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## Systematic Notes on Palearctic Birds. No. 5 Corvidae

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The following notes are observations made during a revision of the Corvidae for a contemplated check list of the Palearctic region. They consist chiefly of brief discussions of the forms that in my opinion are not valid, or require confirmation, or are not sufficiently well differentiated to warrant nomenclatural recognition. With the exception of an occasional older form, these forms have been described since the partial revision of Hartert and Steinbacher (1932, *Die Vögel der paläarktischen Fauna*, suppl. vol., pp. 3–30). These notes include also remarks on distribution and variability and discussions of some forms the status of which, whether as separate species or not, is disputed, for instance as in the case of *Corvus corax* and *C. ruficollis*. The genus *Pyrhcorax* was reviewed in a separate publication.<sup>1</sup>

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### *PERISOREUS*<sup>2</sup> *INFAUSTUS*

This species was divided into 14 races by Sushkin and Stegmann (1929, *Jour. Ornith.*, vol. 77, pp. 384–406) with one additional race from Anadyrland which they refrained from naming but which was later formally described as *sokolnikowi* by Dementiev (1935, *Alauda*, p. 154). I have not examined all the various races, but, as Johansen states (1944,

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<sup>1</sup> Vaurie (1954, *Amer. Mus. Novitates*, no. 1658).

<sup>2</sup> Not *Cractes* Billberg, 1828, a synonym of *Garrulus* Brisson; see Zimmer (1944, *Auk*, vol. 61, p. 647).

Jour. Ornith., vòl. 92, pp. 20–21), it is evident that the geographical variation follows several clines, and the number of described races is clearly excessive. Generally speaking, the populations become grayer and larger and the red patch on the wing and the color of the crown darker as the populations range farther east, and the whole plumage becomes darker and more rufous and the red patch on the wing larger as they range from north to south in the west as also on the Pacific.

In a cline running from northwest to southeast in the west, three races can be recognized, in the following order: nominate *infaustus*, *ruthenus*, and *opicus*; in another cline running from west to east in the southern part of the range, only *rogosowi* and *sibericus*. Two very slightly different races, *caudatus* Buturlin, 1913, northern Mongolia, and *tkachenkoi* Sushkin and Stegmann, 1929, Yakutia, are better merged as synonyms with *sibericus*. These two races are, properly speaking, intermediates, and *caudatus* which seems to be intermediate between *rogosowi* and *sibericus* requires confirmation as it is known, apparently, from only a very few specimens, perhaps only the three specimens mentioned by Sushkin and Stegmann. Of these three specimens, these authors state that the type is in full molt and would appear to me not to be diagnostic, and one of the other two is immature. *P. i. tkachenkoi* is slightly darker than *sibericus* and intermediate between this race and the three races of the Pacific which in their degree of saturation, starting with the lightest, are *varnak*, *sakhalinensis*, and *maritimus*.

The races in the northern part of the range in Siberia are found chiefly north of the Arctic Circle from Arctic Urals to Anadyrland. They start with *ruthenus* in the west and become progressively paler as they range farther east to the basins of the Yana, Indigirka, and Kolyma, the cline becoming somewhat reversed at the eastern limits of the range. East of *ruthenus* it is amply sufficient to recognize but *ostjakorum* and *yakutensis*, treating *monjerensis*, west of the Lena, and *bungei*, between the lower Lena and the lower Kolyma (both described by Sushkin and Stegmann in 1929), as synonyms of *yakutensis* Buturlin, 1916. Of these two, *monjerensis* is a pure intermediate between *ostjakorum* and *yakutensis*, but *bungei* (not examined) is apparently slightly darker and less grayish than *yakutensis*, but according to Dementiev (1933, L'Oiseau, p. 744) still requires further study. The ranges of *yakutensis* or "*bungei*" and *sokolnikowi* (Anadyrland) are apparently not continuous. The validity of *sokolnikowi* has been questioned (see Johansen, 1944), and I have not examined it, but this isolated population is said to have the bill distinctly shorter and broader than in any other known population of the species,

and the comparative measurements given by Dementiev, if valid, seem diagnostic.

### *GARRULUS GLANDARIUS*

For a division of *G. glandarius* into groups of subspecies, see Stresemann (1940, Ornith. Monatsber., vol. 48, pp. 102–104) and for a detailed study of the clinal variations in the nominate *glandarius* group, see Voous (1953, Beaufortia, vol. 2, pp. 1–41). This species shows many instances of minor local variations which in my opinion are not of taxonomic importance. These, together with a high degree of individual variation in some regions, suggest that a fairly rigorous nomenclatural treatment is advisable.

#### THE NOMINATE *glandarius* GROUP

The nomenclatural status of some of the populations of western Europe is much disputed. Mayaud (1936, Inventaire des oiseaux de France, p. 101) refers all the populations of France, with the exception of those of the west, which he calls *rufitergum*, to nominate *glandarius*. Kleiner (1938, L'Oiseau, p. 149) has correctly remarked that some specimens from France, Belgium, and the Netherlands are not separable from *albipectus* of Italy, and I can add that I have examined such specimens from Normandy, Fontainebleau, and south central France. Other specimens examined by me are, however, identical or virtually so with nominate *glandarius*. Meinertzhagen (1947, Bull. Brit. Ornith. Club, vol. 68, p. 19) has proposed that the populations of southern Scotland, England, Germany, Switzerland, Belgium, the Netherlands, France, and northern Italy be united under the name *germanicus* C. L. Brehm. In 1953, Voous stated that the populations of France, western Switzerland, Belgium, and the Netherlands are "intermediate to a different degree between *albipectus* and *glandarius* as also between *albipectus* and *rufitergum*," and proposed that they be called *armoricanus* Lebeurier and Rapine described from Brittany. This last form, however, is a peripheral and quite distinct race which is stated to be uniformly colored above as in *rufitergum* but still darker and more rufous above, apparently as in *hibernicus* from Ireland.

All these authors are correct to a certain extent, but the situation is not nearly so confused as it appears to be from their statements. A large series examined from Germany shows that the large majority of the specimens are identical with or very close to nominate *glandarius* from Sweden, and Meinertzhagen seems to be mistaken in proposing to unite the population of Germany with that of England (*rufitergum*), which, I find, is fairly constant and perfectly separable in series from nominate

*glandarius*. As stated by Voous the populations of France, Belgium, and the Netherlands are the most troublesome in that they are mixed and do not agree in series with nominate *glandarius*, *albipectus*, or *rufitergum*. Since, as stated above, it would be very misleading to call them *armoricanus* and they do show, after all, many specimens that are extremely similar to nominate *glandarius*, it seems wisest to refer them nomenclaturally to this last race.

*Garrulus glandarius armoricanus* Lebeurier and Rapine (1939, L'Oiseau, p. 219, Finistère) and *G. g. caledoniensis* Hazelwood and Gorton (1953, Bull. Brit. Ornith. Club, vol. 73, p. 1, Scotland) should be merged under *hibernicus* Witherby and Hartert, 1911, Ireland. These three maritime peripheral populations, subject to similar conditions of increased humidity and rainfall, have become deeply saturated to about the same degree. They are somewhat larger in size as they range farther north but are most constructively treated as a single polytopic subspecies. Wing length: *armoricanus*, according to Lebeurier and Rapine, 30 specimens, 165–180 (174.6); 27 specimens of *hibernicus* measured by me, 175–190 (182); *caledoniensis*, according to Hazelwood and Gorton, 14 specimens, 184–201, no average given.<sup>1</sup>

*Garrulus glandarius lusitanicus* Voous (1953, Beaufortia, vol. 2, p. 39, Salamanca). The material that I have examined from Spain is more limited than the material examined by Voous, but it does not confirm the validity of *lusitanicus*. Voous has separated under this name the populations of Portugal and northwestern Spain, stating that they are paler above and white, not grayish, on the abdomen as in *fasciatus* from eastern and southern Spain. I find, however, that three specimens from near Salamanca and from Riaño north of Leon are identical with the type and two topotypes of *fasciatus* (Sierra Nevada) and another specimen from Valencia. It may be added that Witherby (1928, Ibis, p. 406) states that he has examined specimens from all parts of the Peninsula and finds that they are not separable.

*Garrulus glandarius ichnusae* Kleinschmidt, 1903, Sardinia. This race is very poorly differentiated and, according to the material examined, could be synonymized with *fasciatus*. Of 12 specimens examined two are very distinctly more rufous and more saturated throughout and are in fact identical with *corsicanus*. The other specimens are about equally

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<sup>1</sup> In a recent publication received after the above was written, Meinertzhagen (1953, Bull. Brit. Ornith. Club, vol. 73, p. 41) states that *caledoniensis* "can be matched exactly by specimens from Tring, the type locality of *rufitergum*." I had not examined specimens from Scotland and had accepted the statement of its authors that *caledoniensis* was a well-saturated form related to *hibernicus*.

divided between specimens that are identical in coloration with *fasciatus* and others that are slightly more rufous, less grayish above, than this last race. The streaks on the crown average, however, somewhat less broad than in *fasciatus*. *G. g. ichnusae* is somewhat smaller than *fasciatus*, but the difference is not well marked, and there is a great deal of overlap. Wing length in adults measured by me: *fasciatus*, 176, 176, 179, 180, 181, 185, 192 (181.3); *ichnusae*, 168, 172, 174, 175, 176, 176, 176, 177, 180, 181, 182, 188 (177.5).

*Garrulus glandarius yugoslavicus* Voous (1953, Beaufortia, vol. 2, p. 39, Hercegovina, Yugoslavia) is not sufficiently distinct to warrant nomenclatural separation from *albipectus* Kleinschmidt, 1920, Tuscany. Voous states that the population of Yugoslavia is similar in coloration with the population of Italy but is "decidedly larger. Length of wing of 6 males 186–192 (average 188.8), against 172–184 (average 176.4) mm. in 5 Italian males." This difference, however, is not confirmed by a larger series of adult males measured by me from Italy: 177, 180, 180, 184, 185, 185, 186, 188, 195 (184.4). A single breeding male examined by me from Hercegovina has a wing of 184 and is identical in coloration with *albipectus*. Four fall birds from Sarajevo and one January bird from Albania are not separable from nominate *glandarius* from Sweden, but these specimens may be winter visitors.

*Garrulus glandarius cretorum* Meinertzhagen (1920, Bull. Brit. Ornith. Club, vol. 41, p. 19, Crete), *G. g. graecus* Kleiner (1939, Bull. Brit. Ornith. Club, vol. 59, p. 71, southern Greece), and *G. g. ferdinandi* Kleiner (1943, Aquila, vol. 50, p. 369, eastern Bulgaria). I have not examined specimens from Bulgaria, but the populations from Crete and Greece are not very well differentiated, the population of Crete being only slightly darker below but showing less or no white on the abdomen. The population of Bulgaria is said to be somewhat paler than the population of Greece, but von Jordans states that they are very similar (1940, Mitt. K. Naturwiss. Inst. Sofia, vol. 13, p. 66), and Niethammer finds that they are "extraordinarily similar" (1943, Jour. Ornith., vol. 91, p. 189). Under the circumstances the slight difference does not seem to be of taxonomic importance and *ferdinandi* must be synonymized with *graecus*.

Stresemann (*in litt.*) tells me that the jay from Bulgaria is typical nominate *glandarius*, that specimens from Greece are hardly separable from *cretorum*, and that in his opinion *graecus* should be synonymized with *cretorum*. My comparative material from Greece and Crete shows the difference noted above but is very limited. A larger series permitting one to judge the range in individual variation may show that the nomenclatural separation of the population of Greece is not warranted. Strese-

mann states also that he does not believe *albipectus* reoccurs in Yugoslavia.

#### THE *cervicalis* GROUP

Stresemann (1940) includes the populations of the Saharian, Middle, and Grand Atlas (*oenops* = *minor*) in the nominate *glandarius* group, but in my opinion *minor* belongs zoogeographically to the *cervicalis* group, being connected through *whitakeri* to *cervicalis* proper.

The populations of north Africa are apparently very sedentary, and some of them, isolated by stretches of unsuitable territory, show several instances of local minor variations. *G. g. cervicalis* is constant, *G. g. whitakeri* less so, and *G. g. minor* the least so. These forms have been discussed by Meinertzhagen (1940, Ibis, p. 125). In the *minor* complex, the population of southern Algeria (*minor* proper described from Djelfa) is slightly paler below than the population of the Grand Atlas in Morocco (*oenops*), but I do not agree with Meinertzhagen that it is nearest to *whitakeri* (Rif and Tlemcen). Meinertzhagen (1939, Bull. Brit. Ornith. Club, vol. 59, p. 67) has separated as *theresae* the population of the Middle Atlas (Azrou), chiefly on the basis of its being paler than that of the Grand Atlas, but two topotypes of *theresae* that I have examined and four other specimens examined from Aïn Leuh and the Tarseft Pass in the region of Azrou average larger than, but are identical in coloration with, specimens from the Grand Atlas, most but not all of the specimens being in worn plumage. Meinertzhagen emphasizes that only specimens in fresh plumage should be compared, but contrary to his opinion I believe that it is not constructive to load the nomenclature with "races," the supposed characters of which can be discerned only during a brief period following the molt.

In 1940 Meinertzhagen discussed minor local differences. He states that there are differences in the streaking of the crown in birds from Azrou and near-by Oulmes and that the latter are smaller, 165–166, as against 165–178 at Azrou. In specimens that I have examined from the region of Azrou, the streaks are distinctly narrower in specimens from Azrou proper than in specimens from near-by Aïn Leuh and the Tarseft Pass and are narrowest in specimens from Azilal farther south. It would lead much too far to separate nomenclaturally all these populations, some of which appear to be relatively inconstant, and I believe therefore in treating them as a single subspecies, the oldest name of which is *minor* Verreaux, 1857, not preoccupied by *G. minor* Dumont, 1822, a *nomen nudum*. Size variation in the Grand and Middle Atlas in specimens measured by me: wing length: Grand Atlas, 154, 155, 159, 163, 164, 164, 164,

164, 164, 167, 167, 168; Azilal, 160, 165; Middle Atlas, Azrou, 163, 173; near Azrou, 165, 167, 167, 176.

*Garrulus glandarius whittakeri* Hartert, 1903, Tangier. This form occurs in the Rif and again in the region of Tlemcen in western Algeria. The two populations are probably discontinuous and differ slightly in coloration, the population of Tlemcen being slightly grayer on the breast. It is also smaller: wing length: Tlemcen, 170, 172, 174, 174, 175, 175, 177; Tangier and the Rif, 175, 179, 180, 180, 182, 184, 186, 187, 190.

#### THE *atricapillus* GROUP

The regions in which *Garrulus glandarius atricapillus* Geoffroy St. Hilaire, 1832, Lebanon, and *G. g. krynicki* Kaleniczenko, 1839, Caucasus, meet and replace each other are not known with certainty, but they appear to be from northern Kurdistan eastward to the south of Azerbaijan. A large series that I have examined from Azerbaijan west to Lake Urmia is identical with topotypical *krynicki*. No specimens were examined west of the lake, but Ticehurst (1927, Jour. Bombay Nat. Hist. Soc., vol. 32, p. 376) finds that in near-by northern Iraq (region of Dohuk) the population is nearer to *krynicki* than it is to *atricapillus*.

The following appear to be synonymous with *krynicki*: *anatoliae* Seebohm, 1883, Asia Minor; *zervasi* Kleiner (1939, Aquila, vols. 42-45, p. 543, Mytilene); *chiou* Kleiner (1939, *ibid.*, vols. 42-45, p. 544, Chios); and *samios* Kleiner (1939, *ibid.*, vols. 42-45, p. 544, Samos). No specimens from the Aegean islands are available, but the three "new races" which are stated by their author to be similar to *krynicki* are based on very insufficient material (two specimens in two cases; three, which are not constant, in the third case) and cannot be accepted until the slight differences on which they are based are shown not to fall within the range of individual variation of *krynicki*, which is rather wide. Sassi (1937, Verhandl. Ornith. Gesell. Bayern, vol. 21, p. 95) states that it is still open to question whether or not an intermediate (*anatoliae*) can be recognized between *krynicki* and nominate *glandarius* in western Asia Minor, but Kummerlöwe and Niethammer (1934, Jour. Ornith., vol. 82, p. 528) find that the population of this region is identical with *krynicki*.

*Garrulus glandarius iphigenia* Sushkin and Ptuschenko, 1914, southern Crimea. Barabasch (1933, Ornith. Monatsber., vol. 41, p. 55) has identified as *iphigenia* a single specimen taken in August at Dnepropetrovsk along the lower Dnieper in southeastern Ukraine, but I find that a first year bird taken in May at the same locality has a whole white crown with streaks as in nominate *glandarius* and, though grayer and less vinous, is extremely similar to this form.

*Garrulus glandarius caspius* Seebohm, 1883, Lenkoran, Russian Talych. Whether or not this form should be recognized as a separate subspecies as are other hybrid races of *G. glandarius* with an extensive range (*severtzowi* and *pekinensis*) is open to question. The specimen of *caspius* that I have examined and all the records that I know of are from the type locality. Furthermore, according to Stresemann (1940), this population is but a true mixed population that shows in large series all possible intermediates between the characters of *krynickyi* and *hyrcanus*. The wing length of *caspius* does not, however, overlap that of *krynickyi*, though it does a good deal that of *hyrcanus*: *krynickyi*, 24 adults measured by me, 184–203 (194.5); *caspius*, according to Kleiner (1939), 162, 165, 168, 173, 174, 174, 175, 182, 183, 185, 185 (175); *hyrcanus*, according to Stresemann (1928, Jour. Ornith., vol. 76, p. 337), 164, 165, 167, 168, 168, 168, 168, 168, 170, 172, 173, 175, 176 (169.4).

#### THE *brandtii* GROUP

Many races have been separated from *G. g. brandtii* Eversmann, 1842, Altai, but all have been reduced to synonyms in recent years. The most disputed is *bambergi* Lönnerberg, 1909, northern Mongolia. The authors who accept *bambergi* do so as being slightly differentiated from *brandtii*, but they do not agree as to its characters. Some authors state that *bambergi* is brighter and paler above, but other authors such as Kozlova (1933, Ibis, p. 62) deny this and state that it is more grayish below. There is also conflict in the statements of range. For instance, Stegmann (1931, Jour. Ornith., vol. 77, p. 216) states that *bambergi* is the form of Amurland and Ussuriland, whereas Dementiev (1933, L'Oiseau, p. 741) identifies these populations as *brandtii*, correctly so as shown by my comparison of specimens from the Altai, Amurland, and Ussuriland. My series of 40 specimens includes also specimens from Manchuria, Sakhalin, and Hokkaido. Individual variation is considerable, and, even in skins of comparative age, paler or darker specimens or specimens that are more or less rufous or grayish occur at the same locality or in the same region. I have not examined specimens from northern Mongolia, but this range in individual variation suggests that *bambergi*, which admittedly is but slightly differentiated, is probably not valid.

Seven of the specimens examined are from Hokkaido and they confirm the opinion of Voous (1945, Limosa, vol. 18, p. 12) that *pallidifrons* described from this island is not valid. The other synonyms of *brandtii* are *ussuriensis* (Ussuriland) and *taczanowskii* (Sakhalin), already synonymized with *brandtii* by Dementiev (1933), and *okai* (Korea) and



*kurilensis* (Kuriles) synonymized with *brandtii* in the "Hand-list of Japanese birds" (1942, p. 5).

#### THE *bispecularis* GROUP

Three populations, *rufescens* Reichenow, 1897, northern Yunnan; *minhoensis* Kleiner (1939, *Aquila*, vols. 42-45, p. 185, western Szechwan); and *rubrosus* Kleiner (1939, *ibid.*, vols. 42-45, p. 186, Hankow, lower Yangtze Valley), have been separated from *sinensis* Swinhoe, 1871, "South China westwards to Szechuen." However, a large series of 60 specimens examined from all parts of the range, with the exception of northeastern Burma, shows that individual variation is great but that geographical variation is slight if the specimens are compared in series. The more western and the more inland populations (northern Yunnan, western Szechwan, and the Tsing Ling Range in Shensi) are identical and average darker and grayer on the mantle than specimens from the upper Yangtze Valley (Chungking to Wanhhsien) and from eastern China, but both series contain many identical specimens (see also Riley, 1926, *Proc. U. S. Natl. Mus.*, vol. 70, p. 64; 1931, *ibid.*, vol. 80, p. 26). Under the circumstances, *rufescens*, of which *minhoensis* is a pure synonym, cannot be separated from *sinensis*.

The palest specimens examined are from the lower Yangtze Valley (from Ichang through Hankow to Kiukiang), but these populations (*rubrosus*) are the most inconstant and contain dark specimens that fit in the range of individual variation of the populations mentioned above. The populations of China are said to be non-migratory, but they may wander in the Yangtze Valley after the breeding season. Until breeding birds can be studied from this region and the range of individual variation properly evaluated, it is best not to recognize *rubrosus*.

#### THE *japonicus* GROUP

*Garrulus glandarius namiyei* Kuroda, 1922, Tsushima Island, is a synonym of *japonicus* Temminck and Schlegel, 1848, Japan. Kuroda stated that the population of Tsushima had a thicker bill that averaged longer than in *japonicus* but the differences are much too slight to be of taxonomic importance. According to Kuroda the height of the bill at the level of the nostrils is 13-13.5 in *namiyei* as against 11-12.5 in *japonicus* and the length of the culmen 30-31 as against 27.5-32. However, in six specimens from Japan measured by me the height of the bill is 11.5, 12, 12, 12.5, 12.5, 13, and according to Taka-Tsukasa (1931, *Tori*, vol. 7, p. 110) the length of the culmen is 29.5-30.5 in *japonicus*.

*Garrulus glandarius hiugaensis* Momiyama, 1927, southern Kyushu, requires confirmation. This form is said to be darker than *japonicus*, with the hind part of the crown suffused with brown. I have not examined specimens from Kyushu. However, in two specimens from the Izu Peninsula, the population of which (*shimoizumii*) is said to be not separable from that of southern Kyushu according to the "Hand-list of Japanese birds" (1942, p. 6), only one specimen has the hind crown suffused with brown. The other specimen is identical with *japonicus*. Both specimens from the Izu Peninsula are slightly darker above, but not below, than *japonicus*, but the difference is extremely slight.

#### CYANOPICA CYANUS

The validity of *Cyanopica cyanus gili* Witherby, 1923, requires confirmation. Witherby separated under this name the populations of Portugal and western Spain from those of central and eastern Spain (*cooki* Bonaparte, 1850), stating that in *gili* the gloss of the crown was bluish rather than purplish and the upper parts were grayish not brownish. These differences are precisely those caused through foxing, and Witherby's diagnosis is not valid, as it was based on the comparison of freshly collected fall skins with worn and foxed specimens, some of them (Tring Collection) one hundred years old. In 1933, Witherby informed Ticehurst and Whistler (Ibis, p. 99) that the two forms were not separable in spring plumage for the "grey-wash" of *gili* had worn off by then and no further mention is made of the color of the gloss. I find, however, that unfoxed fall specimens of *cooki* from eastern Spain are identical with a paratype of *gili* in similar plumage taken also in the fall. *C. c. gili* requires further discussion for its validity is upheld by Jordans and Steinbacher (1942, Ann. Naturhist. Mus. Wien, vol. 52, p. 205) who base their opinion on a comparison of worn specimens taken at the end of May and in early June in southern Portugal, which they identify as *cooki*, with fresh October birds from western Spain, which they identify as *gili*. If Witherby is correct as to the changes caused through wear, such a comparison is open to question. The reasoning of Jordans and Steinbacher is not very convincing, and, as they themselves state, the breeding range of "*gili*" is still uncertain.

#### PICA PICA

The populations of *Pica pica* that breed in eastern Asia from the middle and lower Amur southward constitute in my opinion but a single subspecies (*sericea* Gould, 1845, Amoy). Four additional "races" are, however, more or less generally accepted: *japonica* Temminck and

Schlegel, 1848, Japan (where the species is apparently restricted only to northern Kyushu where it was introduced according to the "Hand-list of Japanese birds," 1942); *anderssoni* Lönnerberg, 1923, Hopeh; *jankowskii* Stegmann, 1927, near Vladivostok; and *amurensis* Stegmann, 1927, near Khabarovsk. I have compared topotypical material of *sericea*, *japonica*, and *jankowskii*, and specimens from the range of *amurensis* and find that all the supposedly distinguishing characters (color of the gloss on the wing and tail, various measurements, and shape of the bill) vary individually to about the same extent in all populations. Meise (1937, Jour. Ornith., vol. 85, p. 451) has already found that *amurensis* is a synonym of *anderssoni*, but the validity of *anderssoni* itself is disputed by some authors. I did not examine *anderssoni*, but its indicated characters leave little doubt in my opinion that they fall also within the range of individual variation of the other populations.

Some authors maintain also that *sericea* is not separable from nominate *pica*. It is correct that the supposed characters of *sericea*, more purplish or more violet-blue on the wing and gloss of the tail bluer, do not hold well in long series, but the two are constantly separable on the basis of proportions, the tail being proportionately shorter in *sericea*, about 115 per cent of the length of the wing as against about 130 per cent in nominate *pica*. Farther south and inland (from Tsinghai to the eastern Himalayas) *sericea* is replaced by a very long-winged race (*bottanensis*) with a still proportionately shorter tail, about 102 per cent of the length of the wing.

*Pica pica bactriana*. Dementiev and Ptushenko (1939, Ibis, pp. 507-512) have shown that the range of this eastern race extends farther west into Europe than was hitherto suspected, to the region of Moscow south to the Ukraine, and they also show that *bactriana*, not *fennorum* as stated by Stegmann, is the form of the Caucasus. They state also that *bactriana* is replaced by nominate *pica* in Transcaucasia and northwestern Iran and that Stresemann (1928, Jour. Ornith., vol. 76, p. 343) has found that the population from Gilan in the southern Caspian districts approaches nominate *pica*. Stresemann, however, had but two adults, and he is careful to quote the opinions of Witherby and Buxton that the populations of the southern Caspian are *bactriana*. I have not examined specimens from this region or from Transcaucasia, but, contrary to the findings of Dementiev and Ptushenko, I find that a large series from northwestern Iran and all parts of Azerbaijan is very definitely *bactriana*, not nominate *pica*. It is possible that the fact that the population of Transcaucasia is continuous with the populations of nominate *pica* in Asia Minor will show that the two have intermediate characters, but the populations of the southern Caspian are cut off from nominate *pica* by the populations

extending from northwestern Iran to coastal Azerbaijan. It seems logical to consider that all the Iranian populations, and probably those of Transcaucasia as well, are better referred to *bactriana*.

In *bactriana* clinal changes from west to east are evident, in the increase of the greenish gloss on the secondaries and of the size of the white patch in the wing as the populations range farther east. In view of these changes the population of the eastern Ukraine (described as *kot* by Gavrilenko in 1929) may be intermediate between typical *bactriana* and the western *femororum*, or possibly nominate *pica*, but judging by a specimen examined from Kursk the westernmost populations of *bactriana* are not sufficiently distinct from the eastern populations to warrant their separation.

### PODOCES

*Podoces panderi* Fischer, 1821, Kyzyl Kum, appears to be monotypic. Two races have been separated: *ilensis* Menzbier and Schnitnikow, 1915, Ili River region, and *transcaspius* Zarudny, 1916, Transcaspia. However, comparison of topotypical material of all three fails to show evidence of geographical variation in specimens in comparative plumage. Dementiev (1933, L'Oiseau, p. 74) has already synonymized *transcaspius* with *panderi*.

It has been suggested that *P. pleskei* Zarudny, 1896, eastern Iran, may be conspecific with *P. panderi*. The two forms are geographically representative and are certainly closely related, but coloration and bill characters are very distinct in the two forms, and it seems best to maintain them as separate species.

### PSEUDOPODOCES

*Podoces humilis* Hume, 1871, Sinkiang, seems best treated as monotypic. The population at the eastern end of the range has been separated as *saxicola* Stresemann, 1928, eastern Tsinghai, on the basis of smaller size, relatively shorter first primary, and darker, browner coloration. However, the specimens that I have examined and those reported in the literature vary a great deal individually, and the geographical variation is irregular. Meise (1939, Jour. Ornith., vol. 85, p. 457) gives the wing length as: eastern Tsinghai, 84–92; southern Kansu, 87, 94.5; northwestern Szechwan, 90–96; Kun Lun and western Tibet, 89–99.5. Schäfer (1938, Proc. Acad. Nat. Sci. Philadelphia, vol. 90, p. 208) gives the wing length in Sikang as 89–93, and Meinertzhagen (1927, Ibis, p. 374) as 88–95 in Sikkim. In specimens that I have measured the wing length is 89 in Sinkiang, 89–92 in Koko Nor, 88–94 in southern Tibet. In seven specimens from eastern Tsinghai measured by me the bill length

varies from 20 to 28.5, and Meinertzhagen gives the bill length as 22–25 in Sikkim, 21–26.5 in Sinkiang, and 24–27 in Kansu. The variations in coloration also follow no special pattern, and my lone specimen from Sinkiang matches some of my specimens from eastern Tsinghai.

#### NUCIFRAGA CARYOCATACTES

In this species, *multipunctata* Gould, 1849, is often considered to be a separate species, chiefly on the evidence advanced by Stuart Baker that it breeds in the same regions as *hemispila* Vigors, 1831. Meinertzhagen (1927, Ibis, p. 370) who reviews this "evidence" shows, however, that it is neither reliable nor conclusive and states that in his opinion the two forms are conspecific. Reliable records and the specimens that I have examined show that the two forms replace each other geographically, the ranges being apparently separated by the Pir Panjal Range, the eastern *hemispila* extending westward, south of the range, to Murree, and the western *multipunctata* eastward, north of the range, to Lahul and probably farther. For instance, in northern Punjab all specimens from Lahul are *multipunctata* and all specimens from Kulu are *hemispila*.

The mountain range, apparently, prevents the two forms from coming into contact, but that they occasionally do so and interbreed where a pass may permit is shown by an intermediate specimen in the collection of the American Museum of Natural History. This specimen, collected in 1931, is unfortunately without locality or further date, but it is known that the collector was at that time in either Bashahr or northern Kulu. Meinertzhagen (1927) states that he observed near Simla a similar individual that he failed to collect.

Further observations are required, but the evidence presented here suggests that the two forms are conspecific. Since both of them occur in the northwestern Himalayas it is advisable to restrict the type locality of *multipunctata*, indicated as "northwestern Himalayas," to Kashmir, north of the Pir Panjal Range. The type locality of *hemispila*, indicated as "Himalayas," has been restricted to the Simla-Almora districts by Ticehurst and Whistler (1924, Ibis, pp. 468–473).

The following forms appear either to be invalid or to require confirmation.

*Nucifraga caryocatactes wolfei* von Jordans (1940, Mitt. K. Naturwiss. Inst. Sofia, vol. 13, p. 63, Bulgaria). This form was separated as having the ground color darker and blacker, the white spots averaging smaller and sparser, and the bill shorter and more slender than in nominate *caryocatactes*. I have not examined specimens from Bulgaria, but confirmation is required that these characters are sufficiently distinct and

constant, for they are shown in specimens examined from Yugoslavia, Carpathians, Jura, and the Alps where two older names [*relicta* Reichenow, 1889, Alps, and *leptorhynchoides* Luzecki (?), 1906, Bucovina], correctly regarded as synonymous of nominate *caryocatactes*, are available.

*Nucifraga caryocatactes altaicus* Buturlin, 1915, Altai, and *N. c. sassii* Keve (1943, Anz. Akad. Wiss., Vienna, vol. 80, p. 17, Baikal Mountains) are not or are probably not separable from *macrorhynchos*. Numerous Russian authors (see bibliography given by Grote in 1947, Ornith. Beobach., vol. 44, p. 90) have studied this species and have failed to detect evidence of constant geographical variation in the populations of Siberia and neighboring regions. Stegmann (1931, Jour. Ornith., vol. 79, p. 146) states that *altaicus* falls within the range of individual variation in *macrorhynchos*. I have not examined specimens from the Baikal region, but specimens examined from near-by northern Mongolia are not separable from *macrorhynchos*, and it is probable that specimens from the Baikal region will be found to fall also within the range of individual variation of *macrorhynchos*.

*Nucifraga caryocatactes kamtschatkensis* Barrett-Hamilton, 1898, is doubtfully distinct from *macrorhynchos*. I did not examine it, but it may be provisionally retained as valid for Stegmann (1931) finds that although its stated characters (white tips to the primaries) are not constant it is somewhat paler below.

*Nucifraga caryocatactes yunnanensis* Ingram, 1910, is best considered to be synonymous with *macella* Thayer and Bangs, 1909. The populations of northern Yunnan and northern Burma (*yunnanensis*) differ from those farther east in China (*macella*) only by averaging larger, wing 202–223 (212) in 20 specimens as against 196–215 (206) in 19 specimens, but the overlap in individual measurements is very great, the measurements of 15 of 20 specimens overlapping. There is no difference in the tail length: *yunnanensis* 132–150 (139), *macella* 130–152 (138).

#### CORVUS MONEDULA

The systematic treatment of the populations of the *monedula* type of this species has suffered in recent years from extravagant splitting. In the 1935 Berajah, Kleinschmidt proposed four new names applied to specimens from, respectively, the region of Vilna, East Prussia, central Germany, and the Rhine. In 1938, Dunajewski (Acta Ornith. Mus. Zool. Polonici, vol. 2, p. 150) described a "new" race from eastern Poland. It is not clear what the ranges of the forms proposed by Kleinschmidt are, but the populations in the regions cited by him and Dunajewski would,

at best, be intermediate, with ill-defined characters. In 1939, Kleiner (Bull. Brit. Ornith. Club, vol. 60, pp. 11-14) divided the populations of the *monedula* type into 10 "races," three of them "new": *ibericus*, Iberian Peninsula; *nigerrimus*, Morocco; *pontocaspicus*, Cyprus, Asia Minor, and neighboring regions.

Examination of topotypical series of *nigerrimus* and *pontocaspicus* shows that these races are not valid. Sufficient material from Spain was not available, but the stated characters of *ibericus* (grayer below, less glossy than *spermologus*) would hardly seem to be sufficiently well indicated to warrant separation, for even authors who are in sympathy with the extreme treatment of Kleiner admit that the difference is "slight" (Voous, 1950, Limosa, vol. 23, p. 283) to "very slight" (Jordans and Steinbacher, 1942, Ann. Naturhist. Mus. Wien, vol. 52, p. 204).

The populations generally combined under the name *soemmeringii* Fischer, 1811, type locality Russia, found from Russia eastward to Siberia, Turkestans, and northwestern Himalayas, and southeastern Europe eastward are divided by Kleiner into *soemmeringii*, *collaris* Drummond, 1846, Macedonia, *pontocaspicus*, and *ultracollaris* Kleinschmidt, 1919, Russian Turkestan. It is correct that in these populations the populations from southeastern Europe (*collaris*) are somewhat lighter gray below than those of Russia and that in the eastern part of the range (*ultracollaris*) individual specimens often are darker and larger than those of Russia, but the characters of these eastern populations are inconstant, and I find in them specimens identical with specimens from Russia and with a series of topotypical *collaris* (see also Ticehurst and Whistler, 1932, Ibis, p. 44). Among the eastern specimens, an entire series of breeding birds from northern Afghanistan is identical with a series from Macedonia, and a series from Cyprus (the type locality of *pontocaspicus*) is not separable from a series from Russia. In view of this inconstant or irregular geographical variation it is wiser to recognize nomenclaturally only one form, *soemmeringii*.

The population of Morocco, on account of its geographical isolation, may possibly be found to be sufficiently distinct to warrant separation and was separated as *nigerrimus* by Kleiner on the basis of being very dark and without gloss and the population of the species with the longest wing length. These characters are not confirmed, however, by specimens that I have examined from Morocco including the type and paratypes of *nigerrimus*. It is obvious that Kleiner did not appreciate the changes caused by wear. All the specimens from Morocco were collected from April 17 to June 12 and are very worn, and Hartert (1926, Mém. Soc. Sci. Nat. Maroc, no. 16, p. 8) is correct in saying that they cannot be

separated from *spermologus* in comparative plumage from France and England. In the specimens from Morocco there is a tendency for the pale collar to be perhaps more often interrupted, but the difference is not constant and should be confirmed by an adequate series of specimens in fresher plumage. The population of Morocco is not "strikingly" larger as stated by Voous (1950) but rather seems inseparable from *spermologus*. I find that the specimens from Morocco measured by Kleiner and other specimens have a wing length in adults of: females, 227, 232, 233, males, 229, 235, 239, 240, 245, unsexed, 232. These measurements are not appreciably larger, if at all, than those of *spermologus* in which the wing length of 54 specimens measures 224–248 according to Meinertzhagen (1926, *Novitates Zool.*, vol. 33, pp. 75–76). In view of these findings I believe that the statement of Voous (1950) that the population of Morocco and eastern Algeria "are strikingly distinct from the S. European ones" is misleading.

The population of eastern Algeria (*cirtensis*) is, however, clearly distinct, differing from the European populations by its very faintly indicated collar, its paler plumage (not darker plumage as stated by Voous), which is purer and bluer slate below, and its distinctly paler, bluer, less purplish crown.

Some authors still recognize *C. m. khamensis* Bianchi, 1906, Sikang, as being distinct from *C. m. dauuricus* Pallas, 1776, Transbaicalia, on the basis that *khamensis* has a longer wing. I have not measured specimens from Sikang, the wing length of which is given by Weigold as 230–249 in 10 specimens according to Meinertzhagen (1926). These measurements do not seem to differ appreciably from those of five adult males of *dauuricus* measured by me from northern Mongolia: 234, 235, 238, 240, 243. Until adequate series of measurements can be compared, I agree with Stegmann (1931, *Jour. Ornith.*, vol. 79, p. 140) that it is best not to recognize *khamensis*.

*Corvus monedula dauuricus* replaces *soemmeringii* east of the Yenisei and is currently treated as conspecific with *C. monedula* but very well may be a separate species. It differs strikingly from all the other forms of *C. monedula* by its white under parts, and, although it apparently comes into contact with *soemmeringii*, it does not seem to interbreed freely, for specimens with intermediate characters are very few.

I have had occasion to reexamine *C. dauuricus* and find, in support of the view that it is probably a separate species, that it differs from *C. monedula* by a clear-cut difference in wing formula. In *C. dauuricus* the first (outermost) primary is distinctly shorter than in the specimens of *C. monedula* that I have examined from Asia, and its second primary is



shorter than the fifth instead of being equal to it. According to Grote (1925, *Falco*, Sonderheft, pp. 157-158) Tugarinov and Buturlin state that both forms are sympatric in the region east of the Yenisei, and Johansen (1944, *Jour. Ornith.*, vol. 92, p. 125) reports that he found but a single specimen in the collection of the Zoological Museum of the Academy of Sciences of Leningrad that appeared to be a hybrid between *C. monedula* and *C. dauuricus*.

### *CORVUS FRUGILEGUS*

The validity of *C. f. tschusii* Hartert is not accepted by most authors. This form is said to have a more slender, more attenuated, and somewhat longer bill, and weaker feet than nominate *frugilegus*. Although I agree that these characters are not sufficiently constant to warrant the recognition of *tschusii*, it is nevertheless true that Turkestan specimens and winter visitors to northwestern India often show these characters, and a similar tendency can be observed in breeding birds from Iran.

### *CORVUS MACRORHYNCHOS*

The status of the Palearctic populations of *Corvus macrorhynchos* which is least clear is that of the mountain populations found from Ala Shan, Kansu, and Tsinghai south through Sikang and western Szechwan to northern Yunnan and the adjoining mountains of Burma to the Assam Himalayas, Bhutan, Sikkim, and neighboring parts of southeastern Tibet. These populations, which in my opinion, should be called *tibetosinensis* Kleinschmidt and Weigold (1922, *Abhandl. Ber. Zool. Mus. Dresden*, vol. 15, no. 3, p. 22, "Southeastern Tibet in the Sifan region" [i. e., eastern Sikang]), have been referred by various authors to either *mandshuricus* (Amurland south to Manchuria and Korea) or *intermedius* (northwestern Himalayas). They have been discussed in part by Mayr (1940, *Ibis*, p. 694) who has shown, although he did not identify them subspecifically, that the populations from the mountains of Szechwan, northern Yunnan, and adjoining Burma cannot be referred to nominate *macrorhynchos*, *levaillantii*, or *colonorum*.

The populations above, which I refer to *tibetosinensis*, differ, as Mayr has shown in the populations that he studied, from all other Palearctic populations by their very black and very glossy plumage, but their other characters are variable. In size their measurements overlap at both extremes those of *mandshuricus* and *intermedius*, though *tibetosinensis* can almost always be distinguished by the shape of the bill which is medium long, fairly heavy, and highly ridged, not so heavy nor so highly ridged as in *mandshuricus* but distinctly larger than that of *intermedius*. In

*tibetosinensis* the color of the base of the nape feathers varies geographically. They are gray (as in *mandshuricus*) in specimens from western Szechwan as they probably are in the populations from farther east and north. They are lighter but still dusky in specimens from northern Burma and northern Yunnan, and they vary from dusky to whitish in specimens from Sikkim. In *intermedius* they are constantly whiter than in any other Palearctic population.

The measurements of *tibetosinensis* in the literature are not numerous, and I have listed below those that I have found, together with those of the specimens that I have measured; those of *mandshuricus* and *intermedius* are given for comparison. It can be seen that if discrimination is based solely on measurements and color of the nape feathers large birds with gray feathers from the northeastern part of the range will be found to be similar to *mandshuricus*, while smaller specimens with whitish feathers from the southeastern part of the range will be found to be similar to *intermedius*. However, all the populations that I refer to *tibetosinensis* are constantly separable, as stated, from the two other races by their very black and very glossy plumage and almost always by the intermediate shape of the bill. Furthermore, *tibetosinensis* is well isolated geographically from either *mandshuricus* or *intermedius*. The distribution of the inland population of *C. macrorhynchos* is not well known, but as Whistler and Kinnear state (1932, Jour. Bombay Nat. Hist. Soc., vol. 35, p. 512) there is no proof that *intermedius* extends along the Himalayas eastward to Sikkim, and I have not examined specimens east of the region of Simla. There are no records in the northeast between Ala Shan and Manchuria.

The populations of *tibetosinensis* are continuous, however, with those of *levaillantii* from Bengal, Assam, and Burma, but this race, which is a lowland form, is smaller and not so glossy; they are continuous also with *colonorum*, which is also chiefly a lowland form with a much duller plumage, especially below, where it is grayish, not glossy. They may be continuous also in Yunnan with *mengtszensis*. I have not examined this last form which was described in 1923 from two specimens taken at Mengtsz. These two specimens are small (male: wing, 329, height of bill, 23; female: 318 and 22), but since the description emphasizes that they are black and very glossy, *mengtszensis* probably represents the end of a cline of decreasing size from *tibetosinensis*.

Measurements: *C. m. tibetosinensis*: Ala Shan, Nan Shan, and Kansu, wing 346–375, height of bill 21–24.5 (Stegmann, 1931, Jour. Ornith., vol. 79, p. 138). Eastern Tsinghai, males 362, 370; females 337, 21.5, 23, 24.5 (Meise, 1937, Jour. Ornith., vol. 85, p. 447). Western Szechwan, males 343, 22. Sikang, type and paratype, male 375, female 348; males

343–368, females 322–352, one unsexed 373 (de Schauensee, 1938, Proc. Acad. Nat. Sci. Philadelphia, vol. 90, p. 205); southwestern Sikang, male 353, female 330 (Ludlow, 1951, Ibis, p. 553). Bhutan and southern Tibet, males 352–354, female 351 (Kinnear, 1944, Ibis, p. 65). Sikkim, unsexed 315, 320, 342, 345, 367, 23, 24, 24, 24, 26. Northern Burma, males 332, 336, 347, 25, 26, 26; females 323, 324, 325, 326, 22, 24, 24, 25.

*Corvus m. mandshuricus*: 320–376, 21–26 according to Stegmann (1931), females 330, 340, 350, 350, 351, 360, 24, 25, 25, 27, 27, 27, unsexed 325, 334, 26, 26. *C. m. intermedius*: males 325, 334, 342, 21, 22, 22.5, females 309, 320, 321, 323, 20, 20.5, 21, 22, unsexed 312, 21.

### CORVUS CORONE

This species has been exceptionally well studied by Meise (1928, Jour. Ornith., vol. 76, pp. 1–203). Johansen (1944, Jour. Ornith., vol. 92, pp. 9–11) has added some details for the zone of hybridization in western Siberia between *orientalis* and *sharpii*, and I am able to report an unsuspected zone of hybridization between these two forms in northern and western Afghanistan. Although the breeding form of Afghanistan has always been assumed to be *orientalis*, Whistler shows (1944, Jour. Bombay Nat. Hist. Soc., vol. 44, p. 512) that virtually nothing was known of these populations until Meinertzhagen (1938, Ibis, p. 497) found that *orientalis* was breeding in eastern Afghan Turkestan at Haibak and Kunduz along the Surkhhab. I have examined large series from Afghanistan and find that the populations of Afghan Turkestan west of the Surkhhab, those of the Bend i Turkestan, and those of the Paropamisus all the way to the border of Iran show all sorts of intermediates. I would expect that the zone of hybridization continues part way into Iran, although *orientalis* has been reported during the breeding season from Kalender abad (just across the border) and from Seistan, but these are records of single specimens and not conclusive. Elsewhere in Afghanistan pure *orientalis* is the breeding form of the northeast, Badakhshan, the region east of Kabul, and the Safed Koh, and continues into Indian territories and the Pamirs.

Little exact information is available on the populations of Transcaspia and western Russian Turkestan. The records of Meise (1928, *ibid.*, pl. 3) show both forms and their hybrids, the latter on the Syr Darya west of Tashkent, and on the southern and eastern coasts of the Aral Sea and the region to the north. These regions may be deemed too vast to form a zone of hybridization, but the distribution in these deserts is far from continuous, the colonies being very widely spaced and apparently few in numbers.

Meinertzhagen (1926, Novitates Zool., vol. 33, p. 111) treats *yun-*

*nanensis* La Touche, described from Mengtsz, as a synonym of *orientalis* but gives no reason. This form is accepted by Hartert and Steinbacher (1932, *Die Vögel der paläarktischen Fauna*, suppl. vol., p. 8), but I find that a cotype of *yunnanensis* and another specimen from Kunming are in no way separable from *orientalis* from Siberia.

### *CORVUS RUFICOLLIS*

This form is usually treated as conspecific with *C. corax*, but the two are sharply differentiated morphologically and ecologically (*C. ruficollis* replacing *C. corax* in the deserts and more arid regions). Since they appear to overlap in several parts of their breeding range, I believe they must be considered to be separate species. They nest within a few miles of each other in north Africa but do not overlap, *C. corax tingitanus* breeding to the southern limits of the pre-Saharan Atlas and *C. ruficollis* in the desert proper (see Heim de Balzac, 1926, *Mém. Soc. Hist. Nat. Afrique du Nord*, vol. 1, p. 8). In Palestine, however, Meinertzhagen (1926, *Novitates Zool.*, vol. 33, p. 104) states that they "occur together at Jerusalem throughout the year except for a month or so when they are nesting." I have examined both species from this locality taken February 16 and 18 and *ruficollis* taken March 14. These dates do not necessarily indicate breeding, but the two species start to breed early for in southern Iran they are already incubating by March 12. Since the southern populations of the raven are not migratory, and it would seem that "a month or so" is insufficient for them to separate and complete the breeding cycle, one can presume that they both breed in Palestine.<sup>1</sup>

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<sup>1</sup> According to information received since the above was written from Dr. H. Mendelssohn of Tel Aviv, both forms breed in Palestine and begin to nest in February. The ranges meet but apparently do not overlap. Generally speaking, *C. corax subcorax* occurs in the more humid Mediterranean parts of Palestine, where the annual precipitation is more than 300 mm., and *C. ruficollis* to the east and south of *subcorax* in the desert or in dry regions with less than 300 mm. of precipitation. The border line separating the two forms "runs from the Jordan Valley about 20 km. south of Beisan to the hills east of Nablus, from there along the watershed to Jerusalem and Hebron and to about 20 km. to the south of this town and from there in a north-westerly direction to the shore of the Mediterranean Sea . . . In some areas their ranges do not touch and there are [intervening] regions without ravens, if the country is not fit for them; in other places, for instance near Jerusalem, their ranges touch, but do not overlap." Dr. Mendelssohn adds that he knows an instance where the nests of the two forms are only about 2 kilometers apart but separated by a high ridge. He believes that some sort of competition may keep them apart, for they do not associate "even when feeding on the ground near carcasses and so on," and he states that "I never saw a raven which could not with ease be assigned to one or the other form."

Farther east the ranges apparently overlap widely in southern Iran from Kirman through the whole of Persian Baluchistan. According to Dementiev (1933, L'Oiseau, p. 730) they overlap in Transcaspia and probably other parts of Russian Turkestan; they both breed in Sind where they may overlap, and they probably do so in parts of Afghanistan and Baluchistan.

The morphological differences are sharp. In specimens from Jerusalem the differences are as follows: *C. corax subcorax* is very distinctly larger with a much longer and heavier bill, the tail is somewhat more pointed, and the third and fifth primaries are subequal, whereas the third is distinctly longer than the fifth in *C. ruficollis*, the nasal bristles are longer and stronger, in fresh plumage the coloration is bluish and more glossy, becoming brownish with wear on the nape and mantle and to a lesser extent on the throat but never so strongly coppery brown as in *ruficollis* where these parts are always brown in both fresh and worn plumage. In north Africa according to Meinertzhagen (1940, Ibis, p. 125) the difference in wing formula between *C. corax* and *C. ruficollis*, though relatively slight on the skin, is sufficiently distinct for *C. c. tingitanus* and *C. ruficollis* to be distinguished on the wing, and the voice of the latter is quite different and unlike that of a raven, being shriller and similar to the "caw" of a rook.

Measurements of adults in Palestine:

|                 | <i>C. corax subcorax</i> | <i>C. ruficollis</i>       |
|-----------------|--------------------------|----------------------------|
| Wing            | 424, 442                 | 380-413 <sup>1</sup> (395) |
| Length of bill  | 76, 80                   | 61-68 (64.5)               |
| Height of bill  | 30, 30                   | 22-23 (22.5)               |
| Tail            | 224, 248                 | 195-214 (204)              |
| Tip of the tail | 53, 60                   | 20-32 (26)                 |
| Tail/tip index  | 21.6, 27%                | 9-16.4 (12.5)%             |

The tip of the tail was measured from the tip of the shortest (outermost) rectrice, and the tail/tip index is the proportion of this measurement to the length of the tail. In a much larger series from southern Iran the tail/tip index is 10-22 (15) in 23 specimens of *C. ruficollis* and 20-29 (23) in 10 specimens of *C. corax subcorax*, the other measurements being, respectively, similar. In southern Algeria the populations of *C. corax tingitanus* and *C. ruficollis* measure smaller than the populations of Asia, but the proportions are similar.

The findings discussed above, though not necessarily conclusive, are strongly suggestive. The two forms may not breed at the same locality, but different preferences in breeding sites are to be expected in ecologically

<sup>1</sup> Four specimens.

distinct forms, and a somewhat similar situation prevails in western North America as between *C. corax sinuatus* and *C. cryptoleucus*.

### CORVUS CORAX

The races of *C. corax* are rather poorly differentiated, the separation being chiefly in relative differences in size, shape of the bill, and slight differences in coloration, and I am unable to distinguish one of the races (*hispanus*) which is generally accepted. This form is supposed to be smaller than nominate *corax* and to have a stouter bill, shorter and more highly ridged, but I cannot see any constant differences in bill characters, and the specimens measured by me are identical. Full adults: nominate *corax* (from Russia, Scandinavia, Germany, England, France, and Switzerland), 23 specimens, wing, 375–442 (414), bill from skull, 68–84 (76.5); "*hispanus*" (Iberian Peninsula and Sardinia), 18 specimens, wing, 390–455 (416), bill from skull, 70–82 (76.5). Meinertzhagen (1926) states that the bill of *hispanus* is "strong and deep as in nominate *corax*," but that this form is smaller. His measurements, however, do not support this opinion (eight specimens from Spain and Sardinia, 410–436, as against 387–452 in 58 nominate *corax*). His bill measurements are shorter than mine, 67–76 as against 70–85, but they are not supported by those of my much larger series of "*hispanus*."

Three populations have been separated in recent years, but two of these (*kretae* and *jordansi*) appear to be invalid, and the other (*cypricus*) is not sufficiently distinct to warrant recognition. *C. corax cypricus* Orlando (1939, Riv. Italiana Ornit., vol. 9, p. 237, Cyprus) is said to be intermediate between *C. ruficollis* and nominate *corax* but closer to the latter. Only two specimens are mentioned. I have not examined specimens from Cyprus, the population of which Meinertzhagen states is *hispanus*, which I believe to be synonymous with nominate *corax*. Further material should be examined, and Orlando himself (1940, Riv. Italiana Ornit., vol. 10, p. 40) states that *cypricus* requires further study. *C. corax kretae* von Jordans and Steinbacher, (1943, Senckenbergiana, vol. 26, p. 73, Canea, Crete) is said to be very similar in coloration to *laurencei* [= *subcorax*] but to have a longer and thicker bill (68–76 long by 28–30 high as against 62, 64.5 and 23, 25 in two specimens of *subcorax*). From the measurements given by von Jordans and Steinbacher I believe that they may have misidentified their two specimens which are very probably not *subcorax* but *C. ruficollis*, the bill in the latter being 60–69 in length by 21–25 high, whereas it measures 71–84 by 27–32 in *subcorax*. Two first year birds examined by me from Crete are identical with first year *subcorax* in coloration, size, and bill characters.

Niethammer (1953, Bonner Zool. Beitr., vol. 4, p. 74) has separated the population of the eastern Canaries as *jordansi* (type locality, Fuerteventura) from that of the western Canaries and north Africa (*tingitanus*) on the basis that in the eastern populations of the Canaries the body plumage is distinctly brownish rather than blackish and much less glossy. Comparison of the material in the American Museum of Natural History shows, however, that specimens from Fuerteventura and the western Canaries are identical in coloration in similar fresh body plumage. I have examined only three specimens from Fuerteventura. It is quite possible that a larger series showing various stages of wear would show that the plumage bleaches more quickly and more strongly in the barren and desert-like eastern islands than it does in the more humid western islands.

The population of the western Canaries has been separated from *tingitanus* as *canariensis* by Hartert and Kleinschmidt on the basis of being generally smaller, and of having a more slender and weaker bill, narrower throat hackles, and stronger feet. The wing length is somewhat shorter in the populations of the Canaries and the bill somewhat longer and more slender than in the populations from north Africa, but these differences, I find, are not very constant and in my opinion seem much too slight to warrant nomenclatural recognition. I can see no geographical differences in the throat hackles or strength of the feet. The validity of *canariensis* is not accepted by Meinertzhagen (1926) or Niethammer (1953).

