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NOTES ON THE WRENS AND DIPPERS OF WESTERN ASIA AND INDIA[1]

By Charles Vaurie

INTRODUCTION

This paper is a study based on the specimens of *Troglodytes troglodytes*, *Cinclus cinclus*, and *Cinclus pallasii* collected by Dr. Koelz in Iran, Afghanistan, and India.

I am deeply grateful to Dr. Ernst Mayr for friendly suggestions. I am also in debt and wish to express my thanks to Dr. E. Stresemann and Dr. W. Meise for their kind help in reëxamining for me the specimens of *T. troglodytes* from the southern Caspian in the Berlin Museum, as I am also to Mr. J. C. Greenway for lending me the specimens of this species from Transcaucasia and the southern Caspian in the Museum of Comparative Zoölogy.

In the lists of specimens the term subadult (subad.) denotes first winter birds; if no qualifying term is used, the specimens are presumed to be adult.

TROGLODYTIDAE

TROGLODYTES TROGLODYTES

Five races of *T. troglodytes* (*hyrcanus*, *zagrossiensis*, *subpallidus*, *magrathi*, and *neglectus*) were collected by Koelz in Iran, Afghanistan, and India.

The first two are Iranian races, the ranges of which extend outside Iran into the Kopet Dagh in the northeast, central Iraq in the west, and Transcaucasia and the northern Caucasus in the

[1] Notes from the Walter Koelz Collections, Number 8. The previous papers in this subseries are: 1949, American Museum Novitates, nos. 1406, 1424, 1425; 1950, *ibid.*, no. 1459; 1950, Jour. Bombay Nat. Hist. Soc., vol. 49; 1950, American Museum Novitates, no. 1472; 1951, *ibid.*, no. 1482.

northwest. These two races, which are rufous, are closely related to nominate *troglodytes*. Of the other three, *neglectus* is a heavily barred race of the western Himalayas, and *subpallidus* and *magrathi* are Afghan races. The last (*magrathi*), which is apparently restricted to the Safed Koh in eastern Afghanistan, is heavily barred and is related to *neglectus*, while *subpallidus*, which is very pale, lightly barred, and shows little rufous, is closely related to the pale populations (*tianschanicus*) of Turkestan.

A study of the Koelz specimens together with those in the American Museum of Natural History and the specimens from Gilan and Transcaucasia in the collection of the Museum of Comparative Zoölogy shows the geographical variation to be as follows:

1. RUFOUS RACES: Adult specimens have been examined from the northern Caucasus, Transcaucasia, Azerbaijan, Gilan, the region of Gurgan, Karaj near Tehran, and in the Zagros from Kermanshah to Luristan and Bakhtiari. My specimens from western Khorasan are immature and I have none from the Kopet Dagh where *hyrcanus* is reported by Dementiev (1935, L'Oiseau, p. 454), while none have been collected in Iraq. According to Ticehurst (1922, Jour. Bombay Nat. Hist. Soc., vol. 28, p. 408), *T. troglodytes* may only be a winter visitor to Iraq where it has been observed in the winter at Kelat Shergat and Tekrit in the Djebel Hamrin and at Hit on March 8.

All these populations have a distinctly longer bill than has nominate *troglodytes* (table 1). On the basis of coloration they can be divided into *hyrcanus* Zarudny and Loudon, 1905 (type locality, Gilan, Mazanderan, and Astrabad) for the northern populations from northern Caucasus through Transcaucasia and Azerbaijan to western Khorasan, and *zagrossiensis* Zarudny and Loudon, 1908 (type locality, "Zagros Mountains"), for the populations of the Zagros. Purely on geographical grounds the winter visitors in Iraq may be presumed to belong to the last. The population of the northern Caucasus has been separated as *erwini* by Stachanow, 1931 (type locality, near Wladikawkas), but this name is quite correctly considered by Hartert and Dementiev to be a synonym of *hyrcanus*.

The northern *hyrcanus* is more rufous, more saturated above and below, and more heavily cross barred on the lower belly, flanks, lower back, and rump than *zagrossiensis*, but all the populations vary slightly in their degree of saturation. This variation

TABLE 1

MEASUREMENTS IN SOME POPULATIONS OF *Troglodytes troglodytes*
(Adult and/or First Winter)

Region and Race	N	Wing	Tail	Bill (from Skull)
troglodytes				
Scandinavia	10 ♂	48–52 (49.8)	31–34 (32.0)	12.5–14.2 (13.5)
	4 ♀	45–47 (46.0)	28–31 (29.0)	12.0–13.0 (12.5)
W. Russia (Pskov)	8 ♂	45–52 (49.5)	30–33 (31.4)	13.0–14.0 (13.3)
	2 ♀	47, 50 —	29, 31 —	12.5, 12.5 —
hyrcanus				
N. Caucasus	5 ♂[a]	49–50 (49.4)	29–32 (30.6)	13.5–15.0 (14.3)
Transcaucasia (Tiflis)	3 ♂	51, 51, 52	31, 32, 35	15, 15.2, 15.5
Azerbaijan	9 ♂	50–52 (51.0)	31–35 (32.6)	14.0–15.5 (15.0)
	5 ♀	47–48 (48.0)	31–33 (32.0)	14.0–15.0 (14.4)
Gilan	4 ♂	49–50 (49.5)	29–30 (29.5)	15, 15.5, 15.5[b]
Karaj	4 ♂[a]	47–52 (50.0)	30–33 (31.7)	15.0–15.5 (15.2)
	4 ♀	46–48 (46.5)	29–35 (32.0)	14.5–15.0 (14.7)
Gurgan region	2 ♀	46+, 50+, —	29+, 31+, —	14.2, 14.2 —
zagrossiensis				
Kermanshah	2 ♂	49, 53 —	32, 34 —	14.0, 14.5 —
	5 ♀	46–49 (47.3)	30–32 (30.6)	13.5–14.2 (13.9)
Luristan and Bakhtiari	11 ♂	48–51 (50.0)	29–36 (32.2)	13.2–16.0 (14.7)
	7 ♀	46–49 (47.5)	29–31 (30.0)	13.2–14.8 (14.2)
subpallidus				
N. Khorasan	4 ♂[a]	47–51 (49.0)	32–35 (33.2)	14.5–15.5 (14.7)
Afghanistan	6 ♂	48–52 (50.1)	33–36 (34.0)	13.5–15.0 (14.1)
	13 ♀	46–49 (48.0)	31–36 (33.3)	13.5–14.5 (14.0)[c]
tianschanicus				
Ferghana	2 ♂	48, 50 —	32, 36 —	14.0, 14.5 —
	1 ♀	48 — —	33 — —	14.0 — —
Djarkent and region	21 ♂	48–53 (50.4)	32–37 (34.0)	14.0–15.5 (14.7)
	3 ♀	47, 49, 52	33, 34, 37	14.0, 14.5, 14.5
magrathi				
E. Afghanistan	2 ♂	49+, 49+, —	30+, 31+, —	13.5, 13.8 —
	1 ♀	48+ — —	29+ — —	13.2 — —
neglectus				
Kashmir to Kumaon	5 ♂	49–51 (50.0)	28+–31+ —	13.0–13.8 (13.4)
	4 ♀	46–51 (47.8)	28+–30+ —	13.0–14.0 (13.5)
nipalensis				
Sikkim	7[d]	47–51 (49.3)	27–31 (29.7)	12.5–14.0 (13.1)

[a] One unsexed, apparently male.
[b] In a fourth, 13.5+, tip broken.
[c] Ten specimens only, broken in the other three.
[d] Unsexed.

is associated with rainfall, and the difference is only truly distinct when the darkest population of *hyrcanus*, from wet Gilan, is compared to the palest population of *zagrossiensis* from much drier Luristan and Bakhtiari.

Abrasion of the plumage may turn the plumage more rufous, and age of the skins certainly does, as is strikingly shown when foxed skins taken in Sweden from 1877 to 1898 are compared with unfoxed skins taken at Upsala in 1926. With these changes due to the state of the plumage in mind, the variation in the coloration of the populations examined is as follows:

Gilan specimens taken from March 28 to April 23 are slightly darker and duller, a little more grayish brown, particularly on the crown, and more heavily and distinctly barred than specimens of topotypical nominate *troglodytes* taken at Upsala on April 11 and 20. There is no appreciable difference in the amount of rufous.

Specimens from the northern Caucasus taken from November 18 to February 1 (four at Wladikawkas and one on the Terek River) are a little less dull and dark and very slightly more rufous than specimens from Gilan. Stresemann (1928, Jour. Ornith., vol. 76, p. 391) has noted that the northern Caucasus population began to depart from *hyrcanus*. It is hard to assess properly the difference, since my Caucasus specimens are less worn and, being taken in 1903–1904, have started to fox, but, judging by the variation in the other populations, the difference in coloration would be much too slight to warrant separation, particularly since the bill measurements and the cross barring are much closer to those of *hyrcanus* than they are to those of nominate *troglodytes*.

The other populations, which are in fresh or little worn plumage, were taken at Tiflis in Transcaucasia from October 24 to January 8, Azerbaijan (October 30 to December 10), Karaj (November 14 to December 28), Kermanshah (December 23 to January 15), and Luristan-Bakhtiari (January 21 to February 20). The Transcaucasian and Azerbaijan populations are identical; that of Karaj is faintly grayer. All three are less dark and rufous, more grayish than the specimens from Gilan. In the Zagros populations, the one from Kermanshah is very slightly darker than the Luristan-Bakhtiari population; it is still *zagrossiensis* but is tending towards the Azerbaijan population of *hyrcanus*.

All these differences are slight, and even the paler *zagrossiensis* is not very strongly differentiated from the dark population of *hyrcanus* from Gilan. I would expect the population of western

Khorasan to be paler than that of Gilan, and possibly that from the region of Gurgan also, but unfortunately my birds from this region are immature or very badly worn adults taken towards the end of July, while those from Khorasan are all immature. Zarudny in his distributional list (1911, Jour. Ornith., vol. 59, p. 218) lists nominate *troglodytes* as a rare winter visitor or stray in the southern Caspian. No specimens of this form were taken by Koelz or examined by me from Gilan, the Caucasus, or Transcaucasia.

At the time this study was started no specimens from Gilan were available, and since my specimens from Azerbaijan were less rufous, I was disturbed by Stresemann's statement (*loc. cit.*) that he found his specimens from Gilan to be somewhat more, rather than less, rufous than in nominate *troglodytes*. I wrote to Dr. Stresemann to have the kindness to reëxamine his material, and Dr. Meise writes in answer that their specimens from Gilan are "a trifle more rufous than birds from Germany of the comparable season . . . But perhaps the Persian birds are more worn." He remarks that no specimens from Scandinavia are available and correctly emphasizes that the best subspecific difference between *hyrcanus* and nominate *troglodytes* is the difference in the length of the bill. Now, thanks to Mr. Greenway, who, I found, had some of the specimens of Heinrich from Gilan that he kindly lent, I was able to study the variation discussed above.

2. PALE RACES: In Khorasan from longitude 58° E., and in Afghanistan with the exception of the Safed Koh in the east, the rufous races are replaced by a very pale form (*subpallidus* Zarudny and Loudon, 1905, type locality, "Mountains of N. E. Persia, especially Khorasan, and from there evidently extending eastward into the Paropamisus System"). This form is paler and grayer below, more faintly barred, and has the upper parts more ochre than rufous. The specimens examined were taken by Zarudny at Imam Quliar south of Ashkhabad from November 12 to 28; from Firusk 30 kilometers west of Ashkhabad I have a specimen taken on March 7, and those from Afghanistan were taken by Koelz from September 20 to November 29 in the Bend i Turkestan, Balkh in Afghan Turkestan, and Pul i Khumri south of Baghlan on the north side of the Hindu Kush.

According to these dates and in view of the fact that these specimens are identical above with a good series of 24 specimens in comparative plumage of *tianschanicus* taken from September 17

to January 27 in the region of Djarkent and three specimens taken from November 5 to December 7 in Ferghana, they might be considered to be winter visitors of this race. However, since most of the specimens from Afghanistan are still moulting, they had probably bred locally, and, furthermore, the Khorasan and Afghanistan specimens, taken as a series, differ from the Turkestan and Ferghana populations by having the under parts more dingy, less whitish on the throat and breast, and by having the cross barring of the lower belly and flanks less heavy and distinctly more grayish. The differences between *subpallidus* and *tianschanicus* are not very well marked, and the two races are differentiated from each other by about the same small degree that *hyrcanus* and *zagrossiensis* differ from each other.

I have not examined breeding specimens of *subpallidus* and in placing the boundary in Khorasan between this form and *hyrcanus* at the 58th meridian, I am guided by the fact that two immature specimens barely out of the nest, taken by Koelz on August 4 to 5 at Kotaliyekchinar north of Bujnurd, are identical with other richly colored immatures of *hyrcanus* taken from July 16 to 26 in the region of Gurgan. Kotaliyekchinar and Firusk are separated by a gap of about 75 kilometers.

3. HEAVILY BARRED HIMALAYAN RACES: In these races the cross barring is heavier and extends farther up, to the lower throat below and to the hind neck above. The eastern populations (*nipalensis*) are very dark rufous brown; those from Kumaon westward into Kashmir (*neglectus*) are distinctly paler, the rufous being more grayish, less brown; while those from the region of the Safed Koh in eastern Afghanistan (*magrathi*) are palest and grayest, worn specimens of this last race showing virtually no trace of rufous.

This last race has hitherto not been recognized, since the only two specimens known were both immature. Its validity, however, is now fully confirmed by the specimens collected by Koelz on June 18 to 19 at Sirotai [Saroti], east of Gardez on the southern side of the Safed Koh. The adults, in very worn plumage, are much paler than an equally worn specimen of *neglectus* taken on July 1 above Tragbal in Kashmir. The two immatures of *magrathi* are paler than an immature of *neglectus* from Peshwari in Kashmir, but an immature from Baltistan farther north is identical with those from Sirotai. Immature *magrathi* cannot be confused with immature *subpallidus;* the latter is paler, lacks its

heavier barring, and is of a quite different general tone. Although the adults of *magrathi* are very pale and gray, their differently barred pattern shows that *magrathi* is not intermediate between *subpallidus-tianschanicus* and *neglectus* but is instead closely related to the latter.

TABLE 2

PARTIAL "SPRING" MOULT OF THE HEAD FEATHERS IN *Troglodytes troglodytes*
(Period, January 18 to April 23)

Region	Total N of Specimens Examined	N of Moulting Specimens	Date and Sex
Shetland Is.	6	2	♂ Mar. 15, ♀ Apr. 22
Ireland	2	1	♂ Jan. 18
Great Britain	15	5	1 ♂, 1 ♀ Mar. 5–14; 2 ♂, 1 ♀ Apr. 4–17
Sweden	3	0	
W. Russia	4	3	2 ♂ Apr. 8, ♂ Apr. 16
Italy, Austria, France	7	0	
Morocco, Algeria	13	2	♂ Feb. 25, ♀ Apr. 12
Sardinia, Mallorca	2	0	
Cyprus	2	2	♂ Mar. 8, ♀ Mar. 10
N. Caucasus	1	1	♂ Feb. 1
Gilan	4	1	♂ Apr. 23, doubtful in ♂ Apr. 5
Luristan-Bakhtiari	19	8	1 ♂, 3 ♀ Mar. 6–15; 4 ♂ Feb. 8–19
Transcaspia	1	0	
Russian Turkestan	3	1	♂ Mar., no date
Kashmir	1	1	♂ Mar. 25
North Burma	3	3	♂ Jan. 22, 2 ♂ Mar. 12–14
Shensi	2	0	
Japan	2	1	♀ Feb. 15
California-Oregon	15	4	♂ Feb. 6; ♂ Mar. 20; 2 ♂ Apr. 1–21
E. United States	8	0	
Total	113	35	

Stuart Baker (1922, Fauna of British India, vol. 1, p. 445) states that Garhwal may form the connecting area between *neglectus* and *nipalensis*. However, all the specimens of *neglectus* examined from the western Himalayas from Kashmir to Rahlam, east of Garhwal and not far from the Nepal border, appear to be identical.

MOULT: Adults have a complete postnuptial moult which probably starts in August, as very worn specimens taken in Iran at the end of July have not started to moult. In specimens taken at the end of October in Azerbaijan this moult is over, but although well advanced or nearly ended is still going on in specimens taken in Afghanistan and northern Punjab from September 20 to October 12, and a few last traces are still showing in the November 5 to 17 specimens from Afghanistan. During the same period, juvenals moult into first winter plumage through a partial postjuvenal moult involving only the body plumage and some wing coverts. After the moult adults and first winter specimens appear to be indistinguishable. In the list of specimens given below, I have not, therefore, distinguished between the two except in the case of the moulting specimens. Very worn specimens taken during the breeding season are, however, assumed to be adult.

There is also a very interesting partial (prenuptial ?) moult which takes place in some specimens collected from about the middle of January to the end of April. This moult, which does not seem to have been recorded before, involves the replacement of the crown, facial, and throat feathers. Sometimes this moult is limited to the crown feathers and in some cases only a very few feathers are involved, but in others all the feathers are moulting. It is present in both male and female, but I cannot tell whether the moulting specimens are adult or first winter birds. It occurs, to a varying degree, in almost all parts of the range. The variation is as given in table 2.

Troglodytes troglodytes hyrcanus Zarudny and Loudon

IRAN: Azerbaijan: Tabriz, October 30–31, 1940, 2 ♂; **Ardebil**, November 2, 1 ♂, 2 ♀, 1 unsexed ad.; Namin, November 6, 1 ♂; **Livan**, November 14, 1 ♂; Maraghe, November 26–28, 1 ♂, 3 ♀; **Rezaieh**, December 8, 2 ♂; Khoi, December 10, 1 ♂. Region of Tehran: **Karaj**, December 28, 1944, 1 ♀, November 14–December 25, 1945, 3 ♂, 1 unsexed ad. [♂], 3 ♀. Mazenderan (region of Gurgan): Dimalu, July 16–24, 1940, 3 imm. ♂, 2 ad. ♀; 6 imm. ♀; Germabdasht, July 24, 1 imm. ♀; Kherat, July 24–26, 2 imm. ♂, 1 unsexed imm. Khorasan: Kotaliyekchinar, August 4–5, 1 imm. ♂, 1 imm. ♀.

Troglodytes troglodytes zagrossiensis Zarudny and Loudon

IRAN: Kermanshah: Kangavar, December 23, 1940, 1 ♂; Kermanshah, December 26, 1 ♀; Qasr i Shirin, December 31–January 5, 1941, 3 ♀;

Bisitun, January 15, 1 ♂, 1 ♀. Luristan: Burujird, January 21, 1 ♂; Durud, January 25–26, 2 ♀; March 4–15, 1 ♂, 3 ♀. Bakhtiari: Ti, February 2–12, 5 ♂, 1 unsexed; Imarat, February 17–20, 4 ♂, 2 ♀.

Troglodytes troglodytes subpallidus Zarudny and Loudon

AFGHANISTAN: Maimana, November 17, 1937, 5 ♀, 1 [♀], 1 unsexed subad.; Safedsang, September 20–22, 1939, 1 subad. ♂, 1 imm. ♂, 1 ad. ♀, 2 subad. ♀; Sufak, September 28, 1 imm. ♀; Burchao Pass, October 10–11, 1 ad. ♂, 2 subad. ♂, 2 ad. ♀; Balkh, October 29–31, 2 ♂, 2 unsexed ad.?, December 3, 1937, 1 ♀; Pul i Khumri, November 5–7, 1939, 1 ♀, 1 subad. ♀.

Troglodytes troglodytes magrathi Whitehead

EASTERN AFGHANISTAN: Sirotai, June 18–19, 1937, 2 ad. ♂, 1 imm. ♂, 1 ad. ♀, 1 imm. ♀.

Troglodytes troglodytes neglectus Brooks

INDIA: Kashmir: above Tragbal, July 1, 1936, 1 ad. ♀; Peshwari, August 3, 1 imm. ♀. Kashmir, Baltistan: above Sodpur, August 10, 1 imm. ♀. Northern Punjab, Lahul: Gemur, October 12, 1 subad. ♂. Tehri: Diar, October 7, 1948, 1 subad. ♂; Bhujeka, October 14, 1 ad. ♀. Kumaon: Sumto-Rahlam Pass, June 17, 1 ad. ♂; Rahlam, June 18–22, 1 imm. ♂, 1 ad. ♀, 1 imm. ♀, 1 unsexed imm.

CINCLIDAE

Cinclus cinclus caucasicus Madarász

IRAN: Azerbaijan: Livan, November 15–19, 1940, 5 ad. ♂, 1 ad. [♂], 3 ad. ♀, 3 subad. ♀; Saujbulagh, November 26, 1 ad. ♂; Rezaieh, December 8, 1 ad. ♂. Region of Tehran: Karaj, December 21, 1943, 2 ad. ♂, 1 subad. ♀, February 7, 1945, 2 ad. ♀, November 14–December 10, 2 ad. ♂, 1 ad. ♀, 4 subad. ♀. Khorasan: Bardu, August 16, 1940, 1 ad. ♀; Bardu Forest, August 17–21, 2 subad. ♂, 1 imm. ♂, 1 ad. ♀. Region of Hamadan: Hamadan, December 21–23, 2 ad. ♂, 3 ad. ♀, 1 unsexed ad.

Cinclus cinclus persicus Witherby

IRAN: Luristan: Burujird, January 21, 1941, 2 ad. ♂; Durud, January 24, 1 ad. ♂, March 5, 1 ad. ♂ "breeding," September 13–October 21, 2 ad. ♂, 1 subad. ♂; Chamchid, February 21, 1 ad. ♂ "building nest"; Khali Kuh, June 1, 1940, 1 imm. ♀. Bakhtiari: Ti, February 3–11, 1941, 2 ad. ♂, 6 ad. ♀, May 30–31, 1940, 1 ad. ♂, 1 ad. ♀; Imarat, February 14, 1941, 1 ad. ♀; Gahar, May 30, 1 ad. ♂.

Two well-marked races occur in Iran: one in the north, *caucasicus* Madarász, 1902 (type locality, northern Caucasus), and the other in the Zagros, *persicus* Witherby, 1906 (type locality,

Mal Amir, Bakhtiari). *Cinclus c. caucasicus* is darker, less rufous on the breast and abdomen, as well as on the crown, hind neck, and upper mantle; its wing also averages shorter (table 3). Specimens of *caucasicus* have been examined from the northern Caucasus, Transcaucasia, Azerbaijan, the regions of Hamadan and Tehran, and from Khorasan. The specimens taken by Koelz in this last region are mostly immature or in full moult, but six adults taken by Zarudny in 1901 are identical with a series of 12 adults in comparative plumage taken in the same year in the northern Caucasus. All these older skins have foxed, being less dark and more brownish above and below than the fresh specimens collected by Koelz.

In the specimens of *caucasicus*, the series from Azerbaijan, Karaj, and Hamadan were taken at the same time of the year and are in fresh comparative plumage. The population from Karaj measures perhaps very slightly smaller than the other two, but is identical in coloration with the population from Azerbaijan. The population from Hamadan is more interesting. Of six specimens, one is as dark as the darkest *caucasicus*, but to a varying degree the other five are more rufous, though not nearly so much so as in *persicus*. These specimens show that at Hamadan, and perhaps in other localities on the edge of the northern side of the western Zagros, the two races probably intergrade. As my specimens, taken as a series, are much closer to *caucasicus*, the infiltration from the north is apparently strongest.

I have, unfortunately, but one specimen from Lebanon. The population of this region (*rufiventris*) is said to be similar to *persicus* but to have a shorter wing and the rufous of the under parts less bright. My specimen, a female from Djebel Sanyn, is duller and has a shorter wing (84+) than the females from the Zagros.

MOULT: Adults have a complete postnuptial moult, and juvenals moult into first winter plumage through a partial postjuvenal moult involving the replacement of all the body feathers, lesser and median wing coverts, and some of the greater coverts. Both of these moults probably start in July, as they are well advanced in adults and juvenals taken on August 16 to 21 in Khorasan and are virtually over in an adult and a first winter bird taken on September 13 to 14 in Luristan.

Cinclus cinclus leucogaster Bonaparte

WESTERN AFGHANISTAN: Sufak, September 27–28, 1939, 7 ad. ♂, 1 subad. ♂, 1 ad. ♀, 2 subad. ♀; Mak, October 2, 1 subad. ♀; Gharchi, October 3, 1 subad. ♀; Burchao Pass, October 10–15, 3 ad. ♂, 1 subad. ♂, 2 ad. ♀, 2 subad. ♀, 1 subad. [♀].

Cinclus cinclus cashmeriensis Gould

INDIA: Kashmir, Baltistan: above Sodpur, August 10, 1936, 1 ad. ♂. Kashmir, Ladak: Shakrot, September 25–26, 1 subad. ♂, 1 imm. ♂, 1 subad. ♀.

The status of the populations of *Cinclus cinclus* which in Asia replace *C. c. caucasicus* from Khorasan eastward is complicated by the appearance of polymorphic forms. The specimens collected by Koelz and those in the collection of the American Museum of Natural History show that the situation may be as follows.

From Afghanistan northeastward, one form (*leucogaster*) follows the northern mountain arc which sweeps through the Pamirs, Alaï, Tian Shan, Tarbagataï, Altaï, and the region around Lake Baïkal to the Stanovoi Mountains in extreme eastern Siberia. In some parts of this huge sweep this form is polymorphic. The prevailing type consists of birds in which the whole of the under parts is white; as far as my specimens go this is the only type found in the region of Djarkent and in Afghanistan, though in the latter a few specimens (discussed below) show slight traces of brown on the abdomen. In the Altaï, however, specimens of three types are found: the all-white type, a type with a white throat and a solidly brown belly, and a type in which the whole of the under parts is brown. In the region of Lake Baïkal I have specimens of the first two types, and at Krasnoyarsk on the Yenissei one specimen each of the last two. The number of specimens is given below. It is possible that the last two types also occur in the region of Djarkent, for I have one specimen of each from the "Issyk Kul." However, as these skins are from the Tancré collection the localities may not be reliable, and no Tancré material is included in this study.

Along the southern mountain arc which starts at the Pamirs and follows through the Himalayas to western Szechwan, northern Kansu, (and to the Khingan?) there is a larger form which is also polymorphic. In the populations of this form (divisible into *cashmeriensis* in the west and *przewalskii* in the east), the all-white

type apparently does not occur, the prevailing type consisting of birds with a white throat and a solidly brown belly, and the other of birds in which the whole of the under parts is brown.

The ecology of the two color phases in the region of the upper Yangtze is discussed in detail by Schäfer (1938, Jour. Ornith., vol. 86, sonderheft, p. 205). The brown-throated phase is dominant on the small streams of the high steppes, while the white-throated phase is dominant in the forested regions. In the Yangtze valley only white-breasted birds are found.

DISTRIBUTION OF THE COLOR PHASES OF ADULTS IN SOME ASIATIC POPULATIONS OF *Cinclus cinclus*

Region	All White Below	White and Brown	All Brown
Afghanistan	14	0	0
Djarkent	18	0	0
Altaï	5	4	1
Krasnoyarsk	0	1	1
Lake Baïkal	4	2	0
Kashmir	0	1	Occurs[a]
Ladak	0	3	Occurs[a]
N. Burma	0	1	0
Szechwan	0	1	0
N. Kansu	0	4	0
N. Kansu[b]	0	15	3

[a] According to Stuart Baker and Hartert.
[b] Meise (1937, Jour. Ornith., vol. 85, p. 572).

Although the northern and southern forms are undoubtedly closely related, they are separated today by the great deserts of central inner Asia. In the west they come together at the Pamirs. One might expect to find specimens with intermediate characters in the region (Afghanistan) which connects the brown-bellied population of Khorasan (*caucasicus*) with the brown-bellied population of Kashmir (*cashmeriensis*). However, the Afghan population, although perhaps somewhat intermediate in size, is white bellied. This is not quite true always, as in four out of eight first winter birds and four out of 14 adults most of the feathers of the abdomen are tipped with brown, but with three exceptions the brown markings are very slight, and these eight specimens look white though a little "dirty." These markings nevertheless are interesting as they indicate a certain amount of gene flow from *caucasicus* into *leucogaster*. Speculation may be idle, but one can

picture the present-day population of Afghanistan as a secondary expansion from Turkestan which has displaced the original brown-bellied population.

This view is strengthened by the fact that the present populations of Khorasan and Kashmir are so similar that I can separate them only on a slight difference in size, specimens of *cashmeriensis* and those measured by Meise (1928, Ornith. Monatsber., vol. 36, p. 140) having a very slightly longer wing. My specimens, however, are not in comparative plumage, and a difference in coloration may exist. Hartert (1910, Vögel der paläarktischen Fauna, p. 795) states that, proportionately, *cashmeriensis* is darker brown below than *caucasicus*. My specimens are not separable, but the former are all worn, while all the latter are in fresh unworn plumage. Young juvenal specimens are identical in the white mottled plumage that precedes the postjuvenal moult, but show the size difference, the wing measuring: Caucasus, 85; Khorasan, 88, 90; Kashmir, 100.

Adult *cashmeriensis* may be darker below than *caucasicus*, but, at any rate, the brown of its under parts has a definite rufous tinge. In the populations from northern Burma to northern Kansu (*przewalskii*) this rufous tone is completely lacking in all stages of the plumage, the specimens differing at once by their much darker, blacker under parts. The brown-bellied phases of *leucogaster* differ from *cashmeriensis* and *przewalskii* by being smaller and by being much paler and browner below, lacking the rufous tinge of the former and the blackish tinge of the latter. I lack specimens of the all-brown phases of *cashmeriensis* and *przewalskii*, but I presume they differ in the same way that the white-throated phases do.

It may be added with Meinertzhagen (1938, Ibis, p. 692) that a large series of *leucogaster* shows this form to be very variable in the color of its upper parts, the color varying from almost sandy brown to rather dark brown. This variation is irregular geographically. The Koelz specimens from Afghanistan, contrary to those of Meinertzhagen, are on the dark side, but as these specimens have just finished moulting or are in the last stages of the moult, they are very fresh, while those of Meinertzhagen were very worn. As my Turkestan and Siberian specimens are very much older skins their browner color is certainly due, at least to a very great extent, to foxing. The difference in size between the Afghanistan and the Turkestan-Siberian specimens is clear but too

small to warrant a separation which would only obscure the relationships of the Asiatic races and their trends in variation.

The only record for Afghanistan, prior to the specimens collected by Koelz, consisted of the three specimens collected by Meinertzhagen in the region of the Shibar Pass. The Koelz specimens now extend the range farther west by about 180 miles.

MOULT: The moult in Afghanistan seems to take place at the same time as in Iran. Most of the adults have finished the moult by the end of September, though in some of them as well as in some first winter birds, a few last traces persist in specimens taken from October 2 to 14. In Kashmir the moult may start later. Although two juvenals taken on September 25 to 26 in Ladak are quite far advanced into the moult, an immature taken on the same date shows no signs of moult at all, nor does an adult taken on August 10, although its plumage is quite worn.

TABLE 3

MEASUREMENTS OF FULLY ADULT SPECIMENS IN THE ASIATIC RACES OF *Cinclus cinclus*

(The individual wing measurements of the larger series are given in the footnotes.)

Race and Region	N	Wing	Tail	Bill
caucasicus				
N. Caucasus	3 ♂	91, 93, 93	49, 49, 53	22, 23
	2 ♀	93, 93 —	45, 52 —	22.5, 23
	7[a]	84–93 (89.0)	45–50 (47.8)	20–23 (21.6)
Transcaucasia	2 ♂	92+, 98	45+, 54	22.5, 23
	1 ♀	88 — —	45 — —	22 — —
Azerbaijan	8 ♂[b]	95–101 (97.5)	52–59 (54.0)	21.5–23.5 (22.8)
	3 ♀	90, 91, 92	51, 52, 52	21.2, 22, 22.5
Karaj	4 ♂[c]	93–95 (94.0)	50–52 (51.2)	21.5–22.5 (22.2)
	3 ♀	86, 88, 90	45, 48, 49	21, 22, 22.5
Khorasan	3 ♂	94, 94, 99	49, 52, 55	22, 22.5 —
	3 ♀	84, 86, 89	44, 46, 47	20.5–21.5 (21.1)[d]
Hamadan	2 ♂	97, 99 —	52, 58 —	22.5, 23 —
	3 ♀	92, 93, 94	48, 51, 53+	21.5, 21.5, 22
rufiventris				
Lebanon	1 ♀	84+ — —	43+ — —	21.5 — —
persicus				
Luristan-Bakhtiari	11 ♂[e]	98–104 (100.4)	53–57 (55.2)	21–23 (22.2)
	8 ♀[e]	90–94 (92.1)	46–53 (50.5)	21.2–22.5 (21.9)

TABLE 3—*Continued*

Race and Region	N	Wing	Tail	Bill
leucogaster				
Afghanistan	10 ♂[f]	96–99 (98.0)	49–60 (55.7)	22–23.5 (22.8)
	4 ♀	87–90 (89.0)	50–54 (51.5)	20.5–23 (22.2)
Djarkent	12 ♂[g]	88–97 (93.4)	48–59 (52.5)	22–24.5 (23.0)
	6 ♀	85–96 (87.3)	48–55 (50.1)	22–23.5 (22.6)
Altaï	5 ♂[h]	85–96 (90.2)	48–54 (50.0)	22–23 (22.6)
	5[a]	85–94 (89.0)	49–54 (51.6)	22–23 (22.4)
Krasnoyarsk	2 ♂	89, 90 —	50, 52 —	22.5, 24 —
Lake Baïkal	4 ♂[i]	90–95 (93.1)	50–53 (51.1)	22.5–24 (23.2)
	2 ♀	84, 86 —	46, 50 —	22.5, 23 —
cashmeriensis				
Kashmir	1 ♂	98.5+ — —	56+ — —	broken
Ladak	2 ♂	101+, 101+	48+, 51+ —	21, 22.5 —
	1 ♀	92+ — —	50+ — —	23, — —
przewalskii				
N. Burma	1 ♂	101 — —	58 — —	22 — —
Szechwan	1 ♂	99 — —	58 — —	22.5 — —
N. Kansu	3 ♂	98, 99, 102	54, 56, 62	22, 22 —
	1 ♀	90 — —	50 — —	22.5 — —

[a] Unsexed.
[b] 95, 95, 96, 96.5, 98, 98.5, 100, 101.
[c] 93, 94, 94, 95.
[d] Five specimens.
[e] Males, 98, 98, 99, 99.5, 99.5, 100, 101, 102, 102, 102, 104; ♀, 90, 90, 91, 92, 93, 93, 94, 94.
[f] 96, 97, 98, 98, 98, 98, 98, 99, 99, 99.
[g] 88, 91, 92, 92, 93, 93, 93, 94, 95, 96, 97, 97.
[h] 85, 87, 90, 93, 96.
[i] 90, 92, 94, 95.

Cinclus pallasii tenuirostris Bonaparte

SYNONYM: *Cinclus pallasii kargasiensis* Koelz.

EASTERN AFGHANISTAN: Paghman, June 27, 1937, 1 imm. ♂; Sanglich, July 26, 1 ad. ♂; Munjan Pass, July 28, 1 subad. ♂; Kargasi Pass, August 8, 1 ad. ♂ (the type of *C. p. kargasiensis*), August 8–9, 1 subad. ♂, 1 ad. ♀, 2 subad. ♀, 1 imm. ♀.

INDIA: Kashmir, Baltistan: Upper Tale Valley, August 24, 1936, 1 ad. ♂; Karzong Nulla, September 12, 1 subad. ♀. Northern Punjab, Kulu: Manali, June 5, 1 imm. ♂; Kulu, November 5–11, 2 ad. ♂, 1 ad. ♀. Kumaon: Mansari, June 8, 1948, 1 ad. ♀; Shankola, July 24, 1 imm. ♀. Nepal: Kulikhan, April 27, 1947, 1 imm. ♂, 1 ad. ♀, 1 unsexed ad.

Koelz (1939, Proc. Biol. Soc. Washington, vol. 52, p. 65) has described as *kargasiensis* the specimens listed above from Afghanistan and the Tale Valley in Kashmir on the basis that these birds were duller and darker in the adult, paler in the immature, and larger than in specimens from northern Punjab. I find, however, that the color difference is due to a state of plumage and that the size difference is not confirmed when specimens are measured from all parts of the range. The number of adults examined, their origin, and measurements are given in table 4.

Skins in comparative plumage and that have been in collections for about the same length of time show no evidence of geographical variation. For instance, of the four adults of "*kargasiensis*," the adult taken at Sanglich on July 26, which has not begun to moult and is very worn, is not separable from other worn adults from northern Punjab, Kumaon, Nepal, and Sikkim. Among the latter, the Kumaon and Nepal specimens collected recently in 1947–1948 have started to moult, and the new feathers are coming in just as dark as in the other three adults of "*kargasiensis*" (two from Afghanistan and one from Kashmir) in which the moult of the body plumage is almost completed. In the full bloom of their very fresh plumage these three adults taken on August 8 to 24 are darker than in fall specimens from northern Punjab, but these that were taken later, on November 5 to 25 (1931–1936), have begun to wear and have long lost the first bloom of their plumage. In old skins, whether they be from Kashmir, Sikkim, Ferghana, or Tian Shan, the plumage has foxed to an equal degree of brown. I also cannot confirm the difference in the immature form. This spotted, whitish gray dress is more variable than that of the adult, but I cannot separate specimens from Afghanistan in this plumage from similar specimens from Ferghana, Gilgit, northern Punjab, Kumaon, and Nepal.

MOULT: The moult varies from that of *Cinclus cinclus*, and the period of moult is more irregular. Adults have the usual complete postnuptial moult, but juvenals moulting into first winter plumage moult all the tail feathers in addition to the body plumage and the lesser and median wing coverts (five out of five specimens). They do not moult the wing feathers. In *C. cinclus* the moult does not seem to start before July and is apparently over by the end of September or early October. In *C. p. tenuirostris* the moult has already well started by April 27 in two adults from Nepal, is at about the same stage in a specimen taken seven weeks

later (June 8) in Kumaon, but in a very worn adult taken on July 26 in Afghanistan there are no signs of moult at all. In the other adults taken on August 8 to 9 in Afghanistan, and August 24 in Baltistan, the moult of the body plumage is virtually over, but, while the wing is fully grown in the Kashmir bird, the Afghan birds still have their old outer primaries while the inner are only about half grown.

In juvenals moulting into first winter plumage the moult has barely started on an August 9 specimen from Afghanistan but is well or far advanced in July 28 and August 8 to 9 specimens from Afghanistan and a September 12 specimen from Kashmir. An immature taken on July 24 in Kumaon shows no signs of moult.

TABLE 4

MEASUREMENTS OF ADULTS IN *Cinclus pallasii tenuirostris*

Region	Wing	Tail	Bill
E. Afghanistan[a]	♂ 102+, 103+; ♀ moult	♂ 60, moult; ♀ 57	♂ 24.5, 25; ♀ broken
Kashmir[a]	♂ 104	♂ 60	♂ 25
Kashmir[b]	♂ 101; ♀ 92	♂ 57; ♀ 49+	♂ 23; ♀ 24
Ferghana	♂ 99; ♀ 95	♂ 53; ♀ 52	♂ 23; ♀ 25
W. Tian Shan	♂ 100, 103, 103	♂ 54, 57, 59	♂ 23, 26, 27
	♀ 94, 97	♀ 52, 52	♀ 25, 26
N. Punjab	♂ 98, 100	♂ 52, 52	♂ 24, 24
	♀ 94, 95, 97.5	♀ 50, 50, 57	♀ 24, 24.5, 25
Kumaon	♀ moult	♀ 52+	♀ 23.5
Nepal	♀ moult; 100+[c]	♀ moult; broken[c]	♀ 23.5; 24.5[c]
Sikkim	[c] 95+, 95+, 103	[c] 52+, 52+, 60	[c] 22, 24, 25

[a] The specimens of "*kargasiensis*."
[b] Narastan and Liddar Valley (not located).
[c] Unsexed.

Cinclus pallasii marila Swinhoe

INDIA: Khasia Hills: Bara Pani, May 19–27, 1949, 3 ad. ♂, 1 subad. ♂.

These specimens are provisionally identified as *marila*, since it is the oldest name (1860) for the browner populations found in Formosa and from Bhutan to central China on the continent. These populations have a distinct rufous brown tinge best shown on the rump and upper tail coverts. In the more northern populations (nominate *pallasii* and *hondoensis*) the brownish tinge is less developed and on the rump and upper tail coverts is very

weakly suggested (*hondoensis*, Japan) or lacking entirely (nominate *pallasii*, Amurland and eastern Siberia).

In his review, Kinnear (1937, Ibis, p. 263) divides the browner southern populations into: *dorjei* (1937, *loc. cit.*) for the birds of Bhutan, Assam, Khasia Hills, Cachar, and Shan States; *souliei* (1892) for the birds of Szechwan, Hupeh, and Kansu; *siemsseni* (1903) for the birds of Fukien; and *marila* for those of Formosa. The birds of Kweichow have also been described as *sini* by Yen (1933, Ornith. Monatsber., vol. 41, p. 15). However, as the differences cited appear to be slight and as wear and foxing both cause important differences in coloration, this splitting appears excessive.

Kinnear states that *dorjei* described from Bhutan is the palest of the southern races and that his specimens from the Khasia Hills "may for the present be considered [to be] the same as [those from] Bhutan." The Koelz specimens from the Khasia Hills are darker, not paler, than any specimens from Formosa, or from the ranges of *siemsseni* and *souliei*. However, these specimens are in very fresh plumage, while the others are worn and old or old and foxed. The foxing may take place rather soon, for in a series taken in 1934 in Szechwan, the bill as well as the plumage has turned brownish. Specimens in fresh plumage taken in Amurland in 1930, which appear to have foxed little, are as dark as the specimens from the Khasia Hills but, as stated above, lack entirely the rufous brown coloration of the rump and upper tail coverts.

Measurements show that the populations of Bhutan, Formosa, Amurland, and Japan have a shorter wing and bill, those of the Khasia Hills may be intermediate, while those of China have a longer wing and bill. In the case of the latter, the size difference appears to be sufficiently well marked to justify recognition of a dimensional race (*souliei*) found in Kansu (Kinnear), Szechwan, Tsin ling Mountains, Hupeh, southern Kiangsu, Chekiang, Fukien, and Kweichow (Yen). *C. p. siemsseni* and *sini* will probably be found to be synonyms of *souliei*, while *marila* for the present must be regarded as having a split range.

MOULT: The adults taken on May 19 to 23 in the Khasia Hills have just finished a complete postnuptial moult, while a few last traces of juvenal plumage still show on the first winter bird taken on May 20. This specimen is moulting the whole tail, as are all the first winter birds of *C. p. tenuirostris*.

MEASUREMENTS OF ADULTS IN SOME POPULATIONS OF *Cinclus pallasii*

(For measurements of *C. p. tenuirostris*, see table 4.)

Region	Wing	Bill
Amurland	♂ 103, 104, 105; ♀ 96	♂ 24.5, 26, 26; ♀ 24
Japan	♂ 103, 104, 105, 106; ♀ 94, 98; unsexed 105	♂ 24, 24.5, 25, 26; ♀ 23, 24; unsexed 24.5
Formosa	♂ 102, 104, 104, 106; ♀ 98, 102	♂ 24.5, 25.2, 26.2, 26.5; ♀ 25.5, 26
Bhutan (Kinnear)	5 ♂ 100–106; 7 ♀ 93.5–101	5 ♂ 24–26; ♀ 24–25.5
Khasia Hills	♂ 105, 105, 111	♂ 27, 27.5, 27.5
Szechwan	♂ 111, 112; ♀ 100, 102, 106, 108, 108	♂ 27, 28.2; ♀ 25, 26, 26, 27.5
Tsin ling Mts.	♂ 112; ♀ 108, 111, 112	♂ 27; ♀ 26, 27, 27
Hupeh, S. Kiang-su, S. Chekiang	♂ 106, 112; ♀ 109, 110	♂ 28.2, 29; ♀ broken
Fukien	♂ 114; ♀ 106, 108, 111	♂ 27.5; ♀ 26, 27, 28.5
Kweichow (Yen)	♂ 114; ♀ 118	—