Gizenko (1955), breeds also in the southern Kuriles.

I have not examined specimens from Sakhalin and follow Dementiev (1951) in synonymizing *borissowi* with *ussuriensis*. The populations of Sakhalin and of the southern Kuriles are also called *ussuriensis* by Gizenko (*op. cit.*). The validity of *dauricus* is discussed above, and I agree with Dementiev (1951) that this slightly differentiated intermediate form is best synonymized with *ussuriensis*. I believe also that Steinbacher (1935, p. 384) was correct in synonymizing *inexpectatus* with *ussuriensis*.

Bangs (1932, pp. 113–114) and Dementiev (1933a, p. 394) described *inexpectatus* inadvertently and independently by publishing a manuscript name of Sushkin in discussing the characters of some specimens from northern China and Manchuria. Bangs states that Sushkin had written this name on the labels of two birds during his visit to the Museum of Comparative Zoölogy, a male from Shansi which, I find, had been collected at “Kiaochunghsien” [probably Kowchuanchen] in northern Shansi, and one from northern Hopeh which Bangs states is the type of *inexpectatus* because Sushkin had told him “that he meant to describe the Chihli [= Hopeh] bird as new and call it ‘*inexpectatus*.’” Bangs saw only birds from northern China, and Dementiev saw only specimens that had been collected in Manchuria along the Manchurian branch of the Trans-Siberian Railway which had been labeled *inexpectatus* by Sushkin. However, I find that the specimens from northern China labeled *inexpectatus* by Sushkin, which were kindly lent to me by the Museum of Comparative Zoölogy, are identical with specimens that I have examined from Manchuria which were also collected along the railway, some of them at the same localities as the specimens labeled *inexpectatus* by Sushkin. *Inexpectatus* Dementiev is thus a synonym of *inexpectatus* Bangs, but the question remains whether this form differs taxonomically from the population of southern Ussuriland. I have not seen specimens from Ussuriland, but I doubt very much that *inexpectatus* is valid, as one of Sushkin’s birds was collected only 130 kilometers from the frontier of southern Ussuriland, and I note that Dementiev subsequently (1951) made no

mention of *inexpectatus*, not even as a synonym, when he included, in the range of *ussuriensis*, those regions in Manchuria from whence he had seen Sushkin's specimens. In 1933 (1933a), when he had inadvertently described *inexpectatus*, he remarked that this form required further study and should be compared to neighboring forms (i.e., *ussuriensis*). Bangs (*loc. cit.*) had made no mention of *ussuriensis* and compared *inexpectatus* only to the populations of Korea, Shantung, the lower Yangtze, and southern China which are *kiautschensis* (see below).

10. *Bubo bubo kiautschensis* Reichenow, 1903, type locality, Shantung, with the following synonyms: *setschuanus* Reichenow, 1903, type locality, Szechwan; *tenuipes* Clark, 1907, type locality, southern Korea; *swinhoei* Hartert, 1913, type locality, northern Kiangsi, lower Yangtze Valley; *jarlandi* La Touche, 1921, type locality, southern Yunnan; and perhaps *yamashinai* Momiyama, 1930, type locality, Hokkaido. This race is much darker, more tawny and rufous, and smaller (table 1) than *ussuriensis*. It resembles nominate *bubo* from Europe rather closely in coloration but differs from it by being paler, more mottled, and less heavily marked with brown on the upper parts, by having narrower dark shaft streaks on the under parts, which average also duller and more ocher, and by averaging smaller. The toes are said to be less heavily feathered in this race, but a constant difference is not confirmed by the material that I have seen. It ranges from Korea and China, south of the range of *ussuriensis*, southward to Kwangtung and Yunnan, and inland to Szechwan and southern Kansu, the birds of southern Kansu and also from the Tsinling Range in southern Shensi showing a slight tendency towards *tibetanus*.

The subspecific status of the populations of Korea and of China, south of the range of *ussuriensis*, requires further study, but a thorough study has been handicapped so far by a lack of abundant material. The material in existence in American or European museums is scanty, deficient in data, and scattered, but the specimens that I have been able to gather suggest strongly that only two subspecies, in addition to *ussuriensis*, inhabit Korea and China. One of these (*kiautschensis*) is dark, very rufous, and relatively small; the other (*tibetanus*) is larger, paler, grayer, and much less rufous. The larger and paler *tibetanus* is relatively dark, however, and is more or less similar to *ussuriensis* in coloration but is more heavily and broadly streaked with darker brown on the nape and breast, and, on the whole, is darker.

Bubo bubo setschuanus was based on a single specimen from "Szechwan," and Hartert (1913, p. 966), who examined it, synonymized

this name with *kiautschensis*. However, Steinbacher (1935, p. 384) does not agree with Hartert and states that the characters of the type of *setschuanus* correspond to the description of *tibetanus*, except that it is "perhaps smaller." Steinbacher would apparently synonymize *setschuanus* with *tibetanus*, but I believe he is wrong and that Hartert was correct. I have not seen a specimen from Szechwan, but Reichenow stated that his specimen was very dark ("*sehr dunkel*"). Its measurements seem too small for *tibetanus*, the wing length of this specimen (which apparently was not sexed) measuring 440 mm., according to Hartert (*loc. cit.*), as against 450, 460 in males, 470 in an unsexed specimen, and 465, 495, 502 in the females of *tibetanus* that I have measured. Furthermore, *tibetanus* is distinctly paler than *kiautschensis*. The type locality, "Szechwan," is not explicit enough to help in our relegating *setschuanus* to *kiautschensis* or *tibetanus*. The province of Szechwan is very extensive and was even more so in Reichenow's time,¹ as it then extended to the Yangtze north to about latitude 33° N., or to the eastern part of the Tibetan Plateau. This vast region varies from the wet and semitropical lowlands of the Red Basin to more arid and very high mountains and steppes, but, if one may judge by the coloration and size of the type of *setschuanus*, this form appears to be invalid and a synonym of *kiautschensis*, as stated by Hartert.

Although I agree with Hartert as far as *setschuanus* is concerned, I believe that his own *swinhoei* is also invalid and a synonym of *kiautschensis*. Hartert based *swinhoei* on four specimens from the lower Yangtze (Kiukiang) and Fukien, apparently all from the collection of the British Museum, but he did not compare *swinhoei* to *kiautschensis*, and the diagnoses and measurements that he gives for these two forms fail to convince me that they are distinct. At any rate, the specimens that I have compared from the lower Yangtze, Fukien, and Shantung are not separable. Steinbacher (*loc. cit.*) has also questioned the validity of *swinhoei*, suggesting that it is a synonym of *setschuanus* (but see above).

The four specimens that I have seen from Korea, which consist of the type and paratypes of *tenuipes* and of a specimen collected subsequently, do not differ constantly from the birds that I have seen from China. The four from Korea vary individually; two are pale and two are dark, the darker birds consisting of the type and one paratype

¹ The western half of the old province of Szechwan was included subsequently in a very large and newly created province called Sikang, but Sikang has been eliminated by recent administrative changes, thereby adding further to the confusion.

slightly paler than the type. These two dark birds are darker above than all the specimens from China but can be matched below by some Chinese birds. A taxonomist who would have seen only the two dark birds would probably recognize *tenuipes*, but the two paler birds from Korea match most of the specimens from China, which include two from Shantung, one of them a topotype of *kiautschensis*. Hartert (1931, p. 967), who had seen the type of *kiautschensis*, could not mention any differences after comparing it to two birds from Korea in the collection of the British Museum. The two birds seen by Hartert and the two pale ones that I have mentioned suggest that the population of Korea does not differ constantly from that of China and that *tenuipes* is a synonym of *kiautschensis*, a conclusion reached already by Steinbacher (*loc. cit.*).

Three of the four specimens that I have seen from Korea were collected in December and February; the fourth has no date. They could represent a mixed series of resident and winter visitors, as a colleague has suggested to me. However, it seems improbable that all the four paler birds seen by Hartert or me had wandered north to Korea from China, if it be assumed that these, rather than the two dark birds, are visitors. Furthermore, there is no evidence of migration in Korea, where the species is resident, according to Austin (1948, p. 147), and it is known that some individuals from Korea and also Sakhalin can be pale or dark. The Japanese authors (see below) speak of a "pale phase" in connection with *tenuipes* (Korea), and it seems also that such a phase occurs in Sakhalin. Hesse (1915, p. 366) based *borrisowi* from Sakhalin on two dark individuals similar to nominate *bubo*, and Clark, when describing *tenuipes*, stated also that it was dark and similar to nominate *bubo*. Dementiev (1951) synonymized *borissowi* with *ussuriensis*. In short, it seems to me that *tenuipes*, as well as *borissowi*, was based on an individual variant.

The population of Korea is said to be resident, but some individuals may occasionally wander to Japan. Austin (1953, p. 474) states that *Bubo bubo* "has been taken only three times in Japan," twice in Hokkaido and once in the Goto Islands off western Kyushu. "A hand-list of the Japanese birds" (1942, p. 97) mentions also a record for Amami Oshima and refers all the birds taken in Japan to *tenuipes*, but with the remark that the committee who wrote the list are aware that "*B. b. tenuipes* is considered to be a synonym of *B. b. kiautschensis* . . . [but] we have no latter specimens to our disposal to settle the point in question." One of the two birds taken in Hokkaido was named *yamashinai* by Momiyama, but the "Hand-list" Committee

states that *yamashinai* is invalid and represents the "Pale phasel" of *tenuipes*. It seems to me that one cannot overlook the possibility that this specimen, as well as the other one taken in Hokkaido, may have been a vagrant *ussuriensis* from Sakhalin or the southern Kuriles and that *yamashinai* is in fact a synonym of *ussuriensis*, not of *kiautschensis*. This question can perhaps be settled by a reëxamination of the type of *yamashinai*, provided it is still in existence. Austin (1953, p. 289) states that Momiyama's collection was "somewhat neglected and scattered after World War II; the remainder is now in the Yamashina Museum."

The last form to be considered is *jarlandi*. This name was bestowed by La Touche on a bird that was given to him as a nestling and that died while still young, as the plumage retains traces of down. I have seen the specimen and agree with Peters (1940) that the alleged subspecific differences represent the juvenal plumage of *kiautschensis*. The reduced barring on the primaries mentioned also by La Touche varies enormously individually in *kiautschensis*.

Hartert (1913, p. 966) mentions that two specimens in the Rothschild Collection from the Tsinling Range in southern Shensi are somewhat paler than is normal for *kiautschensis*. I find that these two specimens, and also a specimen collected 100 miles southwest of Lanchow in southern Kansu, show a tendency towards *tibetanus*, but the tendency is slight, and the specimens are much more similar to *kiautschensis* in every way.

11. *Bubo bubo tibetanus* Bianchi, 1906, type locality, upper Yangtze in the region of Yushu, southern Tsinghai. The subspecific characters of *tibetanus* are mentioned above in the discussion of *kiautschensis*. Its range extends from central and eastern Tibet eastward through Tsinghai to the mountains in the region of Liangchow (now called Wuwei) in central Kansu, and southward from Tsinghai through Sikang to extreme northwestern Yunnan, from whence I have seen a specimen collected in November in the Tseh Chung Mountains at about latitude 28° N. by longitude 99° E.

This specimen is slightly paler above and below than a specimen collected a little southeast of Litang (now Lihwa, at about latitude 30° N. by longitude 100° 18' E.) in the Malashi region of eastern Sikang, but is a little darker than specimens that are virtual topotypes of *tibetanus* that were taken in the region of Seshu (about latitude 33° N. by longitude 98° E.) in northern Sikang, at about latitude 34° N. by longitude 97° E., and at about latitude 35° N. by longitude 95° E. in Tsinghai. The last two specimens are females and are very large, their

wing length measuring 495 and 502. The specimen from Yunnan measures 450 and is said to be a female. If correctly sexed, the wing length of this bird is similar to that of female *kiautschensis*, which averages about 454, but it may have been a male as the wing length of the other two birds, which are males, measures 450 and 460. Nevertheless, the size probably decreases and the color saturation apparently increases from north to south, which suggests that *tibetanus* grades into *kiautschensis*.

12. *Bubo bubo hemachalana* Hume, 1873, type locality, Kotgarh, northern Punjab, with *auspicabilis* Dementiev, 1931, type locality, Kirghiz Range, as a synonym. This race differs very distinctly from *tibetanus* by being much paler. It is much less brown above, the dark pattern being reduced and the white pattern much more developed on a strongly yellowish ocher background; the under parts of *hemachalana* are paler also than in *tibetanus*, are more yellowish, and, on an average, are less heavily streaked and vermiculated with brown. *Hemachalana* resembles *turcomanus* in coloration and is about similar to *yenisseensis* in the general degree of color saturation, but it differs from *turcomanus* by being paler, less yellowish, above, and its brown streaks are sharper on the hind crown and nape, and are heavier, longer, and broader below, the color pattern of *hemachalana* being brighter than that of *turcomanus* and more varied throughout. *Hemachalana* differs from *yenisseensis* by being much more yellow on the rump, under tail coverts, and outer tail feathers, rather than grayish or whitish, and the ground coloration of its body is more yellow, less grayish, above, and is less whitish below. The four races mentioned are all large and about similar in size, with the exception of *turcomanus* which averages a little smaller. The range of *hemachalana* extends from the western Himalayas, and Tibet west of *tibetanus*, with which it probably intergrades, westward to the Tian Shan system in Russian Turkestan, west to the Kara Tau, north to the Dzungarian Ala Tau, east to at least the Tekkes Valley in Chinese Turkestan, and south in Sinkiang to the regions of Kashgar, Yarkand, Qarghalig, and probably the western Kun Lun. This bird is partly migratory, descending to the plains of Turkestan with the cold weather, and apparently reaches northern Baluchistan, as a specimen, which I have seen, taken at Quetta on October 27 is *hemachalana*.

The status of this bright and splendid montane race has been very badly misunderstood in the literature, as virtually everyone has confused *hemachalana* with *turcomanus*. For instance, Meinertzhagen (1927, p. 604) has combined under the name *turcomanus* specimens

that belong to no fewer than four well-differentiated subspecies (*kiautschensis*, *tibetanus*, *hemachalana*, and *nikolskii*), although he had not seen a single *turcomanus*, but relied for his appreciation of *turcomanus* on its original description, which is inadequate, and the color plate furnished by Menzbier [1894 (1888–1894), pl. 8a]. This plate is good but not diagnostic, as the bird depicted could represent any one of three yellowish races (*hemachalana*, *turcomanus*, and *nikolskii*). Dementiev (1931) was the first to establish the fact that the birds of the Tian Shan are distinct from *turcomanus*, and, as he remarks, it is quite impossible to rely on the literature in view of the prevailing confusion.

Dementiev (1931) named the birds of the Tian Shan *auspicabilis*, but he had not seen a specimen of *hemachalana* and remarked that the relationship of these two forms required further study. The description of *auspicabilis* was justified in my opinion, as it was an attempt to place the form of the Tian Shan on a solid basis, because Hume's description of *hemachalana* is very meager, and Dementiev believed, in common with all other authors, that the type of *hemachalana* was no longer in existence. Prior to my present study the status of *hemachalana* could be expressed only in a way similar to that of Peters (1940, p. 117), namely, "Range not known; validity uncertain . . . In the absence of the type specimen and with only a very meagre diagnosis to fall back on, it seems very doubtful whether Hume's name can be used for any race of *Bubo bubo*; it may be an earlier name for *auspicabilis* or *tibetanus*, or it might apply to an endemic race in extreme north-western India."

However, the type of *hemachalana* is still in existence and is diagnostic. Mrs. B. P. Hall of the British Museum writes to me that it was discovered in the collection after Peters wrote his comments; it had escaped attention because Hume failed to label it *hemachalana* (it is well known that Hume often failed to identify his specimens). But, as Mrs. Hall tells me, it was the only specimen that Hume had, and it was collected during "the right year" [1872] at Kotgarh in northern Punjab on the border of Kulu.

Mrs. Hall compared the type for me with the series of *Bubo bubo* in the British Museum, and two specimens, which she says "match it pretty well," were lent to me, the one from Quetta mentioned above and the other from Kashgar in Sinkiang. These two specimens match very well the great majority of the specimens in the fine series of 17 birds in the Rothschild Collection from Turkestan. Those that differ do so only very slightly and consist of two or three that are darker and one or two that are paler than the two birds compared to the type of

hemachalana. Despite a certain amount of individual variation, to be expected, the series of 19 birds can be well characterized by the diagnosis of *hemachalana* that I have given above. The birds from Turkistan, some of which are virtual topotypes of *auspicabilis*, show, of course, that this name is a synonym of *hemachalana*, but my findings have been anticipated by Dementiev (1951) who synonymized his own *auspicabilis* with *hemachalana*.

13. *Bubo bubo tarimensis* Buturlin, 1928, type locality, Lop Nor, Tarim Basin, Sinkiang. This race has not been examined by me and is not mentioned by Dementiev (1951), but in a paper published earlier (1934) he discussed *tarimensis* in detail and considered that it was valid. In the 1934 paper, Dementiev states that *tarimensis* is similar to *omissus* (a form that I believe is not separable from *nikolskii*; see below) in its general "desert" coloration, being very pale and yellowish, but paler yellow, more buffy, and less darkly streaked and vermiculated with brown than *omissus*. He states also that the color pattern of *tarimensis* is duller and less contrasting and that *tarimensis* appears also to be slightly larger than *omissus*, the average wing length measuring 447 mm. in *tarimensis*, as against 435 in *omissus*.

The specimens of *tarimensis* seen by Dementiev were collected in the Sinkiang desert north of the Astin Tagh and south of the eastern Tian Shan (at Niya Oasis, Lop Nor, and Hami) and in the northern Zaidam in Tsinghai (Ghaz Kul and Gashun Nor). Other specimens from the southern Zaidam and the region south and north of the Koko Nor are more or less intermediate in coloration between *tarimensis* and *tibetanus*, according to Dementiev.

The range of *tarimensis* may extend to southwestern Mongolia, as the two young pale and yellow birds that I mention above in the discussion of *yenisseensis* may belong to this race. The populations farther north in Mongolia are probably intermediate in coloration, as is suggested by the two adults mentioned by Kozlova from eastern Khangai which would appear to represent a form intermediate in coloration and more or less similar to the intermediates between *tarimensis* and *tibetanus* mentioned by Dementiev in 1934. The characters of these two specimens were mentioned earlier by Dementiev (1931, p. 368), when he quoted from a paper of Kozlova (not available to me) in which she states (translation) that the two specimens "resemble *tibetanus* at first glance, but the coloration of the upper parts is paler, inclining toward orange and is not brownish."

14. *Bubo bubo turcomanus* Eversmann, 1835, type locality, Ust Urt Plateau between the Aral and Caspian seas, with *eversmanni* Dementiev.

tiev, 1931 type locality, Aral Sea and southern Ural Steppes, as a synonym. This race is compared above to *hemachalana*, which it replaces in the hills, lowlands, steppes, and semi-deserts of Kazakhstan. The range of *turcomanus* extends, according to Dementiev (1951), from the region between the lower Volga and lower Ural, eastward across the southern Kirghiz Steppes, north to the Mugodzhary Plateau and the region of Karaganda, to the region of Semipalatinsk, south to the Mangyshlak Peninsula, the Ust Urt Plateau to Kara Bogaz Bay, and farther east to the basin of the Chu. It is partly migratory or, at any rate, wanders to some extent, because specimens have been collected in the winter at Astrakhan, the southeastern corner of the Caspian Sea, the bed of the western Uzboy in Turkmenia, and on the lower Amu Darya. *Eversmanni* was synonymized with *turcomanus* by Dementiev in 1951. The only two specimens of *turcomanus* that I have seen consist of one from the region south of Orenburg and one from the Kirghiz Steppes, which I mention above in the discussion of *sibiricus*.

15. *Bubo bubo nikolskii* Zarudny, 1905, type locality, Bakhtiari, southwestern Iran, with *omissus* Dementiev, 1933, type locality, Ashkhabad, southern Transcaspia, as a synonym. This race is very similar to *turcomanus* in coloration but is somewhat more yellowish and a little duller, but the subspecific character that separates it clearly from *turcomanus* or any other race of *bubo* (with the exceptions of *ascaphus* and *bengalensis* which are smaller still, but are not closely related to *nikolskii*) is its small size. In the measurements given in table 1, the wing length of *nikolskii* averages from 23 to 46.5 mm. shorter than in *turcomanus*.

Prior to this study, *nikolskii* was known from two specimens only, a male and a female collected by Zarudny in the western Zagros in February, 1904. According to Zarudny, these specimens are similar to *turcomanus* but are less heavily streaked and vermiculated with brown below, and are smaller, the male having a wing length of 378 and the female one of 393.7. The female cotype was measured again by Dementiev (1933a) who found that its wing length was 403 and who named the specimens he had from Transcaspia *omissus* because they were larger, less yellowish, and more heavily streaked than the cotype of *nikolskii*.

Bubo bubo nikolskii remained, however, "shrouded in mystery" as Ticehurst states (1926, p. 106), until two new specimens (reported here for the first time) were collected by Koelz in 1941 at Durud, Luristan, not far from the type locality of *nikolskii*. They are males with a

wing length of 420 and 425. One, collected while "breeding," was taken on March 7 and the other on June 11. They show that *omissus* is a synonym of *nikolskii*, as these two birds are identical in size and coloration, including the streaking, with specimens collected by Zarudny in eastern Iran and by Koelz in Afghanistan. Among these is a male taken by Zarudny at Iman Quli in the Kopet Dagh in northern Khorasan on August 19, 1898. Iman Quli is only 60 kilometers south of Ashkhabad, the type locality of *omissus*.

The range of *nikolskii* appears to extend from the Balkhan Mountains and Kopet Dagh in southern Transcaspia eastward to the Kuh i Tang in southeastern Uzbekistan or to perhaps southwestern Tadzhikistan, then southward to Iran, Afghanistan, and Baluchistan south to the region of Kalat, or at about latitude 29° N. In Iran, *nikolskii* is replaced by *interpositus* in the north, as stated above, and probably also in the northwest, and probably by *hemalachana* in Badakhshan in northeastern Afghanistan north of the Hindu Kush. The birds of southern Tadzhikistan found west of the Pamirs are more or less intermediate between *omissus* [= *nikolskii*] and *hemachalana*, according to Dementiev (1951).

This race is not well known, and I therefore list below the specimens I have seen, with the name of the collector, dates, and wing measurements:

IRAN

SOUTHWEST (ZAGROS): Luristan, Durud, March 7 and June 11, 1941, males, 420, 425; Koelz.

SOUTHEAST (BALUCHISTAN): Bampur, August 10, 1898, female, 440; Zarudny.

SOUTHEAST (BALUCHISTAN): Murgak, June 26, 1898, male, 410; Zarudny.

EAST (EASTERN KHORASAN): Kart, October 19, 1898, male, tips of the primaries clipped; Zarudny.

NORTHEAST (NORTHERN KHORASAN): Iman Quli, August 19, 1898, male, 420; Zarudny.

AFGHANISTAN

NORTHWEST: Andkhui, November 22, 1937, female, 420; Koelz.

NORTH (AFGHAN TURKESTAN): Balkh, September 18, November 28, and December 1, 1937, male, 412, females, 435, 460; Koelz.

CENTER: Shibar Pass, northwest of Kabul, June 30, 1937, immature female, 405; Koelz.

EAST: Bagrami, Kabul Valley east of Kabul, October 2, 1937, female, 420; Koelz.

SOUTHEAST: Gazhni, October 8, 1937, male, 430; Koelz.

16. *Bubo bubo bengalensis* Franklin, 1831, type locality, northern India, ". . . Ganges between Calcutta and Benares." This owl, which

is virtually restricted to India, is not a Palearctic form, as it ascends up to only about 5000 feet, perhaps somewhat higher, on the lower slopes of the Himalayas, the range then extending south to Cape Comorin (but not to Ceylon) and from North West Frontier Province and Sind to Assam, the only record outside of India consisting of a single bird taken about a hundred years ago in Arakan in Burma. A few authors consider that *bengalensis* is not conspecific with *bubo*, for instance, Dementiev (1951), who acknowledges, however, that the two are closely related. I follow the overwhelming opinion in retaining it in *bubo*, as it replaces the latter geographically, has the same color pattern, and seems to have more or less similar habits.

Bengalensis is small (table 1) and about similar in size to *ascalaphus* which it resembles also by having about the same tail and wing ratio (52, as against 50, see above, in *ascalaphus*, and 56 and 58 in *hispanus* and *interpositus*), relatively weak tarsus, toes, and claws, and the tarsus and toes less heavily feathered and less barred with brown than does *bubo*. The tarsus is uniform in coloration in *ascalaphus* and is uniform, or tends to be, in *bengalensis*. However, despite these similarities, which probably represent instances of convergent adaptation, it is clear that *bengalensis* is only distantly related to *ascalaphus* and is more closely related to *bubo* with which it shares the same streaked plumage, not the mottled one of *ascalaphus*.

Whistler and Kinnear (1935, p. 234) have remarked that *bengalensis* varies a good deal individually in coloration. Such color variation is confirmed by the specimens that I have seen, some of which are very dark brown above and others pale and yellowish. On the darker birds the streaks coalesce, or tend to, on the hind crown and nape, but are sharply defined and relatively narrow in the paler birds. A similar variation is shown by the ground color of the under parts which varies from very buffy to relatively grayish and is more or less heavily streaked with brown on the breast. Despite this individual variation, *bengalensis* differs from the neighboring races (*tibetanus*, *hemachalana*, and *nikolskii*) by being considerably darker and more richly colored and of course much smaller.

Bubo africanus

The African Eagle Owl ranges from southern Arabia, northeastern Africa, the Sudan, and the dry belt and grasslands south of the Sahara to French Guinea and possibly Gambia, south to Cape Province, but is lacking in the heavy equatorial forest or in dense mountain forests. It varies geographically, and three subspecies are recognized: *milesi*

in southern Arabia, nominate *africanus* from about the Equator southward, and *cinerascens* in the rest of the range, the last-named ranging northward into the Aïr and Ennedi Massifs in the southern Sahara. The species has a gray and a brown phase and its individual variation is great, especially in the brown phase.

Niethammer (1957, p. 278) has recently described a single bird collected in the Ennedi as a new subspecies, naming it *kollmannspergeri*, but the validity of this subspecies requires confirmation. I consider that *kollmannspergeri* is a synonym of *cinerascens* Guérin-Méneville, 1843. This specimen is of the brown phase and, according to Niethammer, differs from three specimens of the same color phase of *cinerascens* by being paler ("wüstenfarbig") and by having narrower dark bands on the tail and broader and whiter bars on the primaries. Two of his comparative specimens are from Abyssinia, and the third is from the Bahr el Abiad [= White Nile]. Niethammer is aware that a single specimen is inadequate but supports his decision to name a new "desert race" by stating that Hartert (1924, p. 16) had mentioned that two specimens from the Aïr were paler than one specimen from Hausaland, northern Nigeria, and one from Abyssinia; Niethammer states that the specimen from Hausaland represents "typical" *cinerascens*. However, the type locality of *cinerascens* is not northern Nigeria but Abyssinia, which is very far removed. The type locality was restricted to Aduwa in northern Abyssinia by Grant and Mackworth-Praed (1937). Also, the specimen from Hausaland does not come into consideration, because it is the gray phase and of course is not "typical" *cinerascens* as stated.

A new subspecies based on color differences should not be described in *Bubo africanus* from a single specimen, as the individual variation is very great, as Hartert (*loc. cit.*) emphasized, much greater than Niethammer suspects. For instance, in nine specimens of the brown phase that I have seen from northeastern Africa (the correct type locality of *cinerascens*), some vary from quite dark, or rufescent, to very pale and "sandy," and the two birds from the Aïr (which also vary somewhat individually), which Niethammer believes represent *kollmannspergeri*, fall about halfway in the range of individual variation between the dark birds and the pale birds from northeastern Africa. The width and color of the bars on the tail and primaries vary very much individually, and no two specimens that I have seen from the Aïr, northern Abyssinia, or northern Somaliland are alike. Niethammer states that the color tone of *kollmannspergi* corresponds exactly to that of *Bubo bubo ascalaphus* and that of *Strix butleri*. However, it is very clear from my discussion of *ascalaphus* above that this owl also varies

a great deal individually, and the two specimens of *butleri* that I have seen fall also, as far as the color tone is concerned, within the range of individual variation of the series of *cinerascens* from northeastern Africa. In other words, although I have not seen *kollmannspergeri*, I feel confident that it is very probably invalid and is a synonym of *cinerascens* Guérin-Méneville.

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