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## NOTES ON SOME ASIATIC TITMICE<sup>1</sup>

BY CHARLES VAURIE

### INTRODUCTION AND GENERAL REMARKS

This paper is a report on the titmice collected by Dr. Koelz in Iran, Afghanistan, and India. Over a thousand specimens were collected, and the present studies are based on these and a still larger number from the collection of the American Museum of Natural History.

Since the publication of the first three papers in this subseries new collections have been received from Dr. Koelz from northern India in Tehri, Garhwal, and Kumaon, as well as from western India in Rajputana (Sirohi) and from Junagadh and other parts of Kathiawar. The tits in these collections are incorporated in the present paper.

In the first three papers I used the term "Iran" in a restricted sense, because on Dr. Koelz's labels all localities followed by this name were situated on the Plateau or along its borders, localities in other regions bearing the well-known provincial names such as Azerbaijan, Fars, etc. Dr. Koelz, however, prefers that the term Iran be used in its present official sense denoting the whole of the country.

In the lists of specimens the term subadult (subad.) indicates that specimens are in first winter plumage.

### ACKNOWLEDGMENTS

I have received, as usual, much assistance from Dr. Ernst Mayr, and I deeply appreciate his friendly advice and interest in these studies.

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<sup>1</sup> Notes from the Walter Koelz Collections, Number 4. The previous papers in this subseries are: Number 1, American Museum Novitates, no. 1406, 1949; Number 2, American Museum Novitates, no. 1424, 1949; Number 3, American Museum Novitates, no. 1425, 1949.

To Mr. Jean Delacour I am grateful for suggestions and his kindness in examining some specimens of *Parus cyanus* and *Parus major* in the Paris and British Museums. He has always been interested in *Parus major* and together we have prepared a revision of the entire species which is being published elsewhere (L'Oiseau, in press).

Mr. B. Biswas has helped with Indian localities and has furnished me with the measurements of a series of *Aegithalos concinnus* taken by him in the British Museum. I have also had the pleasure of working out with him the plumages of *Parus xanthogenys*.

#### SUBFAMILY PARINAE

##### *PARUS LUGUBRIS*

Three races occur in Iran: *hyrcanus* Zarudny and Loudon, 1905 (type locality, Rustamabad, Gilan), *dubius* Hellmayr, 1901 (type locality, Shiraz, Fars), and *kirmanensis* (type locality, Deh Bakri, Kirman) recently described by Koelz (1950, Amer. Mus. Novitates, no. 1452, p. 8). *P. l. dubius* is a new name for the pre-occupied *persica* of Prazák (1895, Ornith. Jahrb., p. 81), based on *Parus lugubris* ? of Blanford (1876, Eastern Persia, p. 229) whose specimens came from Shiraz.

The range of *hyrcanus* is along the southern Caspian, *kirmanensis* so far is known only from the mountains of Kirman, and *dubius* is found in the Zagros from Fars to Kermanshah. The first two are apparently restricted to Iran, but *dubius* probably continues in the mountains over the Iranian border.

Comparison of the Koelz specimens (listed below) with a limited number of specimens in the collection of the American Museum of Natural History, of nominate *lugubris*, *lugens*, and *splendens* from southeastern Europe and of *anatoliae* from Asia Minor, shows that the specimens of *hyrcanus* from the region of Gurgan in adult and juvenal plumage are tinged with rust on the breast, belly, and flanks, while these parts are creamy or dingy white in all the other populations of the species examined. The crown in the three adults of *hyrcanus* is brown as in nominate *lugubris*, *lugens*, and *splendens*, but the brown is warmer, "browner," and less sooty.

The crown is black in *anatoliae*, *dubius*, and *kirmanensis*, the three races differing from one another by the color of the back. In *anatoliae* the mantle is distinctly darker and grayer than in *kirmanensis* and much darker than in *dubius*; in *kirmanensis*

the mantle is darker than in *dubius* and browner than in either *anatoliae* or *dubius*. In both *kirmanensis* and *dubius* the crown is pure velvety black; in two adult specimens of *anatoliae* (one of which is the type) the black is not so deep, but Paludan (1938, Jour. Ornith., vol. 86, p. 604) could see no difference in the intensity of the black.

**MOULT:** In the Zagros, adult specimens start their post-nuptial moult in May. In this region, the moult had not started in specimens taken from May 5 to 8 but had begun with that of the inner primaries in specimens taken from May 26 to 31. A specimen taken on October 29 at Durud in Luristan is interesting: this specimen, a male, which appears to be in first winter plumage in that it had moulted the contour feathers and greater wing coverts but still retained the juvenal primary coverts and wing feathers, had also grown a complete set of adult tail feathers.

In the region of Gurgan adults taken from July 22 to 23 are in the midst of a complete post-nuptial moult, and at the same time two immatures have started to moult into first winter plumage through a partial post-juvenal moult involving only the contour feathers and greater wing coverts.

TABLE 1

MEASUREMENTS OF FULL ADULTS IN IRANIAN POPULATIONS OF *Parus lugubris*

Race and Region	N	Wing	Tail	Bill
<i>hyrcanus</i>				
Gurgan	2 ♂	Moult	Moult	12.5, 13.0 —
Gurgan	1 ♀	Moult	Moult	12.5 — —
<i>dubius</i>				
Kermanshah	4 ♂	73.5-76.0 (74.5)	57-62 (59.7)	13.5-14.0 (13.8)
Kermanshah	2 ♀	71.0, 73.5 —	57, 59 —	14.0, 14.0 —
Luristan	2 ♂	75+, 75+ —	59, 59 —	13.5, 14.0 —
Bakhtiari	8 ♂	73.0-78.0 (75.4)	58-63 (60.2)	13.0-14.0 (13.6)
Bakhtiari	8 ♀	73.0-74.0 (73.5)	58-60 (59.2)	12.0-14.0 (13.5)
Fars	2 ♂	75.0, 75+ —	57+, 59 —	13.0, 14.0 —
<i>kirmanensis</i>				
Kirman	12 ♂	75.0-78.0 (76.5)	57-64 (60.6)	12.5-14.0 (13.2)
Kirman	6 ♀	71.0-76.0 (74.1)	57-61 (59.5)	12.5-13.5 (13.0)
Type (Deh Bakri)	1 ♂	78.0 — —	64 — —	14.0 — —

***Parus lugubris hyrcanus* Zarudny and Loudon**

IRAN: Region of Gurgan: Dimalu, July 22–23, 1940, 2 ad. ♂, 1 imm. ♂, 1 ad. ♀, 1 imm. ♀.

***Parus lugubris dubius* Hellmayr**

IRAN: Kermanshah: Surkhidizeh, January 10, 1941, 4 ad. ♂, 2 ad. ♀. Luristan: Durud, March 2, 1 ad. ♂, October 29, 1 subad. ♂; Chamchid, May 26, 1940, 1 ad. ♂; Kalvar, May 27–30, 2 imm. ♂, 1 imm. ♀, 1 unsexed ad. Bakhtiari: Ti, February 1–12, 1941, 5 ad. ♂, 1 subad. ♂, 1 ad. ♀, 3 subad. ♀, May 31, 1940, 1 ad. ♀; Imarat, February 14–19, 1941, 1 ad. ♂, 1 subad. ♂, 5 ad. ♀; Pashmshurun, April 30–May 10, 1940, 1 imm. ♂, 1 ad. ♀, 2 imm. ♀, 1 unsexed imm.; Damavar, May 5, 2 ad. ♂. Fars: Niriz, March 28, 1 ad. ♂; Dastarjin, April 8, 1 ad. ♂.

***Parus lugubris kirmanensis* Koelz**

IRAN: Kirman: Deh Bakri, January 27–28, 1940, 2 ad. ♂, January 28, 1 ad. ♂ (the type of *P. l. kirmanensis*), January 29–30, 2 ad. ♂, 3 ad. ♀; Gudar Ushturu, January 30, 1 ad. ♂; Dehidisk, January 31–February 1, 2 ad. ♂, 1 ad. ♀; Guragan, February 10, 1 ad. ♀; Maskun, February 11–13, 4 ad. ♂, 1 ad. ♀.

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***Parus ater gaddi* Zarudny**

IRAN: Region of Gurgan: Gozlu, July 15–16, 1940, 2 ad. ♀; Dimalu, July 16–24, 2 ad. ♂, 1 unsexed ad.; Karimserai, July 21, 2 ad. ♂, 3 ad. ♀; Kherat, July 26, 1 ad. ♀, September 30, 1 subad. ♂, 1 unsexed ad.; Gurgan, September 30, 1 ad. ♀, 1 subad. ♀.

All the July specimens are in full moult and cannot be used for comparison. Of the four September specimens only two are fully adult; the other two are in first winter plumage, but the coloration of their body plumage is identical in one case and in the other very close to that of the two adults. These four specimens differ from a small series of *michalowskii* from the Caucasus (four from Wladikawkaz) and Armenia (two from Kedlabek, north of Lake Sevan) by being browner, less gray, on the mantle and flanks. Two specimens of *derjugini* from Lasistan in western Transcaucasia are still grayer than the specimens of *michalowskii* and have a longer and thinner bill. Four specimens of *chorassanicus* from Ashkhabad are very similar to the four specimens of *gaddi*, but the brown of the mantle and flanks is a little paler. Specimens from the Zagros were not available; the birds of this region have been described as *phaeonotus* by Blanford, a race which, according to Hartert, is darker brown than *gaddi* (1921, *Die Vögel der paläarktischen Fauna*, p. 2115).

**MOULT:** In specimens taken from July 15 to 26 the moult is at its height, the body plumage, wing, and tail moulting simultaneously. The two adults taken on September 30 have finished the moult, but the two subadults still show a few last traces of moult in the body plumage.

**MEASUREMENTS:** Wing, adult female, 70; unsexed adult, 67. Tail, adult female, 48; unsexed adult, 47. Bill, four males, 11-12 (11.6); seven females, 11.0-12.5 (11.3).

### ***Parus ater aemodius* Hodgson**

INDIA: Northern Bengal: Darjeeling district, Tiger Hill, December 23, 1936, 1 ad. ♂.

This specimen measures: wing, 62; tail, 42; bill, 9.

### ***Parus nuchalis* Jerdon**

INDIA: Rajputana, Sirohi: Sirohi, December 25, 1948, 1 ad. ♂.

This specimen, in perfect plumage, has just finished the post-nuptial moult. Another adult male from Rajputana (Sambhar) and this specimen measure: wing, 68, 71; tail, 48, 52; bill, 12.0, 12.5.

This species, so very definitely associated with the dry north-western fringes of the Indian Plateau, has also been taken in southern India. Jerdon's type, collected by shikaris, is said to have come "from the Eastern Ghats west of Nellore." Despite "a very special look-out for it," the survey of the Eastern Ghats failed, however, to find it, and the only well-authenticated record for southern India is the one specimen taken at Satyamangala in the Biligirangan Hills (Ali, 1942, Jour. Bombay Nat. Hist. Soc., vol. 43, p. 145). In the north, outside Rajputana, it is found, according to Ali (1945, Birds of Kutch, p. 2), in Kutch and northern Gujarat. It is resident in these regions but patchy in its distribution and rather rare, the patchiness of its distribution probably being associated with the scarcity of suitable habitats.

### ***PARUS CAERULEUS***

The 125 specimens of this species collected by Koelz in Iran were compared with 65 specimens in the collection of the American Museum of Natural History from Scandinavia, East Prussia, Germany, and the region of Orenburg in eastern Russia. Despite this large amount of material I lack specimens from two important

regions. I have but one specimen from Transcaucasia and none from the Caspian side of the Elburz, except at its eastern extremity.

Examination shows that three forms stand out: a dark one from Scandinavia, East Prussia, and Germany (nominate *caeruleus*), a pale form, very yellowish on the back, from the region of Orenburg (*orientalis*), and a smaller, very pale form from the Zagros (*persicus*). According to my specimens two other forms can be distinguished, but the differences are not so distinct. These are *satunini* in northwestern Iran and *raddei* in northern Iran.

*Parus c. orientalis* was described from the region of Orenburg by Zarudny and Loudon. This form is not recognized by Dementiev, who makes it a synonym of nominate *caeruleus* (1935, L'Oiseau, p. 74). However, my 24 specimens from Orenburg and region, collected by Zarudny, fully support Hartert when he states that *orientalis* is a "good" race, considerably paler and [much] yellower on the back than nominate *caeruleus* (1921, Die Vögel der paläarktischen Fauna, p. 2112).

In 1908 Zarudny described birds from Lenkoran and Kumbaschinsk in Russian Talych as *satunini*. This race is stated to be pale, more or less intermediate between nominate *caeruleus* and *persicus*, paler than *raddei*, and lacking the yellow on the back of *orientalis*. My specimens from Azerbaijan fit this description perfectly. Three additional names have been applied by Buturlin to birds from the Caucasus and Transcaucasia, but these names have all been made synonyms of *satunini* by the Russian authors. A specimen from Transcaucasia taken at Kutaïs, the type locality of one of Buturlin's names (*colchicus*), is very slightly paler above and below than my specimens from Ardebil and Namin (about 50 kilometers from Lenkoran, the type locality of *satunini*) but is identical with specimens from central and western Azerbaijan.

Zarudny stated that *satunini* was also found at Kazvin and in the Transcaspiian mountains. I have only four immature specimens from Khorasan taken at Kotaliyekchinar in the northern mountains, and these specimens are not diagnostic. At Karaj to the east of Kazvin my specimens are distinctly darker green above and darker yellow below than the specimens from Azerbaijan.

These specimens appear to belong to the darker *raddei*, which was described by Zarudny from "Astrabad, Mazanderan, and

Gilan'' as being smaller than nominate *caeruleus* and more strongly tinged with green and darker on the back. This is supported by Stresemann (1928, Jour. Ornith., vol. 76, p. 367) who also found that his specimens from Kuramabad in Gilan were more strongly yellow below.

Unfortunately I have no specimens from the coastal districts of the Elburz, but towards its eastern extremity four specimens from Gurgan and near-by Kherat in fresh plumage are not separable by the color of the back from specimens of nominate *caeruleus* in comparative plumage from Scandinavia, East Prussia, and Germany. Three specimens from Karaj are identical with the Gurgan and Kherat birds. In these seven specimens the yellow of the under parts is perhaps very slightly stronger than in nominate *caeruleus*, but, although too few, the measurements are not smaller (table 2).

On the basis of my specimens from Karaj, Gurgan, and Kherat, I could not recognize *raddei* as distinct from nominate *caeruleus*, but I believe that *raddei* is probably a valid race, since the measurements of both Zarudny and Stresemann (table 2) show it to be smaller, and both authors agree that it differs in coloration. The type locality, however, is vague and also unsatisfactory, as the birds of Gurgan (formerly Astrabad) may not be typical *raddei*.

As stated, *persicus* is very pale and unmistakably different from the other four races. Its bill averages shorter, and, as Blanford stated, it is also thinner.

A cline of decreasing pigmentation runs from east to west in Azerbaijan and from northwest to southeast along the Zagros. This cline is slight but can be appreciated in my excellent series of adult and first winter birds in very fresh or almost fresh plumage taken in these two regions from October 30 to February 13. Specimens from eastern Azerbaijan (Namin, Ardebil, and Sarab) are slightly more heavily pigmented than birds from central Azerbaijan (Tabriz, Livan, and Maraghe), and these in turn are very slightly darker than specimens from Rezaieh on the western side of Lake Urmia and from Saujbulagh south of the lake. I have no specimens between Saujbulagh and Hamadan. At Hamadan the birds are now too pale and too small for *satunini*, but the birds of Hamadan are very slightly darker than those of Kermanshah, and these in turn are very slightly darker than those of Bakhtiari. I would expect the trend to continue and the birds of Fars to be palest. But unfortunately all my specimens from

Fars were taken in April and are no longer comparable; in this worn plumage they are identical with other worn specimens taken in Luristan and Bakhtiari in April and May. All the differences mentioned above are extremely subtle, but they are appreciable in series.

TABLE 2

MEASUREMENTS OF FULLY ADULT MALES AND FEMALES IN  
SOME POPULATIONS OF *Parus caeruleus*

(Fresh or not badly worn plumage only, except where stated)

Locality or Region	N	Wing	Tail	Bill
<i>P. c. caeruleus</i>				
Sweden, Norway	2 ♂	67.5, 70.0 —	53, 53 —	9.5, 10.0 —
Sweden, Norway	4 ♀	65.0–66.5 (65.5)	51–53 (52.0)	9.5–10.0 ( 9.7)
East Prussia	5 ♂	67.0–69.0 (68.0)	51–55 (53.6)	10.0–11.0 (10.4)
Marburg, Hesse	7 ♂	66.0–71.0 (68.8)	50–55 (51.8)	9.0–11.0 ( 9.8)
<i>P. c. orientalis</i>				
Orenburg, E. Russia	10 ♂	68.0–71.0 (69.2)	52–56 (54.0)	10.0–11.0 (10.3)
Orenburg, E. Russia	6 ♀	66.0–69.0 (67.0)	50–53 (51.5)	9.5–10.0 ( 9.8)
<i>P. c. satunini</i>				
Azerbaijan	10 ♂	64.0–70.0 (67.0)	48–56 (51.5)	9.5–10.0 ( 9.9)
Azerbaijan	10 ♀	63.0–68.0 (65.4)	48–53 (50.6)	8.5–10.0 ( 9.4)
<i>P. c. persicus</i>				
Hamadan	7 ♂	63.0–67.0 (65.4)	48–52 (49.5)	9.0–10.0 ( 9.1)
Hamadan	3 ♀	62.0–64.0 (63.0)	46–49 (48.0)	8.5– 9.5 ( 9.0)
Kermanshah	5 ♂	64.0–68.0 (65.5)	48–50 (48.8)	9.0–10.0 ( 9.6)
Kermanshah	6 ♀	62.5–65.0 (63.9)	47–51 (49.0)	8.5– 9.5 ( 9.1)
Luristan, Bakhtiari	19 ♂	62.0–68.0 (66.1)	46–53 (49.8)	8.5–10.0 ( 9.3)
Luristan, Bakhtiari	11 ♂ <sup>a</sup>	62.0–67.0 (64.4)	47–51 (49.0)	
Luristan, Bakhtiari	3 ♀	62.5–64.0 (63.8)	46–50 (47.3)	9.0– 9.5 ( 9.3)
Fars	2 ♂ <sup>a</sup>	65.0, 66.0 —	49, 52 —	9.0, 9.5 —
Fars	2 ♀ <sup>a</sup>	63.0, 64.0 —	48, 49 —	9.0, 9.0 —
<i>P. c. raddei</i>				
Kuramabad, Gilan <sup>b</sup>	5 ♂	62.0–67.0 (64.0)	— — —	— — —
Kuramabad, Gilan <sup>b</sup>	3 ♀	59.0–62.0 (60.7)	— — —	— — —
Karaj	2 ♂	65.0, 67.0 —	47, 49 —	9.0, 10.0 —
Karaj	1 ♀	65.0 — —	48 — —	9.0 — —
Gurgan	2 ♂	67.0, 69.0 —	50, 52 —	8.5, 10.0 —
Gurgan	2 ♀	63.0, 63.0 —	45, 48 —	9.5, 9.5 —

<sup>a</sup> Badly worn.

<sup>b</sup> Stresemann (1928, Jour. Ornith., vol. 76, p. 367).



To summarize:

*Parus caeruleus orientalis* Zarudny and Loudon, 1905 (type locality Orenburg) is a well-characterized race.

Three races occur in Iran:

A. *P. c. satunini* Zarudny, 1908 (type locality Lenkoran); range in Iran: Azerbaijan, and, according to Zarudny, found at Kazvin, and [?] in the Transcasian mountains.

B. *P. c. raddei* Zarudny, 1908 (type locality "Astrabad, Mazanderan, and Gilan"); restricted to Iran: in the Elburz and the southern Caspian districts east of the range of *satunini*.

C. *P. c. persicus* Blanford, 1873 (type locality Shiraz); range in Iran: the Zagros from somewhere north of Kermanshah into Fars.

According to my specimens the characters of the five races included in this study may be summarized as follows:

RACE	COLORATION OF THE BACK	COLORATION OF THE LOWER PARTS	SIZE
<i>caeruleus</i>	Darkest and greenest	Dark; yellow less pure, tinged with grayish green	Large
<i>orientalis</i>	Pale, with strong yellowish tinge	Pale; yellow pure and bright	Large
<i>satunini</i>	Paler than <i>caeruleus</i> , less green, more grayish; darker than <i>orientalis</i> , less yellowish, more grayish	Like <i>orientalis</i> but yellow averages stronger	Large
<i>raddei</i>	Like <i>caeruleus</i> , but said to be darker with more gray	Like <i>caeruleus</i> , but yellow averages slightly stronger	Small
<i>persicus</i>	Very pale and distinctly grayish without yellowish tinge of <i>orientalis</i>	Palest; yellow very weak	Small and with thin- nest bill

MOULT: Adults have a complete post-nuptial moult. In Iran this moult is well advanced in specimens taken from July 15 to 24 in the region of Gurgan, and nearing completion in a specimen from July 27. In Azerbaijan, however, a specimen taken on October 30 is still showing a few last traces of moult on the crown.

According to my specimens, immatures in Iran may moult into first winter plumage a little later than adults, for the moult is just starting in specimens taken from July 24 to 27 in the region of Gurgan, August 3 to 5 in Khorasan, and August 13 in Luristan.

The first feathers to be changed are the lesser wing coverts. In a specimen taken on November 2 in Azerbaijan the moult is virtually finished except for a very few last traces in the body plumage. In the moult into first winter plumage, all the body plumage and wing coverts except for the primary coverts are renewed. The primaries, secondaries except two or three of the innermost, and the rectrices, except for the central pair, are not changed.

### ***Parus caeruleus satunini* Zarudny**

IRAN: Azerbaijan: Tabriz, October 30, 1940, 1 ad. ♂, 1 subad. ♂, 3 ad. ♀, 1 subad. ♀, 1 unsexed ad.; Ardebil, November 2-4, 1 subad. ♀, 2 unsexed subad.; Namin, November 6, 1 ad. ♂; Sarab, November 8-9, 2 ad. ♂, 2 ad. ♀, 2 subad. ♀; Livan, November 14-15, 1 ad. ♀, 1 subad. ♀; Maraghe, November 25-December 1, 2 ad. ♀, 1 unsexed ad.; Saujbulagh, November 26-December 3, 3 ad. ♂, 1 subad. ♂, 1 ad. ♀, 1 unsexed subad.; Rezaieh, December 6-8, 3 ad. ♂, 2 ad. ♀, 1 subad. ♀; Khoi, December 10, 1 subad. ♀.

### ***Parus caeruleus raddei* Zarudny**

IRAN: Region of Tehran: Karaj, January 19-20, 1944, 1 ad. ♂, 1 ad. ♀, November 15, 1945, 1 ad. ♂. Mazenderan (region of Gurgan): Gozlu, July 15, 1940, 1 ad. ♂; Germabdasht, July 24, 1 ad. ♂, 1 imm. ♀; Kherat, July 27-September 30, 2 ad. ♂, 2 ad. ♀, 1 imm. ♀; Gurgan, September 30, 1 ad. ♂. Khorasan: Kotaliyekchinar, August 3-5, 1 imm. ♂, 3 unsexed imm.

### ***Parus caeruleus persicus* Blanford**

IRAN: Region of Hamadan; Hamadan, December 20, 1940-January 18, 1941, 7 ad. ♂, 3 ad. ♀. Kermanshah: Kangavar, December 23, 1940, 1 ad. ♂, 1 unsexed ad., 1 unsexed subad.; Kermanshah, December 26, 1 ad. ♂, 1 ad. ♀; Qasr i Shirin, December 28, 1940-January 6, 1941, 3 ad. ♂, 1 subad. ♂, 5 ad. ♀, 2 subad. ♀, 1 unsexed subad.; Surkhidizeh, January 10, 1 ad. ♀. Luristan: Durud, January 25, 1 ad. ♀, August 13, 1 unsexed imm.; Kalvar, May 28-30, 1940, 3 ad. ♂, 2 imm. ♂, 1 ad. ♀, 1 imm. ♀. Bakhtiari: Damavar, May 4, 1 ad. ♂ "nesting"; Pashmshurun, April 30-May 9, 9 ad. ♂, half of them "nesting"; Ti, February 1-13, 1941, 12 ad. ♂, 1 ad. ♀, May 30, 1940, 1 imm. ♂; Imarat, February 15-19, 1941, 6 ad. ♂, 1 ad. ♀. Fars: Dastarjin, April 8-9, 1940, 2 ad. ♂, 1 subad. ♂, 2 ad. ♀, 1 subad. ♀.

### ***Parus cyanus flavipectus* Severtzow**

AFGHANISTAN: Sufian, July 18, 1937, 1 imm. ♂; Tirgaran, July 19, 2 ad. ♂, 2 imm. ♂, 1 imm. ♀, 1 unsexed imm.; Iskan, August 3, 1 ad. ♂, 1 imm. ♀; Gurzan, October 5, 1939, 1 ad. ♀; Burchao Pass, October 13, 1 ad. ♀.

These specimens constitute the first record of the species for Afghanistan.

In the 1937 series from northeastern Afghanistan the three

adults are extremely worn and cannot be used for comparison, but the six immatures are identical with three immatures of *flavipectus* from Ferghana.

The two adult females taken farther west at Gurzan and at the Burchao Pass in the Bend i Turkestan Range in October, 1939, are in very fresh plumage, the body plumage still showing a few last traces of moult. They are very pale, powder gray, on the back. In adult specimens of *flavipectus* in fresh plumage taken in Ferghana (mostly at Margelan) three females are duller, slightly darker, and bluer, and four males are bluer than the females from both Ferghana and the Bend i Turkestan. The differences, however, are undoubtedly due to sex and the age of the specimens. In their review of the species, Dementiev and Heptner (1932, *Alauda*, pp. 284–291) noticed that males are bluer and darker than females, and that with the age of the specimens the gray of the mantle becomes duller and bluer in both sexes. My Ferghana specimens are all old skins collected from 1878 to 1893. Sex or age of the specimens apparently does not seem to affect the coloration of the lower parts or affects it so slightly that I cannot separate the sexes or the old skins of Ferghana from the recent ones from the Bend i Turkestan.

Since I have failed to find individual measurements of *flavipectus* in the literature, the individual measurements of all adults that are not moulting are given here.

Afghanistan: Wing: males (very worn), 65, 66; females (fresh), 64, 64. Tail: males (very worn), 59, 60; female (fresh), 58. Bill from skull: males, 11, 11, 11.5; females, 10.5, 11.

Ferghana: Wing: males (fresh), 66, 66, 66.5, 68; females (fresh), 64, 65, 66. Tail: males (fresh), 57, 61, 62, 62.5; females (fresh), 55, 56, 58. Bill: males, 10.5, 11, 11, 11; females, 10.5, 11, 11.

MOULT: In adults a complete post-nuptial moult takes place from about the middle of July to early October. Of the two adult males taken on July 19 in the northeast, one is extremely worn but has not started to moult, and in the other the moult has barely started, the first feathers to be replaced being some of the inner secondaries. In another adult male taken on August 3 in the same region the moult is well advanced, the body, wing, and tail feathers moulting simultaneously. Both of the October females show traces of moult in the body plumage, and on the specimen taken on October 5, the three outer pairs of rectrices are from a

third to a half grown. The immatures taken from July 18 to August 3 have not begun to moult into first winter plumage.

### *Parus cyanus carruthersi* Hartert

The measurements given by Hartert in the description of his *Parus flavipectus carruthersi* (1917, Bull. Brit. Ornith. Club, vol. 38, p. 19) must be corrected to: wing length of males, 63 (type), 66; female, 63; unsexed adult, 64. Hartert had given the wing measurements as 93 and 96 in the males, 92 in females, and 94 for the unsexed adult, and in 1921 (Die Vögel der paläarktischen Fauna, pp. 2113–2114) had repeated the erroneous measurements.

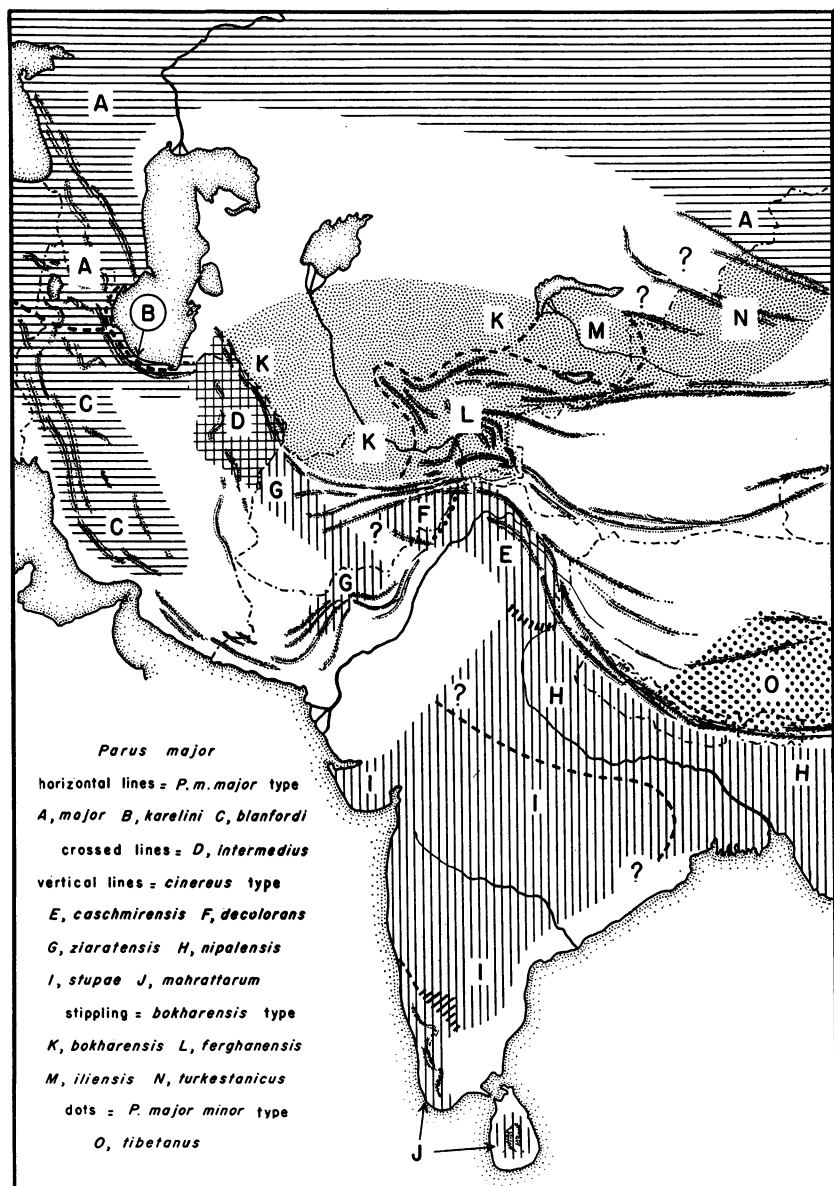
This *lapsus calami* has been corrected by Mr. Jean Delacour who had the kindness to reexamine for me the original specimens from Samarkand in the British Museum. I quote his notes in full, as the validity of *carruthersi* needs to be confirmed, its only appearance in the literature being limited, despite several reviews of *Parus cyanus*, to the two references cited above. He found *carruthersi* to be a well-marked form, being "Smaller than *flavipectus* from Ferghana whose wing measures 65–70, crown grayer and darker, also back and throat, belly less pure white, more 'dirty' and breast less clear yellow. Less white in the tail." Compared to *berezowskii* from the Nan Shan he found *carruthersi* to be "much darker."

The tail measured by Delacour is: males, 59 (type), 61; female, 59; unsexed adult, 59.

### PARUS MAJOR

This species varies geographically throughout its enormous range and, as a result, has been split into innumerable races. Meinertzhagen (1928, Ibis, pp. 530–533) recognizes no fewer than 41 races, and since then a number of others have been described. This review deals only with the races found in the Iranian region, Turkestan, India, and Ceylon.

Within this region, Meinertzhagen recognizes nine races: nominate *major*, *blanfordi*, *cinereus*, *mahrattarum*, *planorum*, *caschmirensis*, *intermedius*, *bokharensis*, and *jitnikowi*. Since Meinertzhagen, *cinereus* has been restricted to Java, and *planorum* and *jitnikowi* are no longer recognized. But five names synonymized by Meinertzhagen have been revived (*karelini*, *nipalensis*, *ferghanensis*, *iliensis*, and *turkestanicus*), and four additional races have been described—the first (*ziaratensis*) by Whistler in 1929,

FIG. 1. Distribution of *Parus major* in western Asia.

and the other three (*stupae*, *meinertzhageni*, and *decolorans*) by Koelz (1939, Proc. Biol. Soc. Washington, vol. 52, pp. 61-63).

This study shows that, in the region as defined above, 14 races can be recognized: nominate *major*, *karelini*, *blanfordi*, *intermedius*, *caschmirensis*, *decolorans*, *ziaratensis*, *nipalensis*, *stupae*, *mahrattarum*, *bokharensis*, *ferghanensis*, *iliensis*, and *turkestanicus*. The ranges are shown in figure 1. Some of these races are based on slender ground, but I have recognized all races whose characters appear to be constant.

My material from this region consists of about 650 specimens, including six types, 200 odd in the collection of the American Museum of Natural History, and 430 odd collected by Koelz. In addition, Mr. J. Delacour has had the kindness to examine for me some of the Turkestan specimens in the British Museum.

#### CHARACTER VARIATION

The variations affect size, proportions, and pigmentation.

VARIATIONS IN SIZE: In table 3, in the 32 populations consisting of four or more adult males that I have measured, the variations in round numbers between the averages are as follows:

Wing: 63 to 78, or about 19 per cent

Bill (from skull): 12 to 14, or about 14 per cent

Tail: 55 to 75, or about 27 per cent

The wing length does not appear to be correlated with migration. In northern Europe, where the species is migratory or partly so, my populations of adult males from Scandinavia, East Prussia, and Pskov have a mean wing length of 76.5, 76.1, and 77.1, but in supposedly sedentary populations in Persia the mean wing length in the Zagros is 76.8, 77.4, and in Khorasan, 77.0.

On the other hand there is definite evidence that the wing length is affected by altitude. In India the Himalayan populations have a wing length of 74.6 and 76.4, but those from lower altitudes in lower Nepal, lowland Assam, United Provinces, and central India have wing lengths of 64.8, 63.5, 66.8, 65.5, and 65.3. The larger race of southern India and Ceylon (*mahrattarum*) is a highland form. In Travancore, Whistler states that it is confined to the hills, going up to 6000 feet (1932, Jour. Bombay Nat. Hist. Soc., vol. 35, p. 518). In Ceylon, the same author has taken it at 5800 feet (1944, Spolia Zeylanica, vol. 23, p. 129). The true specimens of this race that I have seen from southern India were

taken at Ootacamund in the Nilgiris at an elevation of about 7500 feet.

In Iran the birds along the southern Caspian strip (*karelini*), which, as Heinrich states (1928, Jour. Ornith., vol. 76, p. 367), are restricted to the gardens of the coastal plain and the lower slopes, ascending only as high as 600 meters, are smaller than the birds found at higher altitudes in Azerbaijan, the Zagros, or the Plateau. In Turkestan, *ferghanensis* from the mountains of Bukhara and Ferghana averages larger than *bokharensis* from the lowlands of Bukhara and of Afghan Turkestan. In a detailed study based on large series it might be possible to show that throughout the whole range of the species the larger populations come from the higher altitudes.

The size of the bill and the length of the tail, with the significant exception of the Turkestan populations in the case of the latter, appear to be correlated on the whole with the body size as expressed by the length of the wing. In nominate *major* the bill is proportionately a little smaller.

VARIATIONS IN PROPORTIONS: The variations in the tail length are best studied in terms of the proportion of the length of the tail to that of the wing. This tail index, in the populations measured by me in table 3 in which there are four or more specimens, runs within the narrow range of 79.3 to 84.5 (81.5) per cent in 14 populations from the west (Europe and Iran), and 81.7 to 87.5 (84.9) in 12 populations from the east (Afghanistan and India), with an average of 83.14 for the 26 populations. But in the four populations from Turkestan the tail index is 100.5 to 103.6 (101.5). In one population from Dzungaria in the British Museum measured by Delacour the tail index in four males was 102 to 105 (103.7), and in the Turkestan populations in table 3 the two populations measured by Laubmann had an average tail index of 102.8 and 107.3, and in one measured by Zarudny and Bilkevitch the average tail index is 112.4 as against 88.0 for the population from Iran.

As the tail index of the Turkestan populations is proportionately 25 per cent greater than in the western populations (28 per cent, according to Zarudny and Bilkevitch), and 20 per cent greater than in the eastern populations, these differences in proportions do seem important.

VARIATIONS IN PIGMENTATION: Except for occasional minor details, the pattern of the pigmentation remains the same, but the

coloration is more variable than either proportion or size, and racial discrimination is based very largely on the presence or absence of the yellow lipochrome, the greater or lesser degree of saturation, and the slight differences in the distribution of pigment.

In the region where the 14 races occur, there is an obvious division between the western races, in which the plumage of the adult is pigmented with yellow above and below, and those from farther east, in which the yellow lipochrome is completely absent in the adult form and is present or absent in the immature. In this region the race (*intermedius*) that intervenes geographically between the yellow and gray races is a hybrid population, the adult showing a varying amount of yellow on the back but none on the under surface. In the races of the Far East that are not part of this study, the race (*commixtus*) intervening geographically between the gray races of India and Burma and the green-backed populations of northern China also has a varying amount of yellow lipochrome on the back.

In the yellow western races the variation affects the amount of yellow lipochrome on the lower surface of the body. In the gray eastern races the plumage above and below is saturated to a greater or lesser degree, and the greater coverts and inner tail feathers are invaded to a varying degree by melanin. The variation also affects the presence, absence, or amount of pigment on the second outer pair of tail feathers, and sometimes on the tip of the third.

Generally speaking, the degree of saturation appears to be correlated with humidity. For instance, *mahrattarum* from the wet Nilgiris, Travancore, and the mountains of Ceylon is considerably darker than are the populations from the more arid sections of northern, western, and central India. However, in dry Afghanistan, *decolorans* in some parts of its plumage is as dark as, or darker than, the heavily saturated *mahrattarum*.

#### RECOGNIZED RACES

##### ***Parus major* Linnaeus, 1758**

TYPE LOCALITY: Sweden.

SYNONYMS: *Parus major scytharum* Floericke, 1920; type locality, Sarepta, southeastern Russia. *Parus major caucasicus* Domanevski, 1933; type locality, Lagodekhi, Transcaucasia.

These two names have been synonymized with nominate *major* by Dementiev (1935, L'Oiseau, p. 71). In my material, speci-



TABLE 3

MEASUREMENTS OF FULLY ADULT MALES IN SOME RACES OF *Parus major*

(The tail index, expressed in per cent, is the proportion of the length of the tail to that of the wing)

Race, Locality, or Region	N	Wing	N	Tail	N	Tail Index	N	Bill from Skull
<i>P. m. major</i>								
Sweden, Norway	5	75.0-78.0 (76.5)	5	60.0-65.0 (62.0)	5	77.0-87.0 (81.0)	5	12.0-14.0 (13.0)
East Prussia	7	74.0-78.5 (76.1)	7	59.0-67.0 (62.6)	7	77.5-86.0 (82.0)	7	12.0-14.0 (13.2)
Hesse	5	75.0-79.0 (76.4)	5	59.0-64.0 (61.6)	5	75.0-83.0 (79.5)	5	12.5-13.5 (13.1)
W. Russia (Pskov)	5	75.5-80.0 (77.1)	4	61.0-62.5 (62.0)	4	76.0-82.0 (79.6)	5	13.0-14.0 (13.5)
E. Russia (Orenburg)	12	76.0-82.0 (78.1)	12	59.0-68.0 (63.9)	12	76.0-87.0 (82.0)	12	12.5-14.0 (13.2)
Siberia (Altai)	4 <sup>a</sup>	74.0-78.0 (76.2)	4	62.0-66.0 (64.0)	4	79.0-86.5 (82.9)	4	12.5-13.5 (13.0)
Azerbaijan	23	74.5-81.0 (77.5)	21	61.0-68.0 (64.4)	21	78.0-89.0 (82.6)	24	13.0-14.0 (13.5)
<i>P. m. karelini</i>								
Gilan <sup>b</sup>	4	70.0-72.0 (71.4)	—	—	—	—	—	—
Southern Caspian <sup>c</sup>	32	68.4-76.3 (72.8)	27	61.0-68.7 (64.5)	27	85.0-91.0 (88.0)	—	—
<i>P. m. blanfordi</i>								
Shahrud	4	74.0-76.5 (75.5)	4	62.0-63.0 (62.5)	4	81.0-85.0 (82.5)	3	13.0-14.0 (13.4)
Gurgan	4	73.5-78.0 (75.9)	3	60.0-64.0 (62.0)	3	81.0-82.0 (81.5)	4	12.5-14.0 (13.2)
Tehran and region	17	73.0-79.0 (74.8)	15	57.0-65.0 (61.9)	15	76.5-86.5 (81.0)	17	12.5-14.0 (13.4)
Hamadan	5	75.0-78.0 (76.2)	5	58.0-67.0 (62.0)	5	76.0-86.0 (81.5)	5	12.5-13.5 (13.0)
Kermanshah	5	73.5-77.0 (75.4)	5	59.0-61.0 (59.8)	5	77.0-82.0 (79.3)	5	13.0-14.0 (13.5)
Luristan, Bakhtiari	26	74.0-81.0 (76.8)	25	59.0-68.0 (63.6)	25	77.5-87.0 (82.3)	26	12.5-14.0 (13.3)
Isfahan	2	77.5, 79.0	2	65.0, 68.0	2	84.0, 86.0	2	13.5, 14.0
Fars	14	75.0-80.0 (77.4)	14	59.0-69.0 (64.1)	14	77.0-86.0 (81.8)	14	13.0-14.0 (13.5)

<sup>a</sup> Unsexed adults.<sup>b</sup> Stresemann (1928, Jour. Ornith., vol. 76, p. 366).<sup>c</sup> Zarudny and Blkevitch (1913, Messenger Ornith., pp. 24-27).

TABLE 3—Continued

Race, Locality, or Region	N	Wing	N	Tail	N	Tail Index	N	Bill from Skull
<i>P. m. intermedius</i>								
Khurasan	28	74.0-81.0 (77.0)	26	58.0-71.0 (65.0)	26	76.0-89.0 (84.5)	27	12.5-15.0 (13.7)
<i>P. m. caschmirensis</i>								
Kashmir	7	74.0-81.5 (76.4)	7	65.0-73.0 (68.1)	7	84.0-91.0 (87.5)	10	12.5-13.5 (13.1)
Northern Punjab	11	72.0-78.0 (74.6)	11	62.0-67.0 (64.3)	11	84.5-89.0 (86.8)	10	12.5-13.0 (12.8)
Type (Gilgit)	<sup>a</sup>	74.0 — —	—	67.0 — —	—	90.5 — —	—	13.0 — —
<i>P. m. decolorans</i>								
E. Afghanistan	6	74.0-77.0 (75.7)	6	63.0-68.0 (65.0)	6	84.0-88.5 (85.9)	6	12.5-13.5 (12.8)
Type (Jalalabad)	1	77.0 — —	1	68.0 — —	1	88.0 — —	1	13.5 — —
<i>P. m. ziaratensis</i>								
So. Afghanistan	7	71.0-76.0 (74.0)	6	62.0-67.5 (65.0)	6	85.0-89.0 (87.1)	7	12.5-13.5 (13.0)
Ziarat <sup>e</sup>	5	73.0-77.0 —	5	62.5-71.0 —	—	— — —	—	— — —
<i>P. m. nipalensis</i>								
Lower Nepal	5	63.0-66.0 (64.8)	5	53.0-59.0 (55.8)	5	84.0-89.0 (86.5)	5	11.5-12.0 (11.8)
United Provinces	13	63.0-70.0 (66.8)	13	52.0-60.0 (56.3)	13	79.0-87.5 (84.0)	13	11.5-13.0 (12.2)
Assam (Dibrugarh)	4	63.0-65.0 (63.5)	4	54.0-55.0 (54.8)	4	83.0-87.5 (86.0)	4	11.5-12.0 (11.8)
Bengal	3	63.0-64.0 (63.5)	3	54.0-57.0 (55.6)	3	86.0-88.0 (87.0)	3	11.5-12.0 (11.8)
<i>P. m. stupae</i>								
Surguja	4	64.0-67.0 (65.5)	2	56.0, 58.0 —	2	85.0, 87.0 —	4	11.0-12.0 (11.6)
Central Provinces	5	64.0-67.0 (65.3)	4	53.0-58.0 (55.0)	4	80.0-87.0 (82.4)	5	11.5-12.5 (11.7)
Bhopal	2	66.0, 66.5 —	2	53.0, 56.0 —	2	80.5, 85.0 —	1	12.5 — —
Sirohi	3	65.0-69.0 (67.0)	3	52.0-54.0 (53.0)	3	75.0-79.0 (77.2)	3	11.5-12.0 (11.8)
Junagadh	7	68.0-71.0 (69.5)	7	52.0-60.0 (56.3)	7	76.0-86.0 (81.7)	7	12.0-13.0 (12.4)
Type (Sanchi)	1	66.0 — —	1	53.0 — —	1	80.5 — —	1	12.0 — —

<sup>a</sup>Unsexed adult.<sup>e</sup>Whistler (1929, Bull. Brit. Ornith. Club, vol. 50, p. 7).

TABLE 3—Continued

Race, Locality, or Region	N	Wing	N	Tail	N	Tail Index	N	Bill from Skull
<i>P. m. maharatarum</i>								
Bangalore	2	69.0-71.0 —	2	56.0-58.0 —	2	81.0-82.0 —	2	11.5-12.0 —
Ootacamund	6	74.0-75.0 (74.5)	6	59.0-65.0 (61.3)	6	80.0-87.0 (82.5)	6	12.0-13.5 (12.8)
Ceylon	4	70.0-75.0 (72.5)	3	57.0-62.0 (60.1)	3	78.0-88.0 (84.0)	4	12.5-13.0 (12.6)
Type (Nuwara Eliya)	1	73.0 —	1	57.0 —	1	78.0 —	1	12.5 —
<i>P. m. bokharensis</i>								
Transcaspia, Bukhara	5 <sup>f</sup>	63.0-72.5 (68.6)	5	64.0-75.0 (70.2)	5	97.0-115.0 (103.6)	5	12.5-14.0 (13.1)
Balkh	10	66.0-70.0 (68.5)	10	66.0-71.0 (69.0)	10	97.0-115.0 (101.0)	12	12.5-13.5 (13.0)
<i>P. m. ferghanensis</i>								
Ferghana	6	68.0-73.0 (71.0)	6	66.0-75.0 (71.5)	6	97.0-104.0 (100.5)	5	12.5-13.5 (12.9)
Tashkent <sup>g</sup>	9	72.0-76.0 (74.4)	9	73.0-79.0 (76.4)	9	98.0-105.0 (102.8)	—	— —
Rustak	3	75.0-75.0, 75.0	2	74.0, 77.0 —	2	99.0, 103.0 —	3	13.0-14.0 (13.5)
<i>P. m. iliensis</i>								
Ili River, Djarkent	9	72.0-77.0 (74.5)	9	72.0-78.0 (74.9)	9	96.0-104.0 (101.0)	9	13.5-14.5 (14.0)
Ili River, Djarkent <sup>h</sup>	16	68.2-73.5 (71.5)	16	77.0-83.8 (80.5)	16	110.0-116.0 (112.4)	—	— —
Ili River <sup>i</sup>	3	72.0-75.0 (73.3)	3	78.0-79.0 (78.7)	3	104.0-110.0 (107.3)	—	— —
<i>P. m. turkestanicus</i>								
Dzungaria <sup>j</sup>	4	75.0-76.0 (75.5)	4	76.0-80.0 (78.0)	4	102.0-105.0 (103.7)	—	— —

<sup>f</sup>Includes two unsexed adults, apparently males.<sup>g</sup>Laubmann (1913, Verhandl. Ornith. Gesellsch. Bayern, vol. 11, p. 274).<sup>h</sup>Zarudny and Bilkevitch (1912, Messager Ornith., p. 143).<sup>i</sup>Laubmann (1913, Verhandl. Ornith. Gesellsch. Bayern, vol. 11, p. 275).<sup>j</sup>Specimens in British Museum as measured by Delacour.

mens from Jekaterinoslav Gouvernement in southern Russia and Orenburg Gouvernement in southeastern Russia are identical with specimens of nominate *major* from Scandinavia and western Europe. No specimens from Transcaucasia were available, but my very fine and long series from neighboring Azerbaijan also does not differ in any way from European specimens of nominate *major*. Specimens from the Altaï are likewise identical.

***Parus major karelini* Zarudny, 1910**

TYPE LOCALITY: Talych.

This race is admissible on the basis of being smaller than nominate *major* and *blanfordi*. According to Stresemann (1928, Jour. Ornith., vol. 76, p. 366) it is a little paler than nominate *major* but darker than *blanfordi*, the yellow of the under parts in *karelini* being brighter and somewhat less tinged with greenish than in nominate *major*.

I have examined only one unmistakable specimen of this race, an adult female from Resht. Its wing measurement (68 mm.) corresponds very well to the measurements of female *karelini* given by Stresemann, whose three females from Gilan had the wing 67.0–70.5 (69.2), and the measurements of Zarudny and Bilkevitch, whose 15 females from the southern Caspian had the wing 67.2–71.4 (69.7) (1913, Messenger Ornith., pp. 27–28). Female specimens of nominate *major* are larger; in my specimens, 10 from western Europe measure 72–76 (74.2), eight from Russia 73–77 (75.1), and 10 from Azerbaijan 72–76 (74.1). In its coloration, however, the female from Resht is identical with the other female specimens of nominate *major* from Europe and Azerbaijan.

The range of *karelini* is a narrow band in the lowlands of the Caspian side of the Elburz. It may extend, as Stresemann states, as far east as the watershed between Gurgan and Khorasan. But my specimens from Gurgan and vicinity are larger than the published measurements of *karelini*, and their coloration is identical with that of a series of topotypes of *blanfordi*. In the measurements given by Zarudny and Bilkevitch, five males from Astrabad (now Gurgan) had a wing length of 71.2–75.2 (73.8). In my specimens, two males from Gurgan measure 76 and 77, and the last one is still moulting and the feather is perhaps not fully grown. Another male from near-by Shahfasand measures 78, and one from Gozlu 73.5, but this last was collected on July

15 and is badly worn. The first three males, which were collected on September 28 to 30, are very fresh, and the yellow of their under parts is quite pale and identical to the equally fresh topotypes (Tehran) of *blanfordi* taken from October 3 to 21. At Tehran and vicinity, 17 males measure 73–79, and in six other populations of *blanfordi* from the Plateau and Zagros the range of variation in 56 males is 73.5–81.0.

Since the differences between *karelini* and *blanfordi* are at best only slight and specimens indistinguishable from the latter are found in the region of Gurgan it seems preferable to limit the range of typical *karelini* to Talych, Gilan, and Mazandaran.

### ***Parus major blanfordi* Prazák, 1894**

TYPE LOCALITY: Tehran.

SYNONYM: *Parus major zagrossiensis* Zarudny and Loudon, 1905; type locality, Zagros Mountains.

This race differs from nominate *major*, and, according to Stresemann, from *karelini*, by having the yellow of the under parts duller and paler. Above, the green of the mantle averages duller, more grayish. In size, *blanfordi* is larger than *karelini*, the range of variation in *blanfordi* being the same as in nominate *major*.

My material of this race is exceptionally rich, all parts of the range being well represented, including a long series of topotypes (Tehran and near-by Karaj) in every stage of plumage. There is a slight amount of geographical variation: specimens from the regions of Gurgan, Shahrud, Tehran, and Kazvin, which are identical, are very slightly darker than specimens from Hamadan, Kermanshah, and Qasr i Shirin in the western Zagros; these are very slightly darker than specimens from farther south in Luristan and Bakhtiari; and these in turn are very slightly darker than specimens from Isfahan and Fars; the palest birds are those from farthest east in the region of Kirman. However, although these differences can be appreciated in series, the cline is very slight. Furthermore, there is a certain amount of individual variation, and specimens that match each other can be found in all the various populations.

Zarudny and Loudon have described the birds of the Zagros as *zagrossiensis*, but the only significant character that emerges from the long and involved description is that the birds of the Zagros are paler than nominate *major*. The authors do not compare the birds of the Zagros to those of the region of Tehran (*blanfordi*),

and, as I have stated, the differences between the birds of this region and those of the Zagros are inconstant or, in series, too tenuous to warrant separation. Ticehurst (1921, Jour. Bombay Nat. Hist. Soc., vol. 28, p. 246) found that his specimens from southwestern Iran (Dizful) and Shiraz in Fars were identical with specimens from Tehran, Kazvin, and Kermanshah.

### ***Parus major intermedius* Zarudny, 1890**

TYPE LOCALITY: Mountains of southwestern Transcaspia [Kopet-Dagh and Achal Tekke].

SYNONYM: *Parus major jitnikowi* Zarudny, 1910; type locality, Atrek River and tributaries.

This interesting race of hybrid origin is intermediate between the yellow races of the west and the gray races of the east in which this pigment is lacking in the adult form. Its range is limited to Khorasan, including the northern mountains that project into southwestern Transcaspia. The western boundary seems to be the relatively low gap west of Bujnurd, or about at longitude  $57^{\circ}$  E., though to the northwest of Bujnurd, at Marave, about one degree farther west, my specimens belong to this race. The easternmost specimen that I have seen is from Sarakhs on the Hari Rud, and the southernmost from Gesik, or about at latitude  $33^{\circ}$  N.

It is probable that the amount of yellow pigment is not constant within the various populations. For instance, in one series consisting of 10 immatures collected on August 3 to 5 at Kotaliyek-chinar, north of Bujnurd, three specimens are very yellow below and are in fact identical to immatures of *blanfordi* from the region of Gurgan, Tehran, or the Zagros; five are faintly tinged with yellow below and are identical in coloration to immatures from India taken in Kashmir, lower Nepal, Assam, and Central Provinces; the other two specimens are intermediate. Adults vary much less, they have no yellow below, and this pigment appears as a slight greenish patch on the upper part of the mantle. The amount of pigment varies but is never pronounced and sometimes is lacking. In my longest series of adults (14 specimens) taken at Meshed on October 17, 1900, by Zarudny, the pigment is well marked in one male, is present but slight in seven males and two females, very faint in one female, and lacking entirely in three males. In birds in first winter plumage, the new body feathers

on the sides of the breast are white, but in an occasional specimen these feathers are faintly tinged with yellow.

Zarudny has described as *jitnikowi* specimens from the lower and middle Atrek and tributaries. But, as Dementiev states (1925, L'Oiseau, p. 72), there is no doubt that these hybrids, probably because they came from the western part of the range, had more yellow pigment than is usual in *intermedius*.

It has always been assumed that the gray parent stock from the east was derived from Turkestan. However, judging by the present characters of the neighboring Turkestan race (*bokharensis*), this does not appear to have been the case. Rather, as my material shows, the connection is by way of Afghanistan south of the Paropamisus Range. The following evidence may be offered in support of this view:

A. The proportions, as shown by the tail index, are different in *bokharensis* and *intermedius*. In 37 adult specimens of *intermedius* of both sexes the tail index is 76–89 (83.6), whereas in 20 adults of both sexes of *bokharensis* this index is 97–115 (101.5). In *ziaratensis* from Afghanistan, however, the tail index is similar to that of *intermedius*, four adults from Herat having the tail index 80–86 (84.0), and nine from Kandahar 82.5–89.0 (86.1).

B. The general coloration of *intermedius* and *ziaratensis* is similar, but that of *bokharensis* is quite different. In the first two the back is blue gray, on the top of the central tail feathers a variable band of blackish runs along the inner side of the web, or the whole inner web is blackish, contrasting strongly with the outer web, and the sides of the breast and belly are grayish or creamy. In *bokharensis* the back is much paler, the top of the central tail feather is uniformly colored, and the sides of the breast and belly are almost pure white.

C. Immature *intermedius* is always tinged with yellow, but five immature specimens of *bokharensis* examined do not show the slightest trace of yellow. I have seen no immature specimens of *ziaratensis*, and, unfortunately, none is reported in the literature.

D. The ranges of *intermedius* and *ziaratensis* are continuous, but *bokharensis*, which is a lowland form or a bird of the lower altitudes, is cut off by the Paropamisus and the mountain ranges of northern Khorasan. In the last region, an additional barrier, the desert of the Kara Kum, separates *intermedius* from the lowlands of Bukhara.

However, some colonies of *bokharensis* occupy the oases of the

Kara Kum, and one at Tedjen comes close to the range of *intermedius*, and south of Tedjen, at Serakhs at the extreme north-eastern corner of Khorasan, the two forms apparently occur together. From this locality I have three adult specimens of *intermedius* collected on March 28, 1905, and one first winter female of *bokharensis* taken on July 24 [August 7], 1892, by Zarudny. From Germab, which, although on the northern side of the Achal Tekke, is within the range of *intermedius*, I have an adult male of *bokharensis* taken on July 15 [July 29], 1892, by Zarudny. All these specimens, which are perfectly typical of their forms, do not show the slightest evidence of intergradation. Signs of hybridization would be easy to detect, for in addition to the differences mentioned above adult and first winter *intermedius* also sharply differ from *bokharensis* in the amount of white on the two outer pairs of tail feathers. In *intermedius* there is less white on the outer pair, and on the penultimate pair the white is limited to a very small spot at the apex; sometimes this spot is lacking, but in *bokharensis* in similar state of plumage almost the whole of the feather is white.

Germab, which is a little less than 70 kilometers northeast of Bujnurd, is at an elevation of between 600 and 900 meters. This appears to be a little high for *bokharensis* and this specimen, as well as the one from Serakhs, although both were taken during the breeding season, may have been a stray. Although insufficient, these specimens nevertheless show that, at least occasionally, *intermedius* and *bokharensis* occur together or in the same regions. What is of more interest is that, when they do, the characters of the specimens suggest that apparently the two forms do not interbreed.

#### THE INDIAN RACES

The Indian races of *Parus major* have been carefully studied by Whistler (1932, Jour. Bombay Nat. Hist. Soc., vol. 35, pp. 518-519; 1944, Spolia Zeylanica, vol. 23, p. 129), but since then two additional races have been described by Koelz—one, *stupae*, from the very center of India, and the other, *decolorans*, from eastern Afghanistan. Since I also find that some of the characters used by Whistler are very variable, I believe that a fresh review is preferable to an attempt to make the two new races conform to the scheme proposed by Whistler in 1932.



The characters used by Whistler that I find are too variable to be used for discrimination are the width of the white edgings of the tertials and the measurements of the white wedge on the inner web of the second outer tail feathers. I am also unable to see the differences in the shape of the bill mentioned by Whistler.

Six races are found in India and in neighboring parts of Baluchistan and Afghanistan. For the sake of comparison, I have added *cinereus* of Java and neighboring islands, as those populations were, until Whistler, thought to be inseparable from the birds of northern India. Two additional races (*bokharensis* and *ferghanensis*) are also found in Afghanistan, but these races, which are found north of the Hindu Kush, form part of the Turkestan group and are not closely related to the races of the Indian group.

Although the differences between the Indian races are not always easy to express simply, these seven races, when treated as one group and compared in series, can be distinguished in adult plumage as follows:

The most obvious division is on size. Three races have a short wing and four a long one. The wing length of full adults of both sexes and a statement of the range in general terms are:

#### SMALL RACES

<i>nipalensis</i> , northern India; 31 ♂ ♀	62-69 (65.3)
<i>stupae</i> , central India; 15 ♂ ♀	63-68 (65.2)
<i>stupae</i> , western India; 15 ♂ ♀	62-71 (67.2)
<i>cinereus</i> , Java, Bali, etc.; 13 ♂ ♀ (8 from Java, 5 from Bali)	63-69 (65.5)

#### LARGE RACES

<i>caschmirensis</i> , Kashmir, northern Punjab; 20 ♂ ♀	68-81 (75.0)
<i>decolorans</i> , eastern Afghanistan; 10 ♂ ♀	71-77 (74.0)
<i>ziaratensis</i> , north Baluchistan, south Afghanistan; 16 ♂ ♀	67-76 (71.5)
<i>mahrattarum</i> , extreme southern India, Ceylon; 13 ♂ ♀	69-75 (72.8)

In the small races, *stupae* is slightly whiter below than *nipalensis* or *cinereus*, but the only clear-cut and constant difference is in the amount of white on the outer web of the second outer pair of rectrices. In all the true specimens of *stupae* examined there is no black at all on the outer web, whereas in all the specimens of *nipalensis* the outer web is fringed with black, and in all the specimens of *cinereus* the whole outer web, except at the very tip, is all black.

Other but less constant differences are: in *stupae* the top of the tail is distinctly darker, mostly blackish; in *cinereus* and *nipalensis* it is lighter, mostly grayish. In *cinereus* the center of the greater

coverts is mostly blackish; in *nipalensis* the blue fringes of the coverts are wider and the centers paler so that the coverts appear mostly bluish; *stupae* is variable, some specimens have the coverts indistinguishable from *nipalensis*, but in most of them they are almost as dark as in *cinereus*. The white edgings of the tertials and the white wedge on the inner web of the second outer tail feathers are very variable; in *cinereus*, however, this wedge is always small, but from a third to a half of the specimens of *stupae* and *nipalensis* have this wedge just as small.

In the four large races the only constant separation is on the basis of general coloration. *P. m. mahrattarum* is distinctly darker above than any of the large or small races, the tertials and top of the tail being blackish, the white edgings of the tertials narrowest, only a narrow fringe of gray persisting on the outer web of the central tail feathers. The greater coverts are blackish as in *cinereus*, but of course *cinereus* is smaller and the top of its tail mostly grayish. The mantle of *mahrattarum* is darker, more bluish, than in *caschmirensis*, *decolorans*, and *ziaratensis*. Of the last three, *ziaratensis* is the palest, paler above and whiter below than any of the other six races. *P. m. caschmirensis* is a little larger than *ziaratensis*, slightly darker above and more saturated below. In *decolorans* the breast, sides, and especially the lower flanks are more saturated, more "smoky," than in any of the other six races, although a few specimens of *caschmirensis* from northern Punjab and some specimens of *mahrattarum* from Ceylon are almost as dark.

There is no black on the outer web of the second pair of rectrices in the specimens of *ziaratensis*, *decolorans* (one exception out of 10), and *caschmirensis* (one exception out of 20), but in *mahrattarum* a black line variable in width is present in 10 out of 11 specimens from Ceylon and southern India from the Nilgiris south. However, in five specimens from Mysore, three had no

RACE	SIZE (WING)	GENERAL COLORATION	OUTER WEB 2D OUTER RECTRIX	GREATER COVERTS	TOP OF CENTRAL RECTRIX
<i>nipalensis</i>	Small	Pale	Black line	Bluish	Mostly gray
<i>stupae</i>	Small	Pale	All white	Variable	Mostly blackish
<i>cinereus</i>	Small	Pale	All black	Blackish	Mostly gray
<i>caschmirensis</i>	Large	Pale	All white	Bluish	Mostly gray
<i>decolorans</i>	Large	Dark below	All white	Bluish	Mostly gray
<i>ziaratensis</i>	Large	Palest	All white	Bluish	Mostly gray
<i>mahrattarum</i>	Large	Darkest	Variable	Blackish	Most black

black line, and in the 10 specimens of Whistler from Ceylon (1944, *loc. cit.*), the outer web was "entirely white in five specimens and very largely black in five specimens."

A comparison in tabular form is easier to visualize, but the terms used can be only relative, for, as is obvious from the above, some of the differences are slight and tend to merge.

### ***Parus major caschmirensis* Hartert, 1905 (June)**

TYPE LOCALITY: Gilgit, Kashmir.

Specimens from northern Punjab (Kangra, Kulu, and Lahul) average a little smaller than specimens from Gilgit, Ladak, and Baltistan, and in fresh plumage average very slightly darker and grayer on the lower abdomen and lower flanks. However, this difference is not constant, as some specimens from both populations match perfectly, and when worn all specimens are identical. Specimens from the region of Patiala City eastward to Garhwal and Kumaon are smaller than those of northern Punjab and are closer in size and coloration to *nipalensis*. In this region, *caschmirensis* and *nipalensis* probably intergrade.

### ***Parus major decolorans* Koelz, 1939**

TYPE LOCALITY: Jalalabad, eastern Afghanistan.

In very fresh plumage the sides of the upper breast, body, and especially lower flanks are very "smoky" and gray; with wear these parts get lighter but are still saturated. Some specimens of *caschmirensis* from northern Punjab and *mahrattarum* from Ceylon approach it, especially in fresh plumage, but are not quite so dark. The top of the tail in *decolorans* averages slightly darker than in *caschmirensis*.

The only specimens known so far are the present ones. A tentative range may be drawn as a triangle pointing towards Kabul from Kafiristan in the north to at least the Sefid Kuh on the south.

### ***Parus major ziaratensis* Whistler, 1929**

TYPE LOCALITY: Ziarat, northern Baluchistan.

In this, the palest of the Indian races, the white edgings of the tertials appear broadest. However, this is due not to the actual width, which is very variable, but to the greater purity of the white. The white spot at the tip of the third pair of tail feathers

is equally variable, but on an average is a little larger than in *caschmirensis*. *P. m. ziaratensis* averages a little smaller than *caschmirensis*, but I cannot agree with Whistler about a difference in the size and shape of the bill.

The specimens from Herat and Kandahar are identical; although far apart these two localities have a similar climate and elevation.

### ***Parus major nipalensis* Hodgson, 1838**

TYPE LOCALITY: Nepal.

SYNONYM: *Parus major planorum* Hartert, 1905 (September); type locality, southern Punjab.

A small series from Dibrugarh, Assam, in the collection of the American Museum of Natural History is a little darker above and below and has distinctly less white on both webs of the second outer pair of rectrices, than specimens from farther west in lower Nepal and United Provinces.

The type of *planorum*, which is a very old specimen without date or locality, has a wing of 69 mm., a measurement which is, respectively, the upper limit of variation in my specimens of *nipalensis* and the lower limit in those of *caschmirensis*. However, since the outer web of the second outer tail feather is well fringed with black, I believe that *planorum* should be considered a synonym of *nipalensis* rather than of *caschmirensis*, in the synonymy of which Stuart Baker placed it.

Immature *nipalensis* and *stupae* can be distinguished by the same characters as those of the adult. In all (six) immature specimens of *nipalensis* from lower Nepal there is no black fringe on the outer web of the second outer tail feather, but since three out of nine immature specimens of *stupae* from Central Provinces and Surguja have a trace in two and a black fringe in one, the difference is less constant than in the adult. All the immature specimens of *stupae* have the top of the tail very distinctly darker.

### ***Parus major stupae* Koelz, 1939**

TYPE LOCALITY: Sanchi, Bhopal.

All the specimens of *nipalensis* that I have examined came from Patiala, the United Provinces, lower Nepal, Bengal, and Assam. In central India from about latitude 24° N. southward this race is replaced by *stupae*, the range of which extends at least as far

south as latitude  $18^{\circ}$  N., for I have a typical specimen of this race from Dumagudiem on the lower Godavari in eastern Hyderabad. The range of *stupae* probably extends farther south, for specimens examined from Mysore are intermediate between *stupae* and the larger and darker *mahrattarum*, though closer to the latter.

In the west the range of *stupae* extends to Sirohi and Junagadh, but my specimens from western India are a little larger. Three out of 10 from Junagadh and Kathiawar and one out of five from Sirohi have a slight trace of black on the outer web of the second outer pair of rectrices. This variation is too slight and the difference in measurements too small to warrant separation, particularly since in all other characters, such as general coloration, dark top of the tail, and dark greater wing coverts, the western specimens are indistinguishable from true *stupae* of central India.

### **Parus major mahrattarum** Hartert, 1905

TYPE LOCALITY: Nuwara Eliya, Ceylon.

In the avifaunal survey of Ceylon (1944, *loc. cit.*) Whistler restricts *mahrattarum* to Ceylon. However, all the specimens I have examined from Coonoor and Ootacamund in the Nilgiris, and from Travancore, are identical in all respects of size and coloration with a series from Ceylon which includes the type of *mahrattarum*. I certainly cannot see, nor could Ripley (1946, *Spolia Zeylanica*, vol. 24, p. 221), the differences in the bill and in the width of the edgings of the tertials cited by Whistler.

In 1942, Whistler (*in* Ali, Jour. Bombay Nat. Hist. Soc., vol. 43, p. 145) identified specimens from Mysore as *stupae*. Three out of six adults examined by Whistler are now in front of me; these specimens (Tumkur, Bangalore, and Mysore districts) are, as stated above, closer to *mahrattarum* but depart in being smaller and paler. It appears that the range of true *mahrattarum* comprises both Ceylon and extreme southern India, the dark and large populations reaching their northern limit in the Nilgiris; in the more arid region of Mysore to the northeast they apparently gradually merge into *stupae*.

### THE TURKESTAN RACES

The tangled nomenclature and range of the Turkestan races have been well straightened out by Laubmann (1913, Verhandl. Ornith. Gesellsch. Bayern, vol. 11, pp. 269-275) who recognizes

four races: *bokharensis*, *ferghanensis*, *iliensis*, and *turkestanicus*.

These long-tailed and very pale races form a compact group well differentiated from the other races of *Parus major* by the important difference in proportions discussed above.

This difference is difficult to assess. The Turkestan races are almost completely isolated from the other races of *Parus major*, and the long tail may have developed as a result of their isolation, or it is also possible that the Turkestan races constitute a separate species. It may be recalled that Zarudny and Bilkevitch had originally treated them as such under the name *bokharensis* (1912, Messenger Ornith., pp. 132-150).

The two specimens of *bokharensis* mentioned in the discussion of *intermedius* were found during the breeding season within the range of the latter. They show no signs of intergradation or hybridization whatever. At the other end of the range, Delacour has examined in the British Museum typical specimens of *turkestanicus* from the Urungu River in northern Dzungaria, and from near-by Altaï I have specimens of nominate *major*. These two forms are so different that signs of intergradation would be evident at once.

On the other hand, in the Pamirs, where the range of the local Turkestan race (*ferghanensis*) may be continuous with that of *P. m. caschmirensis*, occasional subadult specimens occur (two out of eight in those examined) in which there are very slight traces of yellow on the mantle. Zarudny and Bilkevitch (*loc. cit.*) also state that in Ferghana immatures can be tinged with yellow. In the other Turkestan races apparently the young are always without yellow. It is also to be noted that of the four Turkestan races, *ferghanensis* is the darkest, and in that sense comes closest to the other races of *Parus major*, although the characteristic difference in tail index still holds.

It may be that we are dealing with a group of races which, although not completely reproductively isolated in one part of their range, behave in other parts as a separate species. Additional collecting is necessary in the areas where the range of the Turkestan races comes in contact with, or closest to, that of *Parus major*, such as Transcaspia, the Pamirs, and the region between the Ala Tau and Tarbagataï to the Altaï. Until then, and in view of the fact that the Turkestan races are on the whole geographical representatives of *Parus major*, it is best to consider them as conspecific.

***Parus major bokharensis* Lichtenstein, 1823**

TYPE LOCALITY: Bukhara.

SYNONYM: *Parus major meinertzhageni* Koelz, 1939; type locality, Balkh, Afghan Turkestan.

This race is the smallest and the palest above of the four Turkestan races.

Koelz has separated the birds of Afghan Turkestan as *meinertzhageni* on the basis that in his specimens taken at Tashkurghan and Balkh in 1937 "the back lacks the sandy cast, is bluer; the wing bar is duller and the black of the throat is deeper" than in the specimens of *bokharensis* in the Rothschild Collection. I have examined the same material and five additional topotypes and two specimens from Tukzar collected by Koelz in 1939. I cannot see any difference in the coloration of the wing bar and throat, and, as regards the coloration of the mantle, the difference is very obviously due to the age of the specimens of *bokharensis* used for comparison. As Dementiev and Heptner have shown (1932, *Alauda*, p. 285), in titmice with pale bluish gray backs, the color of the mantle becomes duller in old specimens and takes on a "slight brownish tint" (i.e., "sandy"). The specimens of *bokharensis* in the Rothschild Collection illustrate this foxing very well. Specimens taken in 1892 are duller and more "sandy," and a specimen without date but much fresher has the color of the mantle "bluer" and is absolutely identical with the type and topotypes of "*meinertzhageni*." Care must be taken also not to mix the sexes. In *bokharensis*, as in *Parus cyanus* with a similar pale bluish gray mantle, females are duller and less bluish.

As mentioned by Koelz, the top of the two central rectrices is nearly entirely blue gray in the specimens from Afghan Turkestan. In this character, these birds are identical with *bokharensis*, and their measurements and tail indices are identical or similar (table 3). It may be added, with Meinertzhagen (1938, *Ibis*, p. 494), that no faunal or climatic barrier of any kind separates the plains and lowlands north of the Hindu Kush from those of Turkestan.

The specimens from Tukzar are identical with the specimens from Balkh and Bukhara. Tukzar appears to be at an elevation of between 3000 and 4000 feet. At Haibak, at an elevation of 3000 feet, Meinertzhagen (*ibid.*, p. 673) collected typical specimens of *bokharensis*. As mentioned under *intermedius*, I have seen a specimen of *bokharensis* from Germab in Transcaspia, the elevation of which appears to be between 600 and 900 meters. Al-

though preëminently a lowland form, these specimens show that *bokharensis* occasionally ascends part way up on the mountain slopes.

***Parus major ferghanensis* Buturlin, 1912**

TYPE LOCALITY: Kurschab Valley, Alaï Range, Ferghana.

This race, a highland form, differs from *bokharensis* by being slightly larger and darker, a little bluer on the mantle and distinctly more grayish on the flanks.

The specimens taken by Koelz in northeastern Afghanistan north of the Hindu Kush at Rustak and region are similar in coloration to specimens of *ferghanensis* examined from the upper Amu Daria, Kabadian, and from Margelan and Kokan in Ferghana. The birds of Rustak are a little larger, but the tail index is similar (101.3 in the birds of Rustak and 100 in the others).

***Parus major iliensis* Zarudny and Bilkevitch, 1912**

TYPE LOCALITY: Djarkent.

This race is very similar in coloration to *bokharensis* but differs from it by being larger and by having a heavier bill; *ferghanensis* is darker, especially on the flanks.

***Parus major turkestanicus* Zarudny and Loudon, 1905**

TYPE LOCALITY: Orchu River, Dzungaria.

"Just like *iliensis* in color but larger and with a distinctly longer and heavier bill."

No specimens of *turkestanicus* were available to me or to Laubmann, and this description is supplied by Delacour who had the great kindness to examine for me the specimens in the British Museum. These specimens consist of four adult males, two from southern Dzungaria collected at Manass and along the Manass River by Carruthers, and the other two collected on the Urungu River in northern Dzungaria by Przewalsky. They were reported upon by Kinnear, who found them to be "similar in colour but with larger bills and wings than specimens of *P. m. bokharensis*" from the Amu and Syr Daria (1933, in Ludlow and Kinnear, *Ibis*, p. 449).

**MOULT**

A complete post-nuptial moult in adults takes place in middle summer and early fall. In my specimens from Iran, this moult



is at its height from about July 15 to the end of August. By the middle of September this moult is generally finished, most of the specimens being in very fresh plumage, some still showing a few last traces of moult in the body plumage. An occasional specimen is lagging, such as an adult male from Gurgan in which the moult is only about two-thirds finished by September 30. Specimens from Afghanistan north of the Hindu Kush (regions of Balkh and Rustak), from Kashmir, and United Provinces are at the same stage of moult at approximately the same dates as the birds from Iran. In southern Afghanistan, however, and in central India, the moult is taking place a little later. In some specimens of *ziaratensis* taken at Kandahar and Herat from October 20 to November 13 the moult is far advanced but not quite finished, and specimens of *stupa* from central India are still moulting by the middle of October.

Juvenal specimens acquire the first winter plumage through a partial post-juvenal moult taking place during the same months as the complete moult of the adults. This moult is peculiar. Not only are all of the body feathers and coverts changed, but also the tail in part or as a whole, some of the inner secondaries, and in one case the inner primaries as well. The tail moult is most irregular. Out of 26 specimens of both sexes moulting into first winter plumage in which the tail is moulting, eight are moulting only the central pair of tail feathers, and 18 are moulting the outer pairs or the entire tail. In Whistler's juvenal specimens from central India (1939, Jour. Bombay Nat. Hist. Soc., vol. 41, p. 85) the post-juvenal moult has not yet started by August 24 to September 10.

### ***Parus major major* Linnaeus**

IRAN: Azerbaijan: Tabriz, October 25-31, 1940, 7 ad. ♂, 1 unsexed ad.; Ardebil, November 2-3, 4 ad. ♂, 1 ad. ♀; Namin, November 6, 1 ad. ♂, 1 ad. ♀, 1 unsexed subad.; Sarab, November 8, 4 ad. ♂, 1 subad. ♀; Livan, November 14, 1 ad. ♀; Maraghe, November 27, 4 ad. ♂, 1 subad. ♂, 2 ad. ♀; Saujbulagh, December 3-4, 1 ad. ♂, 1 ad. ♀; Rezaieh, December 6-7, 1 ad. ♂, 4 ad. ♀; Khoi, December 10, 1 ad. ♂.

### ***Parus major blanfordi* Prazák**

IRAN: Northeastern Iran: Shahrud, September 26-27, 1940, 4 ad. ♂, 2 subad. ♂, 1 ad. [♀], 2 subad. ♀. Mazenderan, region of Gurgan; Gozlu, July 15-16, 1 ad. ♂, 2 imm. ♂, 1 imm. ♀; Dimalu, July 16-23, 4 imm. ♂; Karimserai, July 21, 2 imm. ♂, 1 imm. ♀; Garmabdasht, July 24, 1 imm. ♂; Kherat, July 24-26, 1 ad. ♀, 1 imm. ♀; Shahfasand, September 28, 1 ad. [♂]; Gurgan,

September 30, 2 ad. ♂, 1 ad. ♀. Northern Iran: Tehran, June 14-27, 1 ad. ♂, 1 imm. ♂, 2 ad. ♀, 1 subad. ♀, October 3-21, 4 ad. ♂, 1 ad. ♀, 1 subad. ♀, 1 unsexed ad.; Karaj, January 2-February 15, 1945, 2 ad. ♂, 2 ad. ♀, October 15-30, 1 ad. ♂, 1 unsexed ad.; November 14-15, 1 ad. ♂, 1 ad. ♀, November 16-December 28, 1944, 4 ad. ♂, 1 ad. ♀; Sharifabad, October 22, 1940, 1 ad. ♂, 1 ad. ♀, 1 ad. ♀?; Kazvin, October 23, 2 ad. ♂, 1 ad. ♀, 1 subad. ♀. Western Iran: Hamadan, December 20-21, 5 ad. ♂, 2 ad. ♀. Kermanshah: Qasr i Shirin, December 28-January 3, 1941, 3 ad. ♂, 5 ad. ♀, 1 subad. ♀; Kermanshah, January 14, 2 ad. ♂, 1 ad. ♀. Khuzistan: Dizful, April 23, 1940, 1 imm. ♂, 1 imm. ♀. Luristan: Burujird, January 20, 1941, 1 subad. ♂; Chamchid, February 22, 1 ad. ♂; Kalvar, May 27-29, 1 imm. ♂, 3 subad. ♀; Durud, October 19, 1 ad. ♂. Bakhtiari: Baraftab, January 30, 1 ad. ♂; Ti, February 2-10, 10 ad. ♂, 3 ad. ♀, May 31, 1940, 1 imm. ♂; Imarat, February 15-19, 1941, 5 ad. ♂, 4 ad. ♀, 1 subad. ♀; Talimausur, April 28, 1940, 1 ad. ♂, 1 imm. ♂, 1 imm. ♀; Damavar, May 4-6, 4 ad. ♂, 1 ad. ♀; Pashmshurun, May 9-April 30, 3 ad. ♂. Isfahan: Isfahan, March 3-4, 2 ad. ♂, 3 ad. ♀, 2 subad. ♀. Fars: Eglit, March 7-8, 2 ad. ♂, 1 ad. ♀, 2 subad. ♀; Shiraz, March 13-15, 2 ad. ♂, 1 ad. ♀; Niriz, March 28-30, 2 ad. ♂, 1 subad. ♂, 3 ad. ♀; Dastarjin, April 8-9, 1 ad. ♂, 1 ad. ♀; Kazerun, April 11, 1 ad. ♀, 1 imm. ♀. Southern Iran: Dehibakri, January 28-30, 1 ad. [♀], 1 subad. ♀; Gudar Ushturu, January 30, 1 ad. ♂; Cheshmaadozi, February 1, 1 ad. ♂. Kirman: Guragan, February 10-11, 1 subad. ♂, 3 subad. ♀; Maskun, February 11-13, 3 ad. ♂, 1 subad. ♂, 2 ad. ♀.

### ***Parus major intermedius* Zarudny**

IRAN: Khorasan: Marave, July 31, 1940, 2 imm. ♂, 3 imm. ♀; Bujnurd, August 2, 4 imm. ♂, 1 imm. ♀; Kotaliyekchinar, August 3-5, 5 imm. ♂, 3 imm. ♀, 2 unsexed imm.; Karak, August 7, 1 ad. ♂, 1 ad. ♀; Abdullabad, August 15, 1 ad. ♀; Bardu, August 16-21, 1 ad. ♀, 1 subad. ♀, 1 unsexed subad.; Turbat i Haidari, September 10-13, 6 ad. ♂, 1 ad. ♀, 4 subad. ♀; Nishabur, September 20-21, 2 ad. ♀; Sabzawar, September 23-24, 2 ad. ♂, 1 ad. [♂], 1 subad. ♂.

### ***Parus major caschmirensis* Hartert**

INDIA: Northern Punjab, Kangra: Bhadwar, March 27, 1933, 1 ad. ♂; Baijnath, May 22, 1936, 1 ad. ♂. Northern Punjab, Lahul: Tirting, June 20, 1 ad. ♂, October 18, 1 ad. ♂; Shansha, June 30, 1 ad. ♀, October 17, 1 ad. ♂; Jalma, October 18, 1 ad. ♂; Tirot, October 22, 1 ad. ♂. Northern Punjab, Kulu: Jagatsuk, October 27, 1 ad. ♂; Bandrole, October 28, 1 ad. ♀; Kulu, October 28-November 1, 2 ad. ♂. Kashmir: 7000 feet above Bandipur, July 30, 1 ad. ♂. Kashmir, Baltistan: Skardo, August 12-16, 2 ad. ♂, 6 imm. ♂, 1 ad. ♀, 1 subad. ♀, 3 imm. ♀; Dagoni, August 24, 1 imm. ♀; Kapalu, August 27, 1 ad. ♂, 2 subad. ♀, 1 imm. ♀; Hundi, September 7, 1 ad. ♂; Hundar, September 10, 1 subad. ♂, 2 subad. ♀; Karzong Nulla, September 12, 1 ad. ♀; Karsa, September 12, 1 ad. ♀, 1 unsexed subad. Kashmir, Ladak: Leh, September 16-18, 1 ad. ♂, 1 imm. ♂, 1 ad. ♀; Pitug, September 19, 1 subad. ♂, 1 imm. ♂; She, September 23, 1 ad. ♂.

### ***Parus major decolorans* Koelz**

AFGHANISTAN: Eastern: Daulatshah, June 1, 1937, 1 ad. ♂, 1 ad. ♀; Paitak, June 4, 1 ad. ♂, 1 ad. ♀; Jalalabad, December 18, 1 ad. ♂ (the type of *P. m. decolorans*), 1 ad. ♀, December 19, 3 ad. ♂, 1 ad. ♀.

### ***Parus major ziaratensis* Whistler**

AFGHANISTAN: Southern: Kandahar, October 17–22, 1937, 5 ad. ♂, 5 ad. ♀; Herat, November 12–13, 2 ad. ♂, 3 ad. ♀, 1 subad. ♀.

### ***Parus major nipalensis* Hodgson**

INDIA: Patiala: Patiala City, January 21, 1948, 1 ad. ♀. Garhwal: Garur, May 25, 1 unsexed imm. Kumaon: Kathgodam, April 6–7, 1 ad. ♂, 1 ad. ♀, August 20, 1 ad. ♂; Askot, August 2, 1 ad. ♂, 1 unsexed imm.; Berinag, August 6, 1 ad. ♀; Barichina, August 10, 1 imm. ♂; Lechiwala, August 31–September 3, 1 ad. ♂, 1 subad. ♂. Nepal: Simra, March 4–5, 1947, 3 ad. ♂, 1 ad. [♂]; Hitaura, May 11–June 18, 1 ad. ♂, 1 ad. [♂], 3 imm. ♂, 1 ad. ♀, 2 imm. ♀, 1 unsexed imm. Eastern United Provinces: Gorakhpur, January 28, 2 ad. ♂, 1 ad. ♀; Siswa Bazar, January 30, 1 ad. ♂, Nichlaul, February 5–13, 2 ad. ♂, 1 ad. [♂], 1 ad. ♀; Kalnahi, February 20–21, 2 ad. ♂. Bengal: Dacca, January 12–14, 1937, 1 ad. ♂, 1 ad. [♂], 1 ad. ♀; Sevoke Forest, December 19, 1936, 1 ad. ♂.

### ***Parus major stupae* Koelz**

CENTRAL INDIA: Bhopal: Sanchi, January 1, 1938, 1 ad. ♂, 1 ad. ♀, January 2, 1 ad. ♂ (the type of *P. m. stupae*), January 3, 1 ad. ♀. Central Provinces-Mandla, June 22, 1946, 1 ad. ♂; Bichhia, July 2–21, 4 ad. ♂, 1 imm. ♂; Belwani-Kisli, July 28, 1 imm. ♂; Kanha, August 19, 2 imm. ♂. Surguja: Ramanujganj, September 27–October 10, 1947, 3 ad. ♂, 1 subad. ♂, 2 imm. ♂, 1 ad. ♀, 1 subad. ♀, 1 imm. ♀, 1 unsexed ad., 1 unsexed imm.; Khuri, October 14; 1 ad. ♂; Gargori, October 20, 1 ad. ♀.

WESTERN INDIA: Southwestern Rajputana, Sirohi: Anadra, December 29–31, 1948, 3 ad. ♂, 2 ad. ♀. Kathiawar: Sihor, January 23–26, 1949, 1 ad. ♂, 2 ad. ♀. Kathiawar, Junagadh: Sasan, January 31–February 6, 1949, 4 ad. ♂, 1 ad. ♀; Jamwala, February 8, 2 ad. ♂.

### ***Parus major mahrattarum* Hartert**

INDIA: Nilgiri Hills: Ootacamund, February 14–16, 1937, 3 ad. ♂, 2 ad. ♀, March 1–2, 1948, 2 ad. ♂.

### ***Parus major bokharensis* Lichtenstein**

AFGHANISTAN: Afghan Turkestan: Tashkurghan, September 4, 1937, 1 ad. ♀; Tukzar, September 15, 1939, 1 ad. ♂, 1 ad. ♀; Balkh, September 18–19, 1937, 6 ad. ♂, 1 ad. ♀, 1 subad. ♀, October 30–31, 1939, 1 ad. ♂, 2 ad. [♂], 2 unsexed ad., November 28, 1937, 1 ad. ♂ (the type of *P. m. meinertzhageni*), November 28–30, 2 ad. ♂, 3 ad. ♀.

### **Parus major ferghanensis Buturlin**

AFGHANISTAN: Northeast: Khaksari, July 9, 1937, 1 unsexed subad.; Daraim, August 10, 1 subad. ♂; Saidan, August 12, 1 unsexed subad.; Rustak, August 17-26, 3 ad. ♂, 3 subad. ♂, 2 ad. ♀, 1 subad. ♀, 1 unsexed subad.

### **Parus monticola monticola Vigors**

INDIA: Northern Punjab, Chamba: Kukti, July 4, 1936, 1 ad. ♀; Harser, July 6, 1 unsexed imm. Northern Punjab, Lahul: Sisu, October 24, 1 ad. ♂; Gundla, October 24, 1 ad. ♂, 1 ad. ♀. Northern Punjab, Kulu: Naggar, October 28, 1 ad. ♂; 8000 feet above Bandrole, November 13, 1 ad. ♂. Northern Punjab, Kangra: Kotla, January 25-February 9, 1946, 1 ad. ♂, 1 ad. ♀. Northern Punjab, Tehri: Agora, October 9, 1948, 1 ad. ♂; Kanderala, October 18, 1 ad. ♂, 1 ad. ♀; Sarutal, October 23, 1 ad. ♂, 1 imm. ♀. Garhwal: Shotal, May 16, 1 ad. ♂. Kumaon: Girgaon, June 6, 1 ad. ♀; Gunji, July 20, 1 imm. ♂.

In this species a cline of increasing pigmentation runs from west to east on the continent. Good series show that birds from the region of Simla, northern Punjab, Garhwal, and Kumaon are paler and duller yellow below, and paler and duller green above, than birds from the region of Katmandu in Nepal, Sikkim, and Darjeeling. In turn, birds from northern Burma, Yunnan, and Szechwan are deeper and brighter yellow and darker green than the specimens from Nepal, Sikkim, and Darjeeling. Except at the two extremes the differences in pigmentation are slight.

The intermediate populations of Sikkim and eastern Nepal have been described as *lepcharum* by Meinertzhagen. This race is not recognized by Ticehurst (1935, *Ibis*, p. 40) and Kinnear (1937, *Ibis*, p. 23) who consider *lepcharum* to be indistinguishable from *monticola*. These authors may be correct in not recognizing an intermediate race, but my specimens from Nepal, Sikkim, and Darjeeling, taken as a series, cannot be referred to *monticola*. Although individual specimens are very close to or match the paler *monticola*, others are equally close to or match the darker *yunnanensis*, the large majority of the intermediate specimens, however, differing slightly but appreciably from either.

MOULT: Only one specimen, an adult male taken on October 9 at Agora, in Tehri, shows evidence of moult. The moult is virtually over except for a few last traces in the body plumage.

MEASUREMENTS: Adults only. Wing: nine males, 67-71 (68.8); four females, 63-66 (65.5). Tail: nine males, 50-55 (53.0); four females, 47-53 (50.2). Bill: eight males, 12-13 (12.5); four females, 12.5-13.0 (12.6).

### **Parus monticola lepcharum** Meinertzhagen

INDIA: Northern Bengal, Darjeeling district: Tiger Hill, December 23, 1936, 1 ad. ♂; Rangirum, December 26, 1 ad. ♂. Nepal: Chitlang, March 15, 1947, 1 ad. ♂; Thankot, March 21-26, 4 ad. ♂, 1 ad. ♀.

The specimens from Nepal are identical with the specimens from Darjeeling, and with other specimens from Sikkim in the collection of the American Museum of Natural History.

The racial characters are very poorly shown by the type of *lepcharum*, as this specimen, taken at Gangtok, is not adult. It is sexed as male and appears to be a first winter bird, as the gloss is poorly developed on the crown and lacking on the throat, the outer webs of the wing and tail feathers are dull, and the rest of the plumage lacks the full intensity of the adult coloration. It also measures smaller.

MEASUREMENTS: Wing: seven males, 66-71 (68.6); one female, 67. Tail: seven males, 50-56 (52.5); one female, 51. Bill: seven males, 12-13 (12.4); one female, 12.

MEASUREMENTS OF THE TYPE: First winter male, wing, 64.5; tail, 50; bill, 11.

### *PARUS XANTHOGENYS*

The races of this species, with the exception of those found from Sikkim eastward (*spilonotus* and relatives), have been reviewed by Whistler and Kinnear (1932, Jour. Bombay Nat. Hist. Soc., vol. 35, pp. 519-521). These authors recognize three races: nominate *xanthogenys* Vigors (type locality, Almora, northern United Provinces) for the Himalayas up to but not including Sikkim; *aplnotus* Blyth (type locality, mountains of central India) for the central and peninsular populations down to a line extending from Poona to the Godavari Valley; and in the same paper separate as *travancoreensis* (type locality, Mynall, Travancore) the birds of the Western Ghats from southern Konkan in Bombay Presidency to the Ashambu Hills in southern Travancore. In 1939 (Proc. Biol. Soc. Washington, vol. 52, p. 63) Koelz described the birds of southern Bombay Presidency as *xanthonotus* (type locality, Londa).

Examination of the Koelz specimens (listed below) and the material in the collection of the American Museum of Natural History shows that three races are easily separable and that two of these races are separated by an intermediate population. The three easily separable races and their characters are:

1. The northern nominate *xanthogenys* in which the green and yellow parts of the plumage are brightest, the wing coverts tipped with yellow instead of white, and in which, generally speaking, the yellow eye stripe extends farther forward. Except for a slight difference in size (table 4), the Nepal populations are otherwise identical with those of Tehri and northern United Provinces.

2. The central and peninsular *aplonotus*. Specimens examined from Sirohi in Rajputana, Bhopal, Central Provinces, and Mahendra in Orissa are not separable, though the specimens from Central Provinces average perhaps very slightly duller.

3. The southern *travancoreensis*. I have only three specimens of this race (two males and one female) from the Palni Hills, but they differ markedly from the specimens of *aplonotus* from the regions mentioned above in that they are much duller, the mantle almost lacks the green and is very grayish, below the yellow on the sides of the breast and on the cheeks is very pale, and the flanks and lower abdomen are grayish olive. The female specimen, a full adult, is very gray above, and below is all gray with only a faint tinge of yellow. In the three specimens from the Palni Hills the white tips of the tail feathers are much smaller than in the specimens of *aplonotus* and nominate *xanthogenys*.

The intermediate population. The series from southern Bombay and two recently collected specimens from the Kadur (a male) and Hassan (a female) districts in Mysore are perfectly intermediate in all details of coloration in both sexes between the specimens of *travancoreensis* from the Palni Hills and those of *aplonotus*. On this basis, Whistler (1943, Jour. Bombay Nat. Hist. Soc., vol. 43, p. 34) has refused to recognize Koelz's *xanthonotus* from southern Bombay. However, this intermediate population occupies a sizable range, and the characters in the specimens I have examined are constant.

As shown in table 4, specimens from the Himalayas and central India are a little smaller than those of southern Bombay, Mysore, and Travancore, but there is a good deal of overlap.

PLUMAGE AND MOULT: The variations in the female plumage have been repeatedly discussed at great length by Whistler. The 1942 paper (Jour. Bombay Nat. Hist. Soc., vol. 43, p. 146) summarizes his findings as follows: in nominate *xanthogenys* adult male and female are alike with a black crown and a black ventral stripe; in *aplonotus* adult females have a black crown but the ventral stripe is dull olive green; in *travancoreensis* adult

TABLE 4  
MEASUREMENTS IN SOME POPULATIONS OF *Parus xanthogenys*  
(Fully adult specimens only)

Race and Population	N	Wing	Tail	Bill
<i>P. x. xanthogenys</i>				
Tehri and northern United Provinces	5 ♂	72-77 (74.5)	53-58 (56.0)	12.5-14.0 (13.1)
Tehri and northern United Provinces	1 ♀	74 — —	55 — —	13.0 — —
Nepal	6 ♂	70-74 (72.1)	52-56 (54.7)	12.0-13.0 (12.6)
Nepal	1 ♀	71 — —	54 — —	12.5 — —
<i>P. x. aplonotus</i>				
Central India	9 ♂	71-77 (73.5)	54-61 (57.1)	12.5-13.5 (13.2)
Central India	2 ♀	70, 71 —	54, 54 —	13.0, 13.0 —
<i>P. x. xanthonotus</i>				
Southern Bombay	6 ♂	75-80 (77.7)	57-63 (59.0)	13.0-14.0 (13.5)
Southern Bombay	3 ♀	72-74 (72.8)	53-56 (54.0)	13.0-13.5 (13.3)
Type (Londa)	♂	75 — —	59 — —	14.0 — —
Mysore	1 ♂	76 — —	57 — —	13.0 — —
Mysore	1 ♀	74 — —	57 — —	13.0 — —
<i>P. x. travancoreensis</i>				
Palni Hills	2 ♂	76, 80 —	60, 61 —	13.5, 14.0 —
Palni Hills	1 ♀	75 — —	57 — —	13.5 — —

females are polymorphic, having, as stated by Whistler, three phases: phase 1 as in nominate *xanthogenys*, phase 2 as in *aplonotus*, phase 3 in which both the crown and ventral stripe are dull olive green. Although the 1942 paper announced that the question is now definitely settled, Whistler asks for verification of some of these points.

Mr. B. Biswas and I have carefully considered all the statements made by Whistler in the various papers and have checked them with the adult females and first winter specimens of both sexes collected by Koelz and those in the collection of the American Museum. The number of these specimens is insufficient. As far as they go, we agree that the plumage of adult females in nominate *xanthogenys* and *aplonotus* is as stated by Whistler and that first winter birds are like their respective adults. We have only one female of *travancoreensis*. This specimen, a full adult, is like phase 3 of Whistler, having both the crown and ventral stripe grayish olive or "dull olive-green." We have not seen any

specimen like phase 1 from central, peninsular, or southern India, and believe, as suggested by Whistler, that black-throated specimens from these regions marked female were probably wrongly sexed. We have five female specimens from Londa and region. In these specimens (three adults, one first winter, and the other unsexed but apparently an adult female), all have the throat and ventral stripe dull olive green, and the color of the crown varies from pure black (Whistler's phase 2) to dusky with much olive green. In one adult the crown feathers are very broadly margined with olive green; in another and in the first winter specimen the feathers are edged with this color but less so, and the crown is blacker; in the unsexed specimen the crown is still blacker, and the greenish edges are still smaller. In an adult female from southern Mysore the feathers of the crown are almost entirely greenish, only the shafts being dusky black.

We notice in Whistler's papers that all the adult females from Travancore, Ootacamund, Nilgiris, and Coonoor are greenish on both the crown and throat. No black-crowned adult female is reported from this region, all the black-crowned females being juvenals that have not yet started their post-juvenal moult, and in the 1942 paper Whistler reports that a female in the post-juvenal moult "is replacing a dull black crown with a dull olive-green crown." While this specimen is from Mysore, it is probable that a similar moult takes place in true *travancoreensis*. Mysore and southern Bombay are in the intermediate zone, and, as we have stated, our female specimens from this zone in adult and first winter plumage have the crown varying from greenish to pure black.

In conclusion we believe that the polymorphism of adult females in true *travancoreensis* is not established. The plumage in adult females seems to be as follows:

THROAT AND CROWN COLOR IN ADULT FEMALE *Parus xanthogenys*

*P. x. xanthogenys*; black throat and black crown

*P. x. aplonotus*; greenish throat, black crown

*P. x. xanthonotus*; greenish throat, crown varying from greenish to pure black

*P. x. travancoreensis*; greenish throat and greenish crown

I have seen only three moulting specimens, but the date on which one of these specimens is moulting is odd. This specimen, a male with adult wing and tail feathers, is moulting the throat



feathers on April 16 at Bheraghat in Central Provinces. Whistler (1942, *loc. cit.*) says that the moult takes place in December-January; April 16 seems to be very late, for my two other moulting specimens (adult females) are in the last stages of their post-nuptial moult by October 18 to 22 in Tehri. Whistler states that *travancoreensis* breeds late "July to August and possibly even later"; a specimen taken on December 13 in Travancore had just finished breeding. In Nepal, Koelz collected two specimens that were breeding on March 12.

### ***Parus xanthogenys xanthogenys* Vigors**

NORTHERN INDIA: Tehri: Kanderala, October 18-20, 1948, 1 ad. ♂, 1 ad. ♀; Sarutal, October 22-23, 1 ad. ♂, 1 ad. ♀. Northern United Provinces: Kathgodam, April 9-10, 1 ad. ♂, 1 subad. ♂; Almora, April 20, 1 ad. ♂; Sama, June 3, 1 ad. ♂, 1 unsexed subad. Nepal: Bhimpedi, March 12, 1947, 2 ad. ♂; Thankot, March 22-April 9, 2 ad. ♂; Chitlang, April 23-24, 2 ad. ♂; Deorali [near Chisapani Garhi], April 28, 1 subad. ♂, May 2, 1 ad. ♀.

### ***Parus xanthogenys aplonotus* Blyth**

CENTRAL INDIA: Rajputana, Sirohi: Anadra, December 29, 1948, 1 ad. ♂; Oria, January 4-6, 1949, 2 ad. ♂, 1 subad. ♂. Bhopal: Sanchi, January 2-3, 1938, 2 ad. ♂, 1 subad. ♂, 1 ad. ♀. Central Provinces: Bheraghat, March 2-May 9, 1946, 3 ad. ♂, 1 subad. ♂, 2 subad. ♀; Belwani-Kisli, July 30-August 6, 1 subad. ♂, 1 unsexed subad.; Kanha, September 4, 1 subad. ♂. Orissa: Mahendra, January 24-25, 1937, 2 ad. ♂, 1 ad. ♀.

### ***Parus xanthogenys xanthonotus* Koelz**

SOUTHERN BOMBAY PRESIDENCY: Londa, January 7-8, 1938, 2 ad. ♂, January 10, 1 ad. ♂ (the type of *P. x. xanthonotus*), January 15-February 13, 1 ad. ♂, 3 ad. ♀, 1 subad. ♀; Jagalbed, February 18-March 10, 2 ad. ♂, 1 subad. ♂, 1 unsexed ad. [♀].

### ***Parus xanthogenys travancoreensis* Whistler and Kinnear**

SOUTHERN MADRAS PRESIDENCY: Palni Hills, Kodai Kanal, March 10-11, 1937, 2 ad. ♂, 1 ad. ♀.

### *PARUS RUBIDIVENTRIS*

This species varies geographically throughout its range which extends from Afghanistan and Turkestan (Tian Shan and Fergana) through the Himalayas to the mountains of western China. The variations can be grouped into three types: a western type consisting of the populations of Afghanistan, Turkestan, Kashmir, and northern Punjab; an eastern type ranging from the eastern end of Nepal to western China; and a geographically

intervening type in Tehri, Garhwal, Kumaon, and most of Nepal. The eastern and western types vary within themselves, but the third type, so far as is known, does not vary.

In the western type the birds are large, slaty gray on the abdomen with the black of the throat coming far down onto the breast, the mantle is tinged with olive, and the cheeks are pure white. In the eastern type the birds are small, the abdomen is buffy gray with a slight tinge of rufous, and the black of the throat is more limited, reaching only to the upper breast, the mantle is slaty without olive, and the cheeks are buffy. The geographically intervening type is rufous on the abdomen, but its other characters are intermediate or show a combination of the characters of the eastern and western types. These variations, those of the nuchal spot, and the variations within the eastern and western types are summarized below in tabular form.

VARIATIONS IN ADULT *Parus rubidiventris*

	Western Type		Intermediate Type	Eastern Type	
	Ferghana, Afghanistan	Kashmir, northern Punjab	Tehri, Garhwal, Kumaon, Nepal?	Sikkim	Northern Kansu
Belly	Slaty gray	Slaty gray	Rufous	Buffy gray	Paler buffy gray
Throat and breast	Much black	Black	Less black	Less black	Less black
Mantle	Olive	Olive strong-est	Olive weak-est	Slaty (no olive)	Paler slate
Nuchal spot	With rufous	With rufous	Slightly rufous	White	White
Cheeks	White	White	White	Buffy	Buffy
Size (wing and bill)	Large	Large	Intermediate	Small	Small

The rufous-bellied form has hitherto been treated as a separate species. But as Dr. Mayr pointed out to me, this form occupies a well-defined, perfectly geographically representative range and in all characters, except the rufous belly, is intermediate or a combination of the characters of the eastern and western birds. This had been sensed by Hartert, who in 1905 (*Die Vögel der paläark-*

tischen Fauna, p. 302) had suggested that it might be an altitudinal race or possibly the young of the eastern form.

Examination of the specimens collected by Koelz and those in the collection of the American Museum of Natural History shows that the following races can be recognized.

In the western type two races: *P. rubidiventris rufonuchalis* Blyth (type locality, the mountains above Simla) for the birds of Kashmir and northern Punjab, and *P. rubidiventris blanchardi* Meinertzhagen (1938, Bull. Brit. Ornith. Club, vol. 58, p. 95; type locality, Gardez Forest, eastern Afghanistan) for the birds of Ferghana, Gilgit, and Afghanistan. In the material examined, the different populations within each respective group show no differences; but when the two groups are compared, in the birds of Kashmir and northern Punjab (Chamba, Lahul, Kulu, and Bashahr) the black of the throat does not extend so far down as in *blanchardi* and usually does not reach onto or to the abdomen, and the mantle is more strongly tinged with olive. In worn specimens the olive tinge disappears, and the color of the mantle becomes indistinguishable. Fresh specimens show much individual variation in the color of the mantle and size of the black area on the breast, but the differences, though slight, are quite discernible when the specimens are compared as a series.

Keve (1943, Anz. Akad. Wiss., Vienna, vol. 80, p. 18) has described, on a single specimen, a "new" subspecies (*parvirostris*) from Tian Shan, differing from Himalayan *rufonuchalis* by its smaller bill (11 mm.). I have no Tian Shan specimens, but from Ferghana, the birds of which are associated by Keve with his "new" race, a series of specimens do not differ in the size of the bill from topotypical specimens of *rufonuchalis* from northern Punjab (table 5).

*Parus rubidiventris blanchardi* was described from a lone specimen which was aberrant in that the color of its mantle was "entirely lacking the greenish wash." Up to the present the species had been known only from the eastern border of Afghanistan. The specimens taken by Koelz at the Burchao Pass in the western part of north central Afghanistan extend the western border of the range by almost 400 kilometers. No geographical variation is shown by the various Afghan populations in comparative plumage.

The rufous-bellied form is *P. rubidiventris rubidiventris* Blyth (type locality, Nepal). My westernmost population of this race

is from Tehri, and these specimens as far as the belly is concerned show no signs of intergradation with my easternmost (Bashahr) population of *P. r. rufonuchalis*. It is possible, however, that the zone of intergradation is a narrow one and that intergrades will be found. No Nepal specimens were available. The Tehri, Garhwal, and Kumaon specimens are identical.

In the eastern type two races can be recognized: *P. rubridiventris beavani* Jerdon (type locality, Mt. Tongloo, Sikkim) for all the eastern populations with the exception of those of northern Kansu which are a little paler and have been separated by Stresemann as *whistleri* (type locality, Lau hu kou, northern Kansu). Meise (1937, Jour. Ornith., vol. 85, p. 514) has also separated the birds of Szechwan as *szetschwanensis* (type locality, central Szechwan), stating that they were like the Himalayan birds but smaller; *szetschwanensis*, however, does not appear to be well founded and is, I believe, synonymous with *beavani*.

Stresemann and Meise both used the wing measurements of some Sikkim specimens supplied to Stresemann by Whistler (six males, 69–74; five females, 64.5–72.5). In the measurements given in table 5, I find, however, that in specimens I have measured, Sikkim specimens (which include two topotypes of *beavani*) are smaller than those measured by Whistler, and, further, that there is in fact no significant size difference between any of the eastern populations. Comparison of three specimens from northern Kansu with the specimens from Sikkim shows that the Kansu specimens are a little paler on the abdomen and slightly more rufous, and slightly paler above on the mantle and upper tail coverts. The three Kansu specimens were part of Stresemann's original series and include a topotype of *whistleri*.

The westernmost specimens of *beavani* that I have examined were from Sikkim, but the range extends into eastern Nepal, for Mr. Biswas kindly tells me that he has examined two specimens in the British Museum taken at Dolaka not far from the Sikkim border.

**MOULT:** In Afghanistan the complete post-nuptial moult of the adult starts about the middle of June and is over, except for a few last traces, by early September. In one female taken on July 4 in northern Punjab the moult is far advanced, the tail and wing being almost fully grown, but in a male taken on July 30 in Kashmir the moult had barely started. In an adult male just starting to moult on June 18 in Afghanistan the moult is starting

simultaneously with the feathers of the inner wing, wing coverts, and body plumage. The moult into first winter plumage is partial and involves only the body feathers and some coverts. This moult may take place at the same time as that of the adult, or in many cases starts later, for it is not quite finished in several specimens taken from September 23 to October 12 in Afghanistan; and in four specimens taken from July 31 to August 6 in Kashmir had not started in two specimens and was just barely starting with the feathers of the crown and throat in the other two. In first winter plumage the bird differs from the adult by having the greater wing coverts and quills browner, the crest a little shorter and less glossy, the black area below generally more restricted, and the black slightly browner, less intense, and less glossy.

Adult specimens of the rufous-bellied *P. r. rubidiventris* taken in early July in Kumaon were extremely worn but had not started to moult. The only moulting specimens of this form that I have seen were two first winter birds, female and sex unknown, and an adult male taken from October 7 to 12 in Tehri. All three showed a few last traces of moult.

### ***Parus rubidiventris blanchardi* Meinertzhagen**

AFGHANISTAN: Southeastern: 8000 feet, above Khudikhel, May 22, 1937, 4 ad. ♂, 1 ad. ♀; Daulatshah, May 31, 1 ad. ♀; Sirotai, June 17-19, 1 ad. ♂, 1 imm. ♂, 1 subad. ♀, 1 imm. ♀, 1 unsexed imm. Northeast: Daraim, August 9-10, 3 ad. ♂, 1 subad. ♂. North central and western: Terak, September 2-4, 1939, 4 ad. ♂, 4 subad. ♂, 4 ad. ♀, 4 subad. ♀; Safedsang, September 19-25, 6 ad. ♂, 1 ad. ♀, 1 subad. ♀, 1 unsexed subad.; Burchao Pass, October 12-15, 5 ad. ♂, 2 ad. ♀, 3 subad. ♀, 1 unsexed ad., 1 unsexed subad.

### ***Parus rubidiventris rufonuchalis* Blyth**

NORTHERN INDIA: Kashmir: above Bandipur, 7000 feet, July 30, 1936, 1 ad. ♂; Tarakbal, July 31, 1 imm. ♂, 1 imm. ♀; Burzil, August 6, 2 imm. ♂. Northern Punjab, Kulu: Koti, June 5, 1 ad. ♂. Northern Punjab, Lahul: Jugmor, June 10, 2 ad. ♂; Gumrang, October 18, 1 ad. ♂. Northern Punjab, Chamba: Kukti, July 3-4, 1 imm. ♂, 1 ad. ♀.

### ***Parus rubidiventris rubidiventris* Blyth**

NORTHERN INDIA: Tehri: Bhujeka, October 12-13, 1948, 1 ad. ♂, 2 ad. ♀, 1 subad. ♀; Diar, October 6-8, 1 ad. ♂, 1 subad. ♂, 1 subad. ♀; Jagora, October 7-8, 2 ad. ♂, 2 ad. ♀, 1 unsexed subad. Garhwal: Kurumtali, May 12, 1 ad. ♂. Kumaon: near Sumto-Rahlam Pass, June 16, 1 imm. ♂; Jimba, 2 ad. ♂, 1 imm. ♂, 1 unsexed imm.; Sumdum, July 5, 1 imm. ♀; Martali, May 5, 1 ad. ♀.

TABLE 5  
MEASUREMENTS OF ADULTS IN *Parus rubidiventris*

Race and Region	N	Wing	N	Bill from Skull	N	Tail
<i>blanchardi</i>						
Ferghana	3 ♂	75.0, 76.0, 76.0	3 ♂	13.0, 13.0, 14.0	2 ♂	54.0, 55.0 —
Ferghana	3 ♀	71.0, 71.0, 74.0	3 ♀	13.0, 13.0, 13.5	3 ♀	50.0, 50.0, 51.0
Gilgit	1 ♀	76.0 — —	1 ♀	13.5 — —	1 ♀	55.0 — —
Eastern Afghanistan	5 ♂	75.0-79.0 (77.4)	7 ♂	13.0-15.0 (14.0)	6 ♂	52.5-58.0 (55.3)
Eastern Afghanistan	2 ♀	72.0, 73.0 —	2 ♀	13.0, 14.0 —	2 ♀	50.0, 53.0 —
North central Afghanistan	15 ♂	74.0-79.0 (76.4)	15 ♂	12.5-15.0 (13.6)	15 ♂	51.0-56.0 (53.6)
North central Afghanistan	7 ♀	72.0-76.0 (73.7)	7 ♀	12.5-14.0 (13.2)	7 ♀	50.0-54.0 (52.0)
<i>rufonuchalis</i>						
Kashmir and northern Punjab	8 ♂	74.0-80.0 (76.8)	9 ♂	13.0-15.0 (14.1)	8 ♂	49.0-55.0 (52.2)
Northern Punjab	1 ♀	73.0 — —	2 ♀	13.5, 14.0 —	1 ♀	48.0 — —
<i>rubidiventris</i>						
Tehri, Garhwal, and Kumaon	7 ♂	69.0-71.0 (70.2)	4 ♂	all 12.0 —	6 ♂	46.0-49.0 (48.0)
Tehri, Garhwal, and Kumaon	5 ♀	67.0-70.0 (68.4)	4 ♀	11.5-12.0 (11.8)	4 ♀	46.0-49.0 (46.7)

TABLE 5—Continued

Race and Region	N	Wing	N	Bill from Skull	N	Tail
<i>beavani</i>						
Sikkim	9 <sup>a</sup>	66.0-69.0 (66.9)	9	11.0-12.0 (11.4)	9	46.0-49.0 (46.9)
North Burma	3 ♂	69.0, 70.0, 71.0	3 ♂	11.0, 11.0, 11.0	3 ♂	48.0, 49.0, 51.0
North Burma	2 ♀	66.0, 67.0	2 ♀	10.5, 11.0	2 ♀	44.0, 44.0
Northwestern Yunnan	4 ♂	66.0-70.0 (68.0)	4 ♂	11.0-11.5 (11.1)	4 ♂	45.0-46.0 (45.8)
Northwestern Yunnan	1 ♀	68.0	1 ♀	12.0	1 ♀	48.0
Ta pa shan Mountains	11 ♂	62.5-68.0 (64.6)	10 ♂	11.0-11.5 (11.4)	10 ♂	42.0-46.0 (44.6)
Ta pa shan Mountains	3 ♀	62.0, 62.5, 62.5	3 ♀	11.0, 11.0, 11.0	3 ♀	43.0, 44.0, 44.0
Szechwan <sup>b</sup>	11 ♂	62.5-70.5 (66.5)	—	—	—	—
Szechwan <sup>b</sup>	8 ♀	61.5-65.0 (63.0)	—	—	—	—
<i>whistleri</i>						
Northern Kansu <sup>c</sup>	4 ♂	63.5-68.0 (66.2)	—	—	—	—
Northern Kansu <sup>c</sup>	5 ♀	61.0-67.0 (63.0)	—	—	—	—

<sup>a</sup> Unsexed adults.<sup>b</sup> Kleinschmidt and Weigold (1922, Abhandl. Ber. Zool. Mus. Dresden, vol. 15, no. 3, p. 12). The individual wing measurements of these specimens used by Meise in describing *szelchuanensis* are as follows: Sungpan, northern Szechwan, males, 63, 67, females, 62, 63; Waschan, near Mt. Omei, western Szechwan, males, 62.5, 65, 66, 67, 67, 67, 68, 69, 70, females, 61.5, 62.5, 62.5, 64, 64, 65.<sup>c</sup> Stresemann (1937, Jour. Ornith., vol. 85, p. 514). Individual wing measurements: males, 63.5, 66.5, 67, 68, females, 61, 61, 62.5, 63, 67. Three of these specimens as measured by me have: wing, males, 65, 67, female, 64; bill, males and female, all 11; tail, males, 45, 48, female, 45.

### ***Parus melanolophus* Vigors**

AFGHANISTAN: 8000 feet, above Khudikhel, May 22, 1937, 2 ad. ♂, 1 ad. ♀; Sirotai, June 17-18, 4 ad. ♂, 1 imm. ♀.

NORTHERN INDIA: Kashmir: 7000 feet, above Bandipur, July 30, 1936, 1 imm. ♀; Tarakbal, August 2, 1 imm. ♂; Burzil, August 6, 1 imm. ♂, 2 imm. ♀. Northern Punjab, Chamba: Kukti, July 4, 1 ad. ♀; Harser, July 6, 1 imm. ♂. Northern Punjab, Lahul: Dartse, October 9-10, 1 subad. ♂, 1 ad. ♀. Tehri: 10,000 feet, above Luni, September 24, 1948, 1 ad. ♂; Mati, September 29-30, 1 ad. ♂, 1 imm. ♂; Jagora, October 7, 1 ad. ♂; Bhujeka, October 13-14, 2 ad. ♂, 1 subad. ♀. Garhwal: Kanal, May 18, 1 ad. ♂. Kumaon: Gunji, July 17, 1 imm. ♂; Dhakuri, April 26-27, 2 ad. ♂; Martali, May 5-6, 2 ad. ♂, 1 ad. ♀.

I lack specimens in fresh plumage from Afghanistan. Worn specimens from this region (May 22-June 18) are identical with worn specimens taken from April 26 to July 4 in Chamba, Garhwal, and northern United Provinces.

MOULT AND PLUMAGE: Only three moulting specimens have been examined. In an adult male taken on June 18 in Afghanistan a complete moult is barely starting with the inner primaries and body feathers. In Tehri an immature male is moulting into first winter plumage on September 29, and in an immature female taken on October 13 this moult is just about finished. Adults taken in this region at the end of September and early part of October are in perfectly fresh plumage. Birds in first winter plumage have the greater wing coverts and quills browner; below, the black area is a little more restricted, and the black is browner and less glossy, than in adults.

MEASUREMENTS (ADULTS ONLY): Afghanistan (worn): Wing, six males, 65-68 (66.0); one female, 64. Tail, six males, 45-48 (46.5); one female, 44. Bill, six males, 11.0-11.5 (11.2); one female, 11.0.

Chamba, Garhwal, United Provinces (worn): Wing, five males, 63-66 (64.6); two females, 62, 64. Tail, five males, 43-46 (44.0); one female, 44. Northern Punjab, Tehri (fresh): Wing, nine males, 61-67 (64.4); two females, 62, 63. Tail, nine males, 41-47 (43.7); two females, 41, 42. Bill, 14 males, 11-12 (11.5); four females, 11.0-11.5 (11.4).

### ***Parus dichrous kangrae* Whistler**

NORTHERN INDIA: Tehri: Jagora, October 7, 1948, 1 ad. ♂; Bhujeka, October 13, 1 ad. ♀. Garhwal: Wan, May 21, 1 ad. ♀. Kumaon: Dhakuri, April 27, 2 ad. ♂, 2 ad. ♀.



Compared to Sikkim specimens (nominate *dichrous*) in comparative plumage, the specimens of *kangrae* listed above, and another October specimen from Kulu, have the broken collar on the sides of the neck a little whiter, and the color of the chin and throat contrasts more sharply with that of the breast and abdomen. Above, the specimens of *kangrae* are slightly paler, and below are a little brighter, less brown. A series of *wellsi* from northwestern Yunnan are darker above than the specimens of nominate *dichrous* from Sikkim, slightly darker below, more grayish, and show no contrast between the throat and breast, the under parts being uniformly colored. In my specimens, the specimens of nominate *dichrous* are intermediate in saturation and distribution of pigment between those of *kangrae* and *wellsi*.

MOULT: In the October specimens, the specimen from Kulu (October 28) has completed the moult, and the two specimens from Tehri (October 7 and 13) still show a very few last traces of moult in the body plumage.

MEASUREMENTS: Wing, four males, 68–70 (69.2); four females, 65–67 (65.8). Tail, four males, 44.0–46.5 (45.0); four females, 43–46 (44.5). Bill, four males, 11.0–11.5 (11.2); four females, 11–12 (11.5).

### **Melanochlora sultanea sultanea** Hodgson

NEPAL: Hitaura, May 24, 1947, 1 ad. ♂.

Wing, 113; tail, 94; bill, 18; crest from base of bill, 45.

### **Sylviparus modestus simlaensis** Baker

INDIA: Kumaon: Duni, May 3, 1948, 1 ad. ♂.

This specimen, though extremely worn, is yellower than other worn specimens taken in Nepal at the end of April.

### **Sylviparus modestus modestus** Burton

INDIA: Nepal: Chitlang, March 15–April 27, 1947, 3 ad. ♂, 1 ad. ♀; Thantkot, March 23–April 9, 4 ad. ♂, 2 ad. ♀; Deorali [near Chisapani Garhi], April 28, 1 ad. ♀. Northern Bengal, Darjeeling district: Tiger Hill, December 23, 1936, 1 ad. ♂, 1 ad. ♀; Rangirum, December 26, 2 ad. ♂, 2 ad. ♀.

As stated by Mayr (1940, *Ibis*, p. 702), this species has been over-split, and it is quite evident, as Kinnear also concluded (1937, *Ibis*, p. 25), that coloration is affected by foxing and wear. After comparing the Koelz specimens with those in the collection of

the American Museum of Natural History, I can separate only three races, and a fourth may possibly be recognizable. They are:

1. A bright race (*simlaensis*, 1917) in the western Himalayas. I have but one fresh specimen of this race, an adult male taken on December 5, 1931, at Rampur-Bashahr in northern Punjab, but this specimen is distinctly brighter and yellower than any other specimens in comparative plumage from any other part of the range, with the exception of another single specimen, an adult male from southern Annam. This latter, although taken on April 20, 1918, is not worn, and its plumage and coloration match perfectly those of the northern Punjab specimen. The birds of southern Annam, which were described as bright and yellowish, have been named *klossi* by Delacour and Jabouille. More specimens should be compared, but judging by the present ones, *klossi* cannot be distinguished from *simlaensis*.

2. A distinctly duller and grayer race (nominate *modestus*) occurs in the eastern Himalayas. All my Sikkim specimens are old and badly foxed, and the Koelz specimens from Nepal are mostly too worn, but those less worn and particularly the six adults in fresh plumage collected from December 23 to 26, 1936, near Darjeeling, show the racial difference well.

3. A slightly darker, more saturated race (*saturation*, 1906) is found in northern Burma, Yunnan, Chin Hills, and northern Tonkin. Working with the same material, I cannot, nor could Mayr (*loc. cit.*), separate in any way two large series from northern Burma and northern Tonkin. The Tonkin series was taken from November 17 to December 12, 1929, and the Burma series, though taken later in the year, from January 16 to March 30, 1939, is in comparative plumage. I have only one specimen from Yunnan, taken on September 6, 1921, and one specimen from Mt. Victoria (topotypical *saturation*), taken on May 14, 1938. These two specimens are not separable from the Burma-Tonkin series. However, the Mt. Victoria specimen is badly worn, and as wear in this species darkens the plumage, it is possible that specimens in fresh plumage from this region might be paler than the Burma-Yunnan-Tonkin populations. Judging by the variability in this species, I do not believe that this possible variation could be distinct enough to warrant separation. But if so, the name *saturation* will be restricted to the population of the Chin Hills, and *tonkinensis* Delacour and Jabouille, 1930, is available for the

populations of northern Burma, Yunnan, and Tonkin. In the meantime it appears wiser not to separate these populations from the population of the Chin Hills.

4. A race from China (*occultus*) may possibly be separated from the populations of the Chin Hills, northern Burma, Yunnan, and Tonkin. Four specimens from China (one from western Szechwan and three from Fukien) are very slightly duller and very slightly grayer, but, as these specimens are worn, this slight difference should be confirmed by specimens in fresh plumage. *S. m. occultus* was described from western Szechwan in 1912, and in 1923 La Touche separated, not very convincingly, the birds of Fukien as *ricketti*. My four specimens may be insufficient, but, as they are identical, *ricketti* appears to be a synonym of *occultus*.

TABLE 6  
MEASUREMENTS IN ADULT *Sylviparus modestus*

Race and Region	N	Wing	Tail	Bill
<i>simlaensis</i>				
Kumaon, N. Punjab	3 ♂	59.0-60.0 (59.7)	36.0-40.0 (37.7)	9.0- 9.5 (9.2)
S. Annam	1 ♂	57.0 — —	36.0 — —	9.5 — —
<i>modestus</i>				
S. Nepal	7 ♂	57.0-63.0 (60.5)	35.0-41.0 (38.1)	9.0-10.0 (9.2)
S. Nepal	4 ♀	56.5-58.0 (57.0)	34.0-39.0 (36.5)	9.0-10.0 (9.2)
Darjeeling	3 ♂	58.0, 60.0, 62.0	35.0, 36.0, 40.0	9.0, 9.0, 9.5
Darjeeling	3 ♀	55.0, 56.0, 60.0	34.0, 34.0, 39.0	9.0, 9.5, 9.5
Sikkim	9 <sup>a</sup>	56.0-64.0 (59.3)	34.0-40.0 (37.3)	9.0-10.0 (9.4)
<i>saturation</i>				
N. Burma	7 ♂	59.0-63.0 (61.0)	38.0-41.0 (40.5)	9.0- 9.5 (9.2)
N. Burma	6 ♀	56.0-60.0 (56.5)	35.0-39.0 (36.5)	9.0- 9.5 (9.2)
N. Yunnan	1 ♀	58.5 — —	36.0 — —	9.0 — —
N. Tonkin	6 ♂	58.0-62.5 (60.8)	36.0-42.0 (38.5)	9.0-10.0 (9.4)
N. Tonkin	5 ♀	55.0-59.0 (57.2)	35.0-37.0 (36.5)	9.0- 9.5 (9.2)
Mt. Victoria	1 ♀	57.0 — —	38.0 — —	9.5 — —
<i>? occultus</i>				
W. Szechwan	1 ♂	59.0 — —	40.0 — —	9.5 — —
Fukien	2 ♂	58.0, 58.5 —	38.0, 38.0 —	9.0, 9.0 —
Fukien	1 ♀	56.0 — —	34.0 — —	9.5 — —

<sup>a</sup>Unsexed adults.

#### SUBFAMILY REMIZINAE

##### REMIZ PENDULINUS

The penduline tits have been fully reviewed by Hellmayr (1911, *in* Wytsman, *Genera avium*, pt. 18, pp. 56-60), Zarudny

(1913, *Messenger Ornith.*, pp. 46–50; 1914, *ibid.*, pp. 184–222), and Hartert (1918, *Novitates Zool.*, vol. 25, pp. 305–309); further comments have been added by Dementiev (1935, *L'Oiseau*, vol. 5, pp. 82–85). Although most of these reviews are very detailed, and three species, *R. pendulinus*, *R. coronatus*, and *R. macronyx*, are generally recognized, the relationships of the various forms are still not clear.

Adequate material, particularly from central Asia, is lacking or very insufficient, but examination of the specimens available and a study of the descriptions and published statements of range lead me to believe that we are dealing with but one single, geographically variable species, by name *pendulinus*. The ranges of the various forms are geographically representative (fig. 2), and intermediate populations exist. Dementiev (*loc. cit.*) mentions several specimens formerly described as races of *pendulinus* or *macronyx*, which upon examination turn out to be intermediate between these two forms. I have such a specimen and several others, the characters of which are intermediate between *pendulinus* and *coronatus*.

In an earlier paper, Dementiev (1934, *Proc. Eighth Internatl. Ornith. Congr.*, p. 247) emphasized not only the presence of hybrid populations in *R. pendulinus* and *R. macronyx* but also the fact that the young and eggs of these two forms have a "striking resemblance."

It may be objected that specimens identified as *pendulinus*, *coronatus*, and *macronyx* have apparently been recorded from the valley of the Syr Daria, and that *macronyx* and *pendulinus* are both listed as occurring in northern Iran, and *macronyx* and *coronatus* in Ferghana and Seistan. "However [as Dr. Mayr kindly comments], the intergrading populations between these various forms are exceedingly variable and contain specimens which might be identified as belonging to either of the neighboring forms. It is a matter of taste whether such variable intermediate populations should be called intergrades or hybrids. The breeding ranges in arid central Asia of these tits are very localized in river bottoms and swamps with willows and poplars. This has favored the evolution of strikingly different races. The fact that these races interbreed wherever they come in contact shows that they are still conspecific."

The correct identification of specimens of the hybrid populations is difficult. For instance, "*yenisseensis*" now considered by

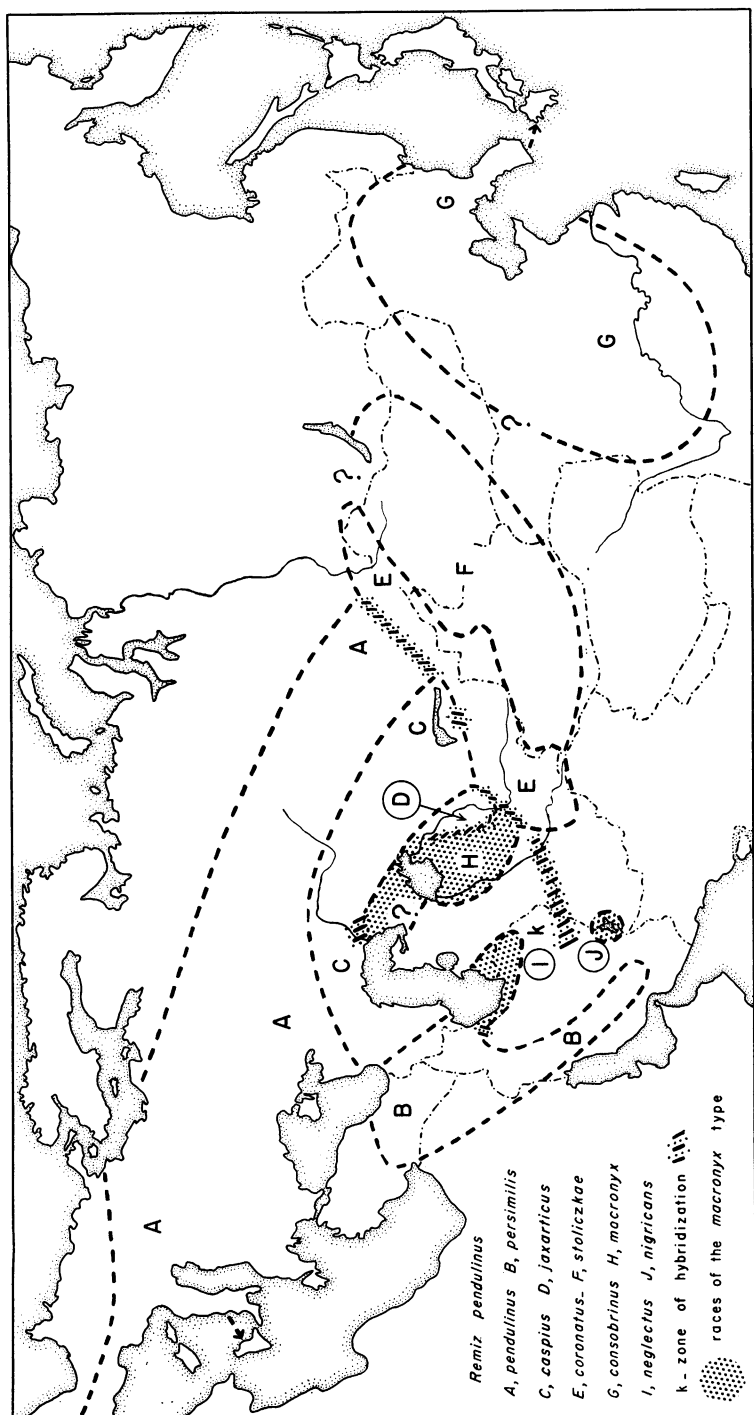


FIG. 2. Distribution of *Remiz pendulinus*; colonies breed within the indicated ranges only in suitable habitats which may be widely separated; in zone k, hybrid specimens may occur only as winter visitors.

its author Sushkin (1925, List and distribution of birds of the Russian Altaï, p. 45), to be a synonym of *coronatus*, was formerly considered by Russian authors to be a race of *pendulinus*, and an experienced worker like Hellmayr in his 1911 paper was, after the examination of the type of "*yenisseensis*," inclined to so regard it. It must not be forgotten also that these little tits, or some of their populations, are migratory, *pendulinus* and *coronatus* occurring as transients or winter visitors in the range of *macronyx*, the full wanderings starting in the late summer.

#### INTERMEDIATE POPULATIONS

In figure 2 some of the zones where hybridization occurs or may occur are shown by diagonal dashes and dots.

According to Dementiev (*loc. cit.*) specimens, all described as separate forms but the characters of which appear to be intermediate between those of the *macronyx* and *pendulinus* types, have been taken in the region of Lenkoran at the southwestern corner of the Caspian, the mouth of the Ural River, the middle Amu Daria, and at a locality on the southern shore of Lake Balkash.

Other probable zones are along the middle and lower Syr Daria and the region from Lake Balkash towards the upper Yenissei.

A broad zone (indicated by k in fig. 2) is shown extending from the middle Amu Daria into eastern Iran. From this zone or near it I have an adult taken on November 20 on the "Transcaspia-Persian Frontier." This specimen is intermediate between the races of the *pendulinus* and *macronyx* types, having a blackish throat and a crown that is white but without the chestnut frontal band. (For the head pattern and other characters of the various races, see table 7 and fig. 3.)

I also have an interesting series of 14 adult males from zone k which appear to be intermediate between *coronatus* and a population of the *pendulinus* type. All the 14 males lack the chestnut frontal band characteristic of the races of the *pendulinus* type, and, to a varying degree, the head pattern is intermediate between *coronatus* and the races of the *pendulinus* type. The variation is as follows:

- A. Two specimens are of the *pendulinus* type with no nuchal band
- B. Seven are identical or very similar to *coronatus*
- C. Five are more or less intermediate between A and B

These specimens were taken: one on October 20 at Maimana, three at Kang on November 2 (as these four specimens from

Afghanistan, collected by Koelz, are very close to, or identical with, *coronatus* they are identified as such in the list of the specimens collected by Koelz); two from Tedjen in Transcaspia collected on March 3 to 18 by Härms (an adult female taken at Merw at the same time is also intermediate); eight collected in eastern Iran by Zarudny from November 22 to February 26 (three of these are from southern Khorasan and the others from Persian Baluchistan).

It will be noticed that these specimens were taken, as was the *pendulinus* × *macronyx* hybrid, in fall or winter. They may all be winter visitors from farther north and east, or it is possible that isolated colonies of *coronatus* and of a race of the *pendulinus* type breed in zone k. This zone connects, more or less, the ranges of the races of the *macronyx* type (*macronyx* on the middle Amu Daria, *neglectus* in the Atrek River basin, and *nigricans* in Seistan).

It may also be remarked here that the ranges shown in figure 2 are to be accepted only with reservations. They must not be taken literally; for instance, although a colony of *caspius* is reported from Lake Balkash there are apparently no records between the lake and the Ural River, and no records of nominate *pendulinus* between this river and the Semipalatinsk. Even less is known of *stoliczkae*.

#### CHARACTER VARIATION

The character variations in *R. pendulinus* are summarized in table 7, and the measurements are given in table 8. Reservation must be made that I had no specimens of two of these races (*macronyx* and *neglectus*) and very few in the case of others.

#### *Remiz pendulinus persimilis* Hartert

IRAN: Kirman: Bam, January 26, 1940, 1 unsexed subad. Luristan: Durud, March 17, 1941, 2 ad. ♂, 2 ad. ♀, 1 subad. ♀, September 19, 1 subad. ♂, October 12, 1 subad. ♂; Burujird, June 19, 1 ad. ♂, 1 subad. ♀, 1 imm. ♀, July 22–24, 1 imm. ♂, 1 unsexed imm., September 21, 1 subad. ♂, September 6–October 10, 1942, 2 subad. ♂, 1 unsexed subad.

The adults collected on March 17 and June 19 match perfectly the specimens of *persimilis* in the collection of the American Museum of Natural History which consist of the type, an adult male, taken on May 8 at Eregli, Asia Minor, and two paratypes, an adult female from Eregli collected on May 11 and an adult male collected on February 2 at Lenkoran. As stated by Hartert in the original description of *persimilis* (1918, *Novitates Zool.*, vol.

TABLE 7  
CHARACTER VARIATION IN ADULT *Remiz pendulinus*

Race	Coloration of Crown	Coloration of Mantle and Upper Wing Coverts	Shape of Bill and Average Size
A <sup>a</sup> <i>pendulinus</i>	Whitish, a narrow chestnut band above black frontal band	Bright chestnut	Large (11.7)
B <i>persimilis</i>	As in <i>pendulinus</i> , but chestnut band exceedingly narrow	Mantle as in <i>pendulinus</i> but lesser upper coverts distinctly paler	Large (10.9)
C <i>caspius</i>	Very broad chestnut area extending to top of crown, posterior part of crown and nape whitish	As in <i>persimilis</i>	Large (11.3)
D <i>jaxarticus</i>	As in <i>persimilis</i> , but chestnut reduced to very faint traces or lacking	A little paler than in <i>persimilis</i> and <i>caspius</i>	Very small, short, and thin (8.5)
E <i>coronatus</i>	A black frontal band, but no frontal chestnut at all, front and top of crown whitish but posterior part and nape well marked with broad black nuchal band, with wear entire crown becomes black except for a white patch on forehead	Mantle averages paler than the above races; lesser coverts paler, more sandy	Large (11.0)
F <i>stoliczkae</i>	A black frontal band but no chestnut, crown whitish with a variable nuchal band, dusky or blackish but not true black	As in <i>coronatus</i>	Very small, short, and thin, like <i>jaxarticus</i> (8.5)
G <i>consobrinus</i>	A narrow dusky or blackish frontal band surmounted by a very narrow white band, rest of crown ashy gray with darkish shaft streaks	Mantle sandy, lesser coverts edged with sandy but with centers blackish	Short and thin (9.1)
H <i>macronyx</i> <sup>b</sup>	Whole crown including nape black, throat blackish	Dark chestnut	—

<sup>a</sup> Capital letters refer to figures 2 and 3.

<sup>b</sup> No specimens; characters taken from the literature.



TABLE 7—Continued

Race	Coloration of Crown	Coloration of Mantle and Upper Wing Coverts	Shape of Bill and Average Size
I <i>neglectus</i> <sup>a</sup>	—	—	—
J <i>nigricans</i>	Whole crown, nape, and upper part of mantle black, throat blackish	Upper mantle black, lower mantle and lesser coverts very dark chestnut	Slightly longer (12.4) and very pointed

<sup>a</sup> No specimens; characters taken from the literature. Said to be like *macronyx* but smaller.

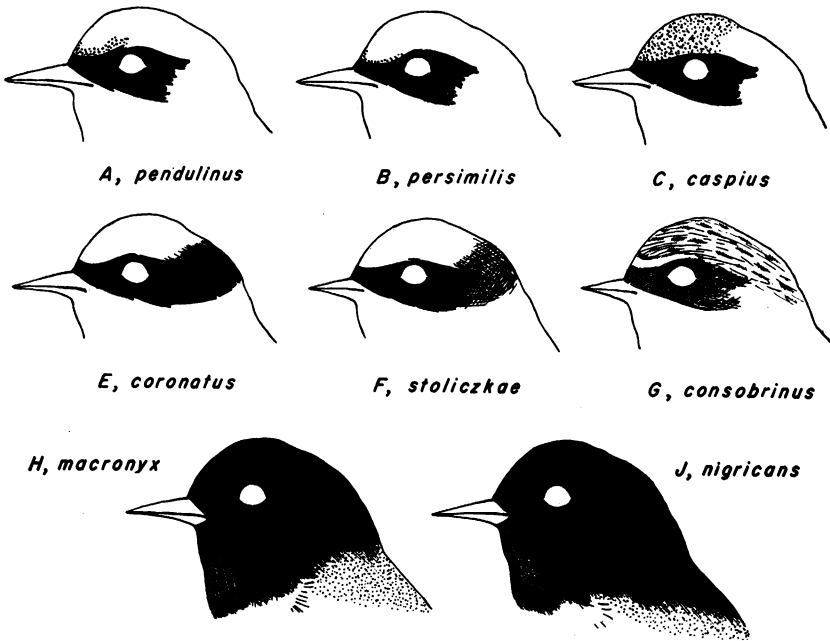


FIG. 3. Head pattern in *Remiz pendulinus*. Colors other than black as follows: white, white or whitish; hatched lines, blackish; lines (*consobrinus*), ashy gray crown with darker shaft streaks; dots, chestnut.

25, p. 307), the Koelz specimens, which are also in worn plumage, "are very much like *A. p. pendulinus*. . . the chestnut line above the black forehead is exceedingly narrow, sometimes hardly visible, top of head of male in spring pure white. Lesser upper wing-coverts and rump paler, the latter therefore in sharper contrast

to the interscapular region." The three males taken by Koelz are identical, and their wing length and that of the adult females are, with one exception, slightly shorter than in the specimens of nominate *pendulinus*.

Dementiev (*loc. cit.*) makes *persimilis* a synonym of "*menzbieri*" described in 1913 by Zarudny from the lower Karun in southwestern Iran. Despite the fact that Koelz's specimens are virtual topotypes of "*menzbieri*," I agree with Hartert that *persimilis* cannot be the same as "*menzbieri*" which was described as having a wider, not narrower, chestnut band than nominate *pendulinus*.

I do not know at what time of the year Zarudny's specimens were collected, but they might have been winter visitors of *R. p. caspius* in which the chestnut band is far broader than in nominate *pendulinus*. Or, as they evidently had more chestnut than in the latter, and, presumably, less than in *caspius*, they might have been hybrids.

### **Remiz pendulinus coronatus** Severtzow

AFGHANISTAN: Northeast: Daraim, August 9-10, 1937, 1 ad. ♂, 2 imm. ♂, 1 unsexed imm. North central: Pul i Khumri, November 6, 1939, 1 subad. ♀. Northwest: Maimana, October 20, 1 ad. ♂, 2 subad. ♂, 4 subad. ♀. Seistan: Kang, November 2, 1937, 3 ad. ♂.

The adult male taken on August 10 at Daraim, which had probably bred locally as it is still moulting, has black head markings identical in pattern with those of two typical specimens of *coronatus* from Ferghana, an adult male and an adult female taken on May 31 and June 1. The three specimens have the basal half of the feathers of the whole crown black in the males, blackish in the female. In fresh plumage, as in the male from Daraim, the distal end of the crown feathers are whitish, except towards the nape where the black shows through as a broad nuchal band. In the two Ferghana specimens these whitish ends are mostly worn off, persisting only as a white spot on the fore crown. As stated in the discussion of the intermediate populations, the adult from Maimana and the three from Kang are identical or very close to the specimen from Daraim and the two from Ferghana.

Prior to the Koelz specimens *coronatus* was known only as a winter visitor to Afghanistan, and the only records were the two specimens collected on April 19 and 23 reported by Whistler

(1944, Jour. Bombay Nat. Hist. Soc., vol. 44, p. 516), who states also that it "is a fairly regular winter visitor to N.-W. India from Peshawar to Sind." Stuart Baker included Baluchistan within its range. Although this is questioned by Ticehurst who says he knows of no records from this region (1926, Jour. Bombay Nat. Hist. Soc., vol. 31, p. 491), I believe it probably occurs there as a winter visitor since it occurs in Sind, and I have specimens from Seistan and a January 14 specimen from Jalq just over the Iranian side of the border of southern Baluchistan.

### **Remiz pendulinus** subspecies

IRAN: Luristan: Burujird, September 6, 1942, 1 subad. ♂.

This specimen is in first winter plumage, and, although probably a fall visitor of *neglectus*, I cannot identify it with certainty as I have not seen specimens of *neglectus* and *macronyx*, and my specimens of *nigricans* are immature or full adults. In the Burujird specimen the crown is brownish black, the pigment reaching only to the top of the crown; as adult *nigricans* is so much darker, the pigment reaching to the center of the mantle, I would expect first year *nigricans* to be darker and the pigment to reach farther back than in this specimen. The wing length, 52.5 mm., comes within the range of variation of adult *neglectus* but is too small for both *macronyx* and *nigricans* (see table 8).

### MOULT AND PLUMAGE

The moult and plumages of the nominate race are described by Stresemann (1920, Avifauna Macedonica, p. 104). The only moulting specimens that I have examined are an adult male of *coronatus* taken on August 10 at Daraim in northeastern Afghanistan, in which a complete post-nuptial moult is well advanced, and two juvenal males of *persimilis* taken on September 19 and 21 in Luristan, of which one is undergoing a complete post-juvenal moult, and in the other the moult is partial, only the body plumage and central tail feathers being replaced.

After their post-juvenal moult first winter birds of both sexes resemble the general plumage of their respective adult females, but they are browner on the crown, *coronatus* being a little darker than *persimilis*. In both races the facial mask is brownish instead of blackish, and the black frontal band is lacking or faintly marked. Immatures of both races and sexes are identical before

TABLE 8  
MEASUREMENTS IN ADULT *Remiz pendulinus*

Race, Locality, Region, and Dates	N	Wing	Tail	Bill
<i>pendulinus</i>				
S. Europe, Feb. 12-June 28	8 ♂	56.0-57.5 (57.0)	43.0-48.0 (46.0)	11.0-12.5 (12.0)
	4 ♀	55.0-56.5 (55.9)	44.0-47.0 (45.2)	10.5-12.0 (11.4)
<i>persimilis</i>				
Type, Eregli, May 8	1 ♂	54.0 —	45.0 —	11.5 —
Eregli, May 11	1 ♀	52.5 —	38.0 —	10.0 —
Lenkoran, Feb. 2	1 ♂	53.5 —	42.0 —	11.5 —
Luristan, March 17, June 19	3 ♂	52.0, 52.5, 54.5	41.0, 42.5, 46.0	10.5, 10.5, 11.0
Luristan, March 17	2 ♀	53.0, 57.0 —	44.0, 45.0 —	10.5, 11.5 —
<i>caspicus</i>				
Lower Volga, Orenburg, April 20-June 20	7 ♂	55.0-59.0 (57.2)	45.0-50.0 (46.6)	10.0-12.0 (11.3)
	2 ♀	57.0, 57.0 —	46.0, 47.0 —	11.0, 11.5 —
<i>jaxarticus</i>				
Perowsk, March 14	1 ♀	53.0 —	42.0 —	8.5 —

TABLE 8—Continued

Race, Locality, Region, and Dates	N	Wing	Tail	Bill
<i>coronatus</i>				
Ferghana, N.E. Afghan., May 16–August 10	2 ♂	52.0, moult	40.0, moult	10.5, 11.0
	1 ♀	52.0	42.0	10.5
W. Afghan., E. Iran, <sup>a</sup> Oct. 20–March 18	14 ♂	51.0–54.4 (53.0)	40.0–43.0 (41.4)	10.5–12.0 (11.0)
	1 ♀	51.0	40.0	11.0
<i>stoliczkae</i>				
Outer Mongolia, March–June 3	2 ♂	53.0, 53.0	38.0, 43.0	8.5, 9.0
	1 ♀	55.0	39.0	8.0
<i>consobrinus</i>				
N. and E. China, Jan. 1–April 28	1 ♂	56.5	40.0	9.0
	2 ♀	52.0, 54.0	39.0, 39.0	9.0, 9.5
<i>macronyx</i> <sup>b</sup>	?	56.0–59.0	48.0–52.0	10.5–11.5
<i>neglectus</i> <sup>c</sup>	?	50.0–56.0	46.5–51.0	?
<i>nigricans</i>				
Seistan, May 31–June 15	8 ♂	56.0–58.0 (56.8)	45.0–50.0 (47.4)	12.0–13.0 (12.4)
	1 ♀	55.0	50.0	12.0

<sup>a</sup>Intermediate specimens from zone k discussed in text.<sup>b</sup>Not examined, measurements from Hartert (1910, Die Vögel der paläarktischen Fauna, p. 393).<sup>c</sup>Not examined, measurements from Hartert (1921, *ibid.*, p. 2127).

the post-juvenal moult, being brownish gray over the whole crown and sides of the face.

### ***Cephalopyrus flammiceps flammiceps* Burton**

INDIA: Kashmir: Burzil, August 5, 1936, 1 subad. ♂. Northern Punjab, Chamba: above Kukti, July 3, 1 unsexed imm. Northern Punjab, Lahul: Puker, September 7, 1930, 1 ad. ♀. Northern Punjab, Kangra: Bhadwar, March 30, 1933, 1 ad. ♂. Northern United Provinces, Garhwal: Wan, May 14, 20, 1948, 2 ad. ♂. Northern United Provinces, Kumaon: Rahlam, June 22, 1 subad. ♂. Surguja: Gargori, October 23, 1947, 1 imm. ♂.

No specimens from the eastern Himalayas (*saturatus*) and northwestern Yunnan (*olivaceus*) are available.

Five adult males taken from March 30 to May 24 (1925–1948), in Kashmir, northern Punjab, and Garhwal are identical below in the depth and distribution of the golden orange color; above, they vary slightly, two specimens from northern Punjab being a little brighter, more yellow green, than a specimen from Kashmir and two from Garhwal. In these five specimens and in three others from the western Himalayas but without locality, the width of the red cap varies from 7 to 12 mm. The immature male from Surguja is more yellowish on the crown and below than the adult female from Lahul; this young male has no red feathers on the crown.

MOULT AND PLUMAGE: The two juvenal males taken on June 22 in Kumaon and August 5 at Burzil in Kashmir are going through a complete post-juvenal moult, the moult of the wing and tail being well advanced. The moult of the crown is about over, and the new feathers, with the exception of four or five red ones on the fore crown, are greenish. In this first winter plumage the males, in addition to the few red feathers, differ also from the adult female by being washed with weak golden orange on the throat and upper breast rather than with pale yellow.

MEASUREMENTS (ADULTS): Wing: seven males, 58–63 (60.5); one female, 64. Tail: eight males, 30–34 (31.6); one female, 35. Bill: seven males, 9–11 (9.9); one female, 9.5.

### SUBFAMILY AEGITHALINAE

#### ***Aegithalos caudatus alpinus* Hablizl**

IRAN: Mazenderan, region of Gurgan: Garmabdasht, July 24, 1940, 3 imm. ♂; Kherat, July 27, 3 imm. ♂, 1 imm. ♀, 2 unsexed imm., September 30, 2 ad. or subad. ♂ (in this species and those following, further mention other than "imm." is omitted; see below), 1 ♀, 1 unsexed; Shahfasand, September 28, 2 ♀.

**MOULT AND PLUMAGE:** All the immature specimens taken from July 24 to 27 are in the midst of the post-juvenal moult. This moult is complete, the tail and wing moulting simultaneously with all the contour feathers. The September specimens are in very fresh plumage. In these, and in the very much longer series of *passekii*, I can see no difference in state of plumage other than that caused by wear. Since no juvenal feathers are retained, and the very soft plumage wears quickly and badly, no distinction appears possible on skins in this genus between adults and first winter birds. According to the "Handbook of British birds" (1938, vol. 1, p. 273), the first winter plumage in the British race is like that of the adult.

**MEASUREMENTS:** Wing, males, 60, 60; females, 57, 59, 59. Tail, males, 68+, 70+; females, 65+, 66+, 66+. Bill, males, 9, 9; females, 8.5, 9, 9.

### ***Aegithalos caudatus passekii* Zarudny**

IRAN: Azerbaijan: Rezaieh, December 7, 1940, 5 ♂. Kermanshah: Qasr i Shirin, December 29, 1 unsexed; Surkhidizeh, January 10, 1941, 3 ♂, 1 ♀; Kermanshah, January 14, 3 ♂. Luristan: Chamchid, February 22, 1 ♂; Kalvar, May 27-29, 1940, 1 ♂, 2 imm. ♂, 1 ♀, 2 imm. ♀. Bakhtiari: Baraftab, January 30, 1941, 1 ♂; Ti, February 1-10, 5 ♂, 4 ♀, 1 unsexed, June 1, 1940, 1 imm. ♂; Imarat, February 15-18, 1941, 3 ♂, 4 ♀; Taze, May 2-7, 1940, 1 ♂, 1 ♀, 2 imm. ♀; Damavar, May 3-5, 2 ♂, 1 imm. ♂, 4 ♀, 1 imm. ♀. Fars: Dastarjin, April 8-9, 4 ♂, 1 ♀; Kotalipirzan, April 10, 1 ♂, 2 imm. ♀.

This long series shows no evidence of geographical variation. Specimens in comparative plumage from western Azerbaijan (December) are identical in coloration and size to the specimens from Kermanshah (December-January) and Bakhtiari (January-February). Worn specimens from Fars taken in April are indistinguishable from other worn specimens taken in May in Bakhtiari and Luristan.

These specimens fully support Paludan's observation (1938, Jour. Ornith., vol. 86, p. 605) that the birds of the mountains of western Iran are distinctly paler than those of Asia Minor (*tephronotus*) and those of the mountains along the southern Caspian (*alpinus*).

The breeding season in the Zagros begins in April or earlier. In Luristan a specimen taken on February 22 had the testes enlarged, and adults were nest building or were accompanied by fledged young on April 8 to 10 in Fars and May 3 to 7 in Bakhtiari.

No moulting specimens of *passekii* were available.

MEASUREMENTS: There is no apparent geographical variation in size: five males from western Azerbaijan have the wing, 58–62 (60.0), six from Kermanshah, 58–63 (61.0), 14 from Luristan and Bakhtiari, 59.0–62.5 (61.2), and five from Fars, 60–62 (61.1). The tip of the tail wears badly, but there is also no significant variation in length and none in that of the bill.

The combined measurements are: Wing, 30 males, 58.0–62.5 (61.0); 16 females, 56.0–62.5 (58.5). Tail, 30 males, 61–72 (67.2); 13 females, 59–71 (65.4). Bill, 30 males, 7.5–9.0 (8.6); 16 females, 8–9 (8.7).

DIAGNOSTIC CHARACTERS OF IRANIAN RACES: Comparison of the population from western Azerbaijan and the populations of the Zagros from Kermanshah to Fars with the series from the region of Gurgan (*alpinus*) and a series of eight specimens of *tephronotus* from Asia Minor in the collection of the American Museum of Natural History shows that *alpinus* is darkest, deeper gray above and brown below and that *tephronotus* is lighter than *alpinus* above and below, but still distinctly darker than *passekii*, especially below. In *passekii* the under parts are very pale, have little or no brown, and lack the fine streaking on the throat of *alpinus* and *tephronotus*; in *tephronotus* this streaking is variable but averages less than in *alpinus*. The rosy tints of the feathers of the lower flanks appear to be a little brighter in *passekii*, but this no doubt is caused by the greater contrast with the paler and whiter abdomen.

### ***Aegithalos niveogularis* Moore**

INDIA: Northern Punjab, Lahul: Tsokang Nulla, October 19, 1936, 2 ♂, 1 ♀. Tehri: Tela, October 1, 1948, 1 ♀; Bhujeka, October 11–13, 5 ♂, 1 ♀. Kumaon: Dhakuri, April 28, 1 unsexed imm.

MOULT: All the October specimens are moulting. The moult is complete, and most of the specimens are in the midst of it. In an October 1 female specimen from Tehri and two males from October 19 in Lahul the moult is almost over, a few traces still persisting in the body plumage. In the October 1 specimen, the tail also is not quite fully grown.

MEASUREMENTS: The wing of these three specimens measures: males, 62, 63; female, 59. Tail: males, 56, 57. Bill in all the specimens: seven males, 10.0–10.5 (10.3); three females, all 10.



### *Aegithalos concinnus iredalei* Baker

NORTHERN INDIA: Northern Punjab, Kulu: Banjar, January 2, 1933, 1 ♂. Kumaon: Dhakuri, April 28, 1948, 1 ♀; Khati, April 29, 1 ♀. Garhwal: Shotal, May 17, 1 ♂; Wan, May 20, 1 imm. ♂. Tehri: 10,000 feet, above Luni, September 24, 1 ♀; Kanderala, October 20, 1 ♂; Sarutal, October 23, 1 ♂. Nepal: Bhimpedi, March 13, 1947, 1 ♂; Thankot, March 21–April 14, 6 ♂, 3 ♀; Chitlang, March 15, 1 unsexed, April 19–24, 1 ♂, 2 imm. ♂, 2 ♀, 1 unsexed, 1 unsexed imm.; Deorali [near Chisapani Garhi], 1 unsexed.

I have no specimen in fresh plumage from Nepal. Worn specimens from this region (April 2–29) are identical to two equally worn specimens from Kumaon (April 28–29) and a May 17 specimen from Garhwal.

Ticehurst has separated the birds of the eastern Himalayas from Sikkim to the Mishmi Hills as *rubricapillus* on the basis of being smaller than *iredalei*, and, in fresh plumage, bluer on the back, and darker chestnut on the head and flanks. The measurements, not broken down as to sex and not averaged, are given as 46–52 in 20 birds from Sikkim, and 50–57 in 20 from the north-western Himalayas.

I have only three unsexed specimens from Sikkim, the wing lengths of which are 48, 51, 52. These measurements are insufficient and the skins are too old for color comparison. The measurements given below that I have taken and those of a series from Nepal in the British Museum measured by Biswas show that the birds decrease in size from west to east. However, the differences are so slight that it is doubtful if a series of measurements from Sikkim would show a size difference of taxonomic significance.

Individual wing measurements in *Aegithalos concinnus* in the Himalayas are as follows:

Simla: Unsexed, 52.

Northern Punjab: Males, 54, 54, 55, 55, 55, 56, 56, 57 (55.2); females, 51, 52, 52.5, 52.5, 54 (52.4).

Central Nepal: Vaurie: Males, 52, 52.5, 53, 53, 53, 54, 54, 55 (53.3). Biswas: Males, 49, 49, 50, 50, 51, 51, 51, 52, 52, 52, 55 (51.2). Vaurie: Females, 49, 50, 50, 51, 52, (50.4). Biswas: Females, 49, 51, 51, 52 (50.8).

Sikkim: Unsexed, 48, 51, 52 (50.3).

In the specimens that I have measured, the tail (which is seldom perfect) measures: Simla, unsexed, 45; northern Punjab and Kumaon, eight males, 49–53 (51.8); five females, 47–52 (49.0); Nepal, eight males, 51–58 (53.0); five females, 45–50

(48.0); Sikkim, three unsexed, 46–52 (48.3). Bill: Simla, unsexed, 8.5; northern Punjab and Kumaon, eight males, 8.5–9.2 (8.9); five females, 8.0–9.5 (8.7); Nepal, eight males, 8.5–9.0 (9.0); five females, 8.5–9.0 (8.9); Sikkim, two unsexed, 8.5, 9.0.

MOULT: The three specimens taken on September 24 and October 20 to 23 are in the last stages of a complete moult. Two of these specimens appear to have been juvenals. If so, as in *A. caudatus*, no distinction is possible on plumage between adults and first winter birds.

### ***Aegithalos leucogenys* Moore**

AFGHANISTAN: Daulatshah, May 30–June 1, 1937, 3 ♂, 1 ♀, 2 imm. ♀, 1 unsexed imm.

These specimens in worn plumage measure in the adult: Wing, males, 56, 56, 57; female, 54. Tail, males, 51+, 52+, 55+; females, 50+. Bill, males, 10.0, 10.0, 10.5; female, 9.5.