

# AMERICAN MUSEUM NOVITATES

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY  
CITY OF NEW YORK JUNE 6, 1951 NUMBER 1518

---

## NOTES ON SOME PHEASANTS FROM SOUTHWESTERN ASIA, WITH REMARKS ON MOLT<sup>1</sup>

BY DANIEL MARIEN

### INTRODUCTION

These taxonomic notes on the Walter Koelz Collections deal with the genera *Lerwa*, *Ammoperdix*, *Tetraogallus*, and *Pavo*. Other genera of the Old World subfamily Phasianinae will be discussed in subsequent reports. The arrangement of the species follows for the most part the "Check-list of birds of the world," by Peters (1934, vol. 2). Synonyms and citations of original descriptions to be found in that work are not reproduced here.

All measurements are given in millimeters; measurements and localities are of the Koelz specimens unless otherwise specified. Except as noted in *Pavo*, the bill was measured from the base of the cere.

### SYSTEMATIC NOTES

#### ***Lerwa lerwa major* Hodgson**

INDIA: Punjab: Lahul, May 14, 1932, 1 ?ad. ♂, 1 ?ad. ♀. United Provinces: Gharwal, Baratoli, May 10-11, 1948, 2 ad. ♂, 1 ad. ♀ (breeding); Kumaon, Sumto-Rahlam Pass, June 16-17, 1948, 1 ad. ♂, 1 ad. ♀, Bedang Pass, July 13, 1 ad. ♂.

#### ***Lerwa lerwa major* Meinertzhagen**

SYNONYM: *Lerwa lerwa callipygia* Stegmann.

The range of the single species of the genus *Lerwa* includes the high mountainous regions of Tibet, northern India, and

---

<sup>1</sup> Notes from the Walter Koelz Collections, Number 10.

China from Kashmir to Szechwan and Kansu. Peters (1934), perhaps relying on an erroneous statement of Baker (1928), places Afghanistan within the range of *Lerwa*, but Whistler (1945) points out that there is no evidence to support the inclusion of the snow partridge within the Afghan fauna. Two subspecies have been described from the extreme eastern end of the range: *major* Meinertzhagen, 1927, from western Szechwan (type locality, Tatsienlu), and *callipygia* Stegmann, 1938, from south Kansu (type locality, Satani, Segutschen District).

Meinertzhagen (1927a) separated *major* as being larger than typical *lerwa* from Nepal and Sikkim; Steinbacher (1938) found *major* also to have broader dark and light bands on the tail, to be more spotted and variegated, and to have a somewhat brighter color than the nominate form. Meinertzhagen (1927b) had noticed essentially the same characters in the Berlin Museum series, but stated that the very old Sikkim specimens in the British Museum were similar in color to Szechwan birds. Comparing a single Yunnan (Lichiang Mountains) specimen with two "Himalayan" skins, Riley (1931) observed the Yunnan bird to have a larger bill and to be generally lighter above but darker on the primaries and chestnut under parts. The specimen was referred by Riley to *major*, although he had no opportunity to examine any Szechwan birds.

The sexes are different, a fact apparently first appreciated by Stegmann (1938). Females are considerably darker, especially on the back. The sexual difference being of the same degree as the difference in color used to distinguish *lerwa* from *major*, Meinertzhagen possibly was misled by mixing both sexes in a single series, but it is not certain that he did this.

Stegmann's (*op. cit.*) careful description of the Kansu bird offers no ready means of distinguishing it from *major*. The author must have been unaware of the existence of a Szechwan race, for he makes no mention of it, comparing *callipygia* directly with nominate *lerwa*. Beick's Kansu expeditions seem not to have met with it, and to my knowledge a brief allusion to the habitat of this form by Schäfer (1938) is the only reference to *callipygia* to have appeared since the publication of the name.

Peters regards *major* as a synonym of *lerwa*, but Steinbacher's more recent work restores the name. Four Szechwan skins, two of them topotypical for *major*, and the Yunnan specimen described by Riley have been examined. These are only a little

brighter than specimens from Sikkim and the United Provinces. All have longer culmens than any of the Indian birds. In the American Museum, a specimen taken by the Sage West China Expedition in northeastern Szechwan is almost topotypical for *callipygia*. A female, it is slightly larger than typical *lerwa*, but scarcely differs otherwise. The only consistent difference between the western and eastern populations of the snow partridge is the difference of 1 or 2 mm. in the length of the culmen.

There is thus some evidence to indicate that the Chinese populations are distinct, although *callipygia* does not seem separable from, and is apparently a synonym of, *major*. Yunnan should be included in the range of *major*.

**MOLT:** In one specimen from Kumaon, July 13, the innermost five primaries are new, and fresh feathers appear among the worn ones of the back, rump, and throat. A Sikkim example, Lacheepia, September 11, is in fresh plumage, with some of the new rectrices still sheathed at their bases. Two Szechwan males are in heavy molt on September 21 and October 7.

**MEASUREMENTS.** Punjab: Male, wing, 189; tail, 113; bill, 18. Female, wing, 190; tail, 115; bill, 16. United Provinces: Males, wing, 185, 190, 190, 192; tail, 108.5, 109, 114, 118; bill, 16.5, 17. Females, wing, 185, 187; tail, 107, 109; bill, 17. Sikkim: Males, wing, 189 (worn), 200 (fresh); tail, 102 (worn), 113 (fresh); bill, 17.5, 18.5. Female, wing, 192; tail, 107; bill, 16.5. Yunnan: Male, wing, 184; tail, 107; bill, 20. Szechwan: Males, wing, 182, 183, 195; tail, 110, 116, 117; bill, 18.5, 19, 20. Female, wing, 196; tail, 107; bill, 20. Unsexed (female?), wing, 191; tail, 103; bill, 19.

### ***Ammoperdix griseogularis***

There is no recent comprehensive review of the see-see partridges; the latest definitive arrangement, that of Peters (1934), shows two allopatric species in the genus *Ammoperdix*. The polytypic species *A. heyi* is listed as occurring from the Sudan and lower Egypt to the Dead Sea and southern Arabia. *A. griseogularis*, listed as monotypic, has a complementary distribution over the Iranian Plateau and Afghanistan from the Euphrates to Sind. From a study of 115 specimens from all parts of the species' range and including all plumages, it becomes clear that Peters' treatment of *griseogularis* must be emended. In addition to the Koelz series of 69 skins from Iran

and 20 skins from Afghanistan, the sample consisted of material from the American Museum collections as follows: 19 specimens from northeastern Iran and Transcaspia, two specimens from Buchara, three specimens from India, and one specimen from Turkey. This fairly extensive series confirms the presence of geographic variation as earlier concluded by Sarudny, but a thorough revision based upon a more adequate sample is still needed.

A major hindrance to earlier workers' attempts to analyze the variation in this species had been the unknown extent of seasonal plumage changes produced by abrasion and bleaching. Comparative material in fresh plumage has not often been available, and much personal judgment was involved in estimating the effects of these changes. There is no prenuptial molt, and all spring and summer birds are pale and very reddish—in effect, phenocopies of the subspecies *ter-meuleni* and *peraticus*. The subjective element is now largely removed because many of the specimens collected by Koelz are in fresh and comparable plumage.

As almost all authors have been aware, the subspecific characters are most easily seen in the female. The degree of flank vermiculation in the female is a constant character that does not seem to be affected by wear; it is used here for the first time as a taxonomic character.

At least three subspecies can be recognized: *ter-meuleni* Sarudny and Loudon (type locality, Province of Arabistan, Persia), *griseogularis* Brandt [type locality, Transcaspia and Persia, restricted to Persia by Hartert (1921)], and *peraticus* Koelz (type locality, Burchao Pass, northern Afghanistan). (See below concerning the possible validity of *bucharensis* Sarudny.)

### ***Ammoperdix griseogularis ter-meuleni* Sarudny and Loudon**

IRAN: Kermanshah: Qasr i Shirin, December 28, 1940–January 5, 1941, 4 ad. ♂, 2 ad. ♀, 1 subad. ♀.

Sarudny and Loudon separated the resident population of the low hills of western Iran, comparing it with the related species *Ammoperdix heyi* in being, like the latter, sandy rather than gray on the neck, back, rump, upper tail coverts, and wing coverts. The new race, *ter-meuleni*, was further described as

having the crown with a distinct vinaceous tint, not gray as in the nominate race. Hartert (1921), Buxton (1921), Ticehurst (1922), Baker (1928), and Paludan (1938) recognized this subspecies, although some questioned its distinctness. A later reexamination of Mesopotamian specimens caused Ticehurst (1926) to conclude that this race was based upon individual variation, thereby making *ter-meuleni* a synonym of *griseogularis*.

As a series, the seven freshly molted Koelz birds from Kermanshah agree very well with the diagnosis of *ter-meuleni*. The crown is sandy, the birds are over-all paler, less gray, than examples from the rest of Iran taken during the same season. The flanks of the females are finely vermiculated. Occasional individuals from other Iranian areas are often as pale, but the crown is then consistently grayer and the specimens have been collected late in the breeding season when the pallor can rather be ascribed to bleaching and wear. Moreover, the Kermanshah males are obsoletely speckled on the sides of the neck; the speckling does not reach the upper back, and consequently the upper back and nape are poorly defined, not distinctly delimited from each other as is the case in birds from the range of the nominate race. There are two specimens from Fars that are rather sandy colored, but the neck speckling is fairly prominent and the crown gray, tending towards *griseogularis*. There is a similar example from Cheshmashirin in Bakhtiari, but birds from there and Fars are best referred to nominate *griseogularis*.

Although the status of *ter-meuleni* requires further clarification, I propose to recognize it as a valid subspecies. Its range is roughly a triangle, one apex of which is the low mountains of Iranian Khuzistan (Arabistan of Sarudny), the eastern boundary is the Pusht i Kuh in Luristan and Kermanshah, the Euphrates River forms the western side, and the base extends across southern Turkey from Rum Kale eastward to the low hills of northern Iraq.

### ***Ammoperdix griseogularis griseogularis* Brandt**

IRAN: Northern Iran: Karaj, January 20, 1943, 2 ad. ♂, March 29, 1945, 1 ad. ♂, November 5, 1944, 1 ad. ♀, November 22, 1943, 1 subad. ♂; Teheran Market, February 26, 1941, 1 ad. ♂, 2 ad. ♀. Luristan: Durud, April 12, 1941, 1 ad. ♂, November 8, 1 subad. ♀; Safed Kuh, May 13, 1 ad. ♂; Burujird, September 29–October 7, 2 ad. ♂, 1 subad. ♂, 1 juv. ♂, 2 ad. ♀, 2 ?subad. ♀, 2 juv. ♀. Bakhtiari: Marberinji, April 25, 1940, 1 ad. ♂; Labisufed, April 27, 2 ad. ♂, 1 ad. ♀, May 15, 1 ad. ♂; Cheshmashirin, May 11–13, 2 ad. ♂.

2 ad. ♀. Fars: Persepolis, March 11, 1940, 1 ad. ♂; Shiraz, March 16, 1 ad. ♀; Jahrum, March 23, 1 ad. ♂. Kirman: Khabis, January 12, 1940, 1 subad. ♀; Chaharfarsakh, January 16, 1 ?subad. ♀; Dehi Shib, January 17, 2 subad. ♀; Kirman, January 21-23, 4 ad. ♂, 1 subad. ♂, 1 ad. ♀, 2 subad. ♀, February 16, 2 ad. ♂; Dehidisk, January 31, 1 ad. ♀, February 1, 1 subad. ♀; Cheshmaedazi, February 1-2, 1 ad. ♂, 2 ad. ♀; Guragan, February 9-10, 2 ad. ♂; Darzin, February 15, 1 ad. ♂; Saadatabad, December 22, 1939, 1 subad. ♂; Teserj, December 25, 1 subad. ♂. Yazd: Dehibala, Shir Kuh, February 21-23, 1940, 2 ad. ♂, 1 ad. ♀. Khorasan: Khaur, November 5-6, 1940, 2 ad. ♀.

AFGHANISTAN: Southern Afghanistan: Kandahar, October 24-27, 1937, 2 ad. ♂, 2 subad. ♂, 3 ad. ♀, 1 subad. ♀, 1 ?subad. ♀.

The nominate race breeds from the Zagros Mountains in western Iran eastward to Transcaspia, southern Afghanistan, and the Punjab Salt Range in India. Females of nominate *griseogularis* are always heavily vermiculated on the flanks and grayer than the females of both *ter-meuleni* and *peraticus*. The males are not so easily distinguished, but like the females the males of the nominate race tend to be grayer.

### ***Ammoperdix griseogularis peraticus* Koelz**

*Ammoperdix griseogularis peraticus* KOELZ, 1950, Amer. Mus. Novitates, no. 1452, p. 1 (Burchao Pass, western Afghanistan).

AFGHANISTAN: Northwestern Afghanistan: Lala Maidan, August 26, 1937, 2 fledgling ♂, 1 fledgling ♀; Qala Sarkari, September 8, 1939, 1 subad. ♂; Chashmaegawan, September 9, 1 juv. ♂; Burchao Pass, October 10-12, 4 ?subad. ♂, 1 ad. ♀, 3 ?subad. ♀.

### ***Ammoperdix griseogularis* subspecies**

AFGHANISTAN: Northeastern Afghanistan: Khairabad, July 16, 1937, 1 ad. ♂.

*Ammoperdix griseogularis peraticus* Koelz is a north Afghan endemic. Closely resembling *ter-meuleni*, both sexes of the Afghan race are more vinaceous and the females are even more finely vermiculated on the flanks. The nominate race is always grayer, and the females are heavily vermiculated on the flanks. Meinertzhagen (1938) had noticed that three females which he had collected at Barfak and Haibak, in the same mountain range from which *peraticus* was later described, were paler than Indian birds and had a vinaceous tinge as in *ter-meuleni*, but he thought that the paleness resulted from abrasion and bleaching. Since his specimens were collected in May, he was justifiably cautious in attaching any significance to his ob-

servation. The type series of *peraticus*, however, were in fresh plumage when collected, hence its characters cannot be due to such mechanical factors.

At present, *peraticus* is known only from the Bend i Turkestan Range at the localities listed above. Meinertzhagen's specimens are most likely also of this race. An adult male from Khairabad, in the northeastern corner of Afghanistan, is tending towards *griseogularis*, but the specimen is quite worn and not certainly identifiable as to subspecies. It may possibly represent "*bucharensis*" (see below). The series from Kandahar, in southern Afghanistan, is typical of nominate *griseogularis*. In similar plumage, these birds contrast strongly with the north Afghan series, affording an excellent basis for comparison of the racial characters.

### **?*Ammoperdix griseogularis bucharensis* Sarudny**

Sarudny's (1911a) *bucharensis* (type locality, southern mountains of Buchara) is stated to differ from Iranian birds chiefly in having a longer wing. His published measurements (see table 1) suggest a clear difference. I do not know how to explain the disparity between our figures for wing length; possibly he measured the chord or had poor material. However, our measurements of the tail length of Iranian birds are in agreement.

The Bucharan race was also stated to be vinous, like *termuleni*, not gray like the nominate race.

In the Rothschild Collection there are two old specimens from Kilif, on the Bucharan-Afghan frontier. Because of the very broadly defined type locality of *bucharensis* it might be possible to consider these specimens as topotypes. The wing length of the male is about average for the species (table 1); the female is a giant, being even longer winged than most of the males of Sarudny's original series. The male is rather reddish and resembles *peraticus*; the female is vinaceous on the upper parts but gray below, varying in the direction of *griseogularis*. Her flanks are strongly vermiculated, clearly differing from *peraticus* and agreeing with the typical race. Some of the resemblance to *peraticus* may be due to wear and bleaching, since these skins are old and not in fresh plumage.

It is difficult to determine the correct status of *bucharensis* in the absence of an adequate sample. The name is not applicable to *peraticus* nor would it appear to be a synonym of *griseogularis*.

TABLE 1  
MEASUREMENTS<sup>a</sup> OF *Ammoperdix griseogularis*

Subspecies and Locality	Sex	N	Wing	N	Tail	N	Bill
<i>ter-meuleni</i>							
Turkey <sup>b</sup>	♀	1	134.0	1	60.5	1	11.0
Iran, Kermanshah	♂	4	132.0-137.0 (134.5)	4	60.0-64.0 (62.0)	4	11.0-11.5 (11.1)
	♀	3	128.0-130.5 (129.0)	3	61.0-63.0 (62.3)	3	10.0-11.0 (10.7)
<i>griseogularis</i>							
Persia <sup>c</sup> (Iran)	♂	12	118.5-127.5 (124.3)	12	58.0-66.0 (62.2)	—	—
	♀	8	115.0-120.6 (118.6)	8	56.4-67.6 (59.0)	—	—
Northern Iran <sup>d</sup>	♂	5	132.0-137.0 (134.4)	4	58.0-65.0 (62.0)	5	10.0-12.0 (11.2)
	♀	3	125.0-131.0 (127.3)	3	58.5-62.0 (60.5)	3	10.5-11.0 (10.8)
Bakhtiari	♂	5	131.0-136.0 (134.2)	6	61.0-64.0 (61.6)	6	11.0-12.0 (11.2)
	♀	3	126.0-132.0 (128.0)	3	56.5-58.5 (57.3)	1	11.0
Luristan	♂	3	130.0-136.0 (132.7)	5	58.0-67.5 (63.4)	5	11.0-12.0 (11.6)
	♀	5	128.0-133.0 (130.4)	4	60.0-62.0 (60.6)	5	11.0-11.5 (11.1)
Fars	♂	2	135.0-136.0 (135.5)	2	61.0-63.5 (62.3)	2	12.0-13.0 (12.5)
	♀	1	129.0	1	64.0	1	11.0
Kirman	♂	13	125.0-136.0 (131.7)	13	57.0-66.0 (61.1)	13	10.0-12.0 (11.0)
	♀	11	123.0-129.0 (126.9)	10	56.0-60.0 (57.7)	11	10.0-11.0 (10.7)
Yezd	♂	2	131.0-136.0 (133.5)	2	62.0-63.0 (62.5)	2	11.0-11.0 (11.0)
	♀	1	130.0	1	63.0	1	11.0
Khorasan	♂	—	—	—	—	—	—
	♀	3	128.0-130.0 (129.0)	3	58.0-61.5 (60.0)	3	10.0-11.5 (10.8)
Transcasia <sup>b</sup>	♂	7	133.0-139.0 (135.6)	7	55.0-64.0 (59.1)	6	10.0-11.0 (10.7)
	♀	4	131.0-136.0 (132.5)	4	53.0-62.0 (58.6)	4	9.5-11.5 (10.5)
Southern Afghanistan	♂	4	130.0-135.0 (132.5)	3	60.0-62.0 (61.0)	4	10.0-11.0 (10.5)
	♀	5	122.0-131.0 (126.0)	5	59.0-62.5 (60.2)	5	10.5-11.5 (11.0)
Western India <sup>b</sup>	♂	2	131.0-135.0 (133.0)	2	58.5-61.0 (59.8)	2	11.0-11.0 (11.0)
	♀	—	—	—	—	—	—



TABLE I—Continued

Subspecies and Locality	Sex	N	Wing	N	Tail	N	Bill
<i>peralticus</i>							
Northern Afghanistan	♂	4	132.0–135.0 (133.6)	4	61.0–65.5 (62.3)	4	10.0–11.0 (10.8)
	♀	4	127.0–131.0 (129.4)	4	58.5–63.0 (60.5)	4	10.0–11.0 (10.6)
<i>bucharensis</i>							
Southern Buchara <sup>b</sup>	♂	1	133.0	1	58.5	1	11.0
	♀	1	137.0	1	62.5	1	11.0
Buchara <sup>c</sup>	♂	17	126.0–140.0 (131.6)	17	64.5–76.8 (69.7)	—	—
	♀	8	120.4–128.0 (123.2)	7	63.4–68.5 (65.2)	—	—

<sup>a</sup> Includes both adults and subadults; all original measurements except those marked by footnote *c*.<sup>b</sup> Specimens from the Rothschild Collection.<sup>c</sup> *Fide* Sarudny (1911a).<sup>d</sup> Some specimens from Teheran Market, presumed to be local.

The stated and observed characters of *bucharensis* impress me as being intermediate in color between the former two races, but perhaps of larger size than either.

**MOLTS AND PLUMAGES:** The following observations are based on a series of about 40 skins. The onset of molt in adults probably follows shortly after conclusion of breeding, which seems to vary both individually and locally. Postnuptial molt had begun in early July in a female from Transcaspia and a male from Buchara, in mid-July in a second Transcaspian female, but for Iranian and Afghan birds the postnuptial and postjuvenile molts could not have commenced long before the end of August and were not entirely completed until late November.

The postnuptial molt is complete. The postnatal and postjuvenile molts overlap to some extent; in particular, the appearance in the chick of the distal primaries (8, 9, and 10) is delayed, and these remiges still grow synchronously with the replacement through the postjuvenile molt of the most proximal primaries (1 to 4). The postjuvenile molt is initiated by the innermost flight feathers which are progressively renewed distad; the outermost secondaries are the first to drop and the molt of the secondaries proceeds mediad.

It is clear that primaries 9 and 10 are usually, if not always, retained by first-year birds. In fairly fresh-plumaged specimens this fact offers a means of separating otherwise indistinguishable subadults and adults. The eighth primary is slow to achieve maximum size; it is incompletely developed in birds taken as late as November when the rest of the molt was mostly or wholly completed.

If the sexing of the Koelz specimens is correct, then it would appear that young of both sexes wear a dress of masculine type. Young males are diminutive replicas of the adult males except that the cinnamon and black streaking of the abdomen is absent in the fledged chick and barely indicated in the juvenile. Two Luristan juvenals, sexed as females, resemble the young males closely in having a pearly-gray throat and crown, with black forehead and supercilium and a vinaceous-buff-colored breast. They differ in lacking any traces of abdominal streaks (vermiculations on the flanks are also absent) and by having the breast conspicuously but finely barred. Two small females from Afghanistan, beginning the postnatal molt but with down

still clinging to the feathers, are similar to male chicks of equal age, but in both specimens only the forehead is black; there is no trace of a black superciliary line. Thus, the character of the adult female plumage seems to be acquired at the postjuvenile molt. Subadult females, i.e., first-winter birds, have a faintly gray throat, but it is scarcely marked enough to be a reliable age indicator.

#### THE GENUS *TETRAOGALLUS*

The genus *Tetraogallus* is composed of five similar species of large game birds confined to the highest mountain chains of central and southern Asia from the Caucasus, Taurus, and Zagros Mountains eastward in the Hindu Kush, Pamir, Himalaya, Tian Shan, Altai, and Sayan systems, and the Tibetan Plateau to the ranges of Kansu and northern Szechwan in China. The English vernacular name of snow-cock may serve to indicate something of the altitudinal distribution and ecologies of this interesting fowl.

*Tetraogallus* can be conveniently divided into two species groups characterized by having either a predominantly gray or mostly white abdomen. The forms with a white belly are referred to the species *altaicus* and *tibetanus*, whereas those possessing a gray belly are usually treated as *caucasicus*, *caspius*, and *himalayensis*. All of the species resemble one another closely in most respects, and the genus is therefore compact and homogeneous, clearly delimited as a taxonomic unit from its near relative *Tetraophasis*.

The species within each of the two groups are allopatric, but *tibetanus* and *himalayensis* overlap over most of their ranges. Since the ecologies of all five species seem to be quite similar, competition may partially account for the high degree of geographical replacement. There is even some evidence suggesting that *tibetanus* and *himalayensis*, apparently occurring together over a wide area, may actually replace each other within their common geographical range. Although three of the Koelz specimens representing both species were taken on the same date at the same locality in Ladak, Meinertzhagen (1927b) remarked that in northwest India he had never found the two species together on the same mountains. Other observers have had similar experiences. For example, Ludlow and Kinnear (1934) recorded both species as common in parts of Chinese Turkestan,

but in the mountains where one occurred the other was usually absent. Beick collected both in Kansu, where he found *tibetanus* in the Tetung Mountains and *himalayensis* on the adjacent Si-liang-Shan to the northwest, but flocks of the two species were not found together (Stresemann, 1938). Such an interdigitating distribution pattern might result from accidents of dispersal; the first of two approximately equally adapted species to colonize a region may gain an initial advantage sufficiently great to prevent the invasion of a potential competitor.

A conspicuous size difference exists between *tibetanus* and

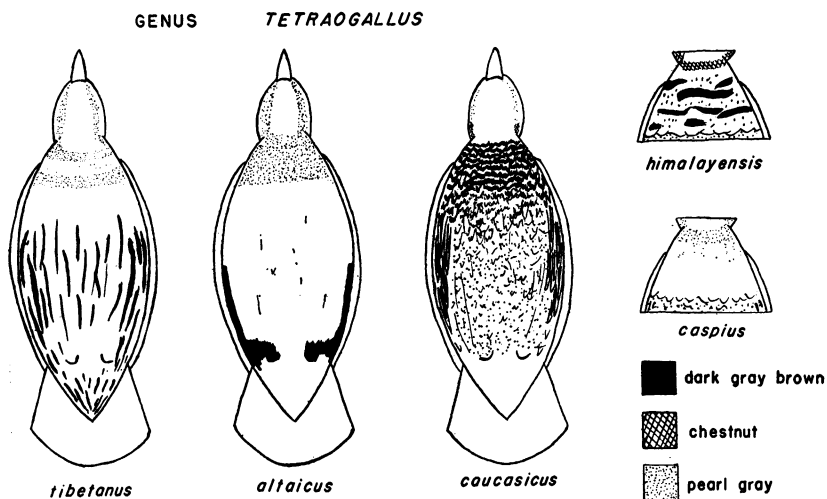


FIG. 1. Diagram of the under parts of the species of *Tetraogallus*, showing plumage patterns. Stippled, pearl gray; cross-hatched, chestnut; solid, dark gray-brown.

*himalayensis* and may contribute to their ecological compatibility wherever they are sympatric. The larger of the two, with a longer and stouter bill, is *himalayensis*; *tibetanus* is much smaller—in fact, is the smallest member of the genus. The other species of *Tetraogallus* are of about the same size as *himalayensis*.

The semispecies *caspius* and *himalayensis* might well be united into a single species as two well-marked subspecies groups, but following customary usage they are treated here as separate species. The endemic Caucasian form, *caucasicus*, is clearly a member of the *caspius-himalayensis* group, but *caucasicus* has

differentiated more than the others and sufficiently to be recognized as a distinct species. However, all three allopatric forms can be considered as constituting the superspecies *Tetraogallus caspius*. Consequently, the arrangements by Hartert (1921) and Peters (1934) should be altered; both authors insert *altaicus*

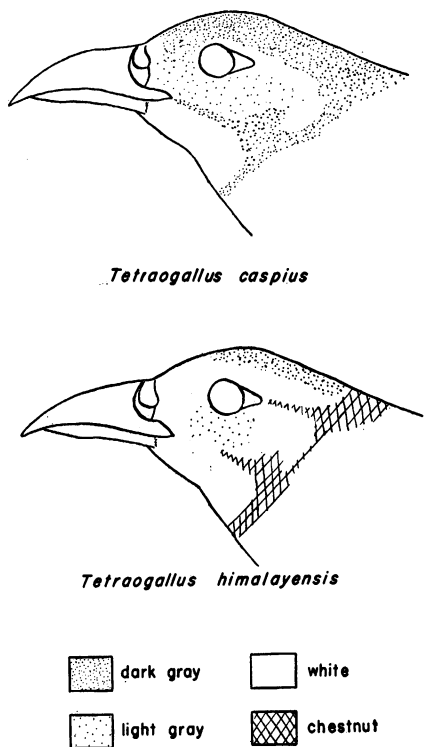


FIG. 2. Diagrammatic lateral views of the heads of *Tetraogallus caspius* and *T. himalayensis*, showing plumage patterns. Stippled, gray; cross-hatched, chestnut.

and *tibetanus* between *caspius* and *himalayensis* in what appears to be an unnatural order. The required change would have *himalayensis* following *caspius* and preceding *tibetanus*. The check-list order is then *caucasicus*, *caspius*, *himalayensis*, *tibetanus*, *altaicus*.

KEY TO THE SPECIES OF THE GENUS *Tetraogallus*  
(Compare with figs. 1 and 2)

1. Belly dark gray..... 3  
Belly white, sometimes with black stripes..... 2
2. White wing patch present; under tail coverts white, not with black margins;  
flanks and sides dark gray-brown..... *altaicus*  
White wing patch absent; under tail coverts white with black margins;  
belly and flanks black striped..... *tibetanus*
3. Breast not sharply demarcated from abdomen; breast buff, finely, evenly,  
and continuously barred with black..... *caucasicus*  
Breast sharply demarcated from abdomen; breast buff or white, unbarred,  
or coarsely and discontinuously barred, mottled, or flecked, or all three.. 4
4. Malar and postocular stripes gray..... *caspius*  
Malar and postocular stripes chestnut..... *himalayensis*

Superspecies *Tetraogallus caspius*

*Tetraogallus caspius caspius* G. R. Gray

IRAN: Northern Iran: Teheran, January 1, 1946, 1 ad. ♂, 1 subad. ♀.

*Tetraogallus caspius semenow-tianschanskii* Sarudny

IRAN: Bakhtiari: Ti, April 23, 1941, 1 ad. ♀, 5 fledgling ♂, 2 fledgling ♀, 1 unsexed fledgling. Luristan: Qadi Sar, June 4-5, 1940, 1 ad. ♀, 2 juv. ♀.

Two races of *T. caspius* breed in Iran. The nominate subspecies occurs in the Elburz Mountains to Transcaspia; the Zagros race, *semenow-tianschanskii*, described from a single specimen in 1908, was known until now only from the type. As Paludan (1938) makes no mention of having collected any representatives of the latter race, Dr. Koelz appears to have rediscovered this form after 32 years, and his specimens confirm its distinctness. Furthermore, with the collection of eight chicks and two juvenals, the status of the race as a breeder in the Zagros is established.

As Sarudny observed, the upper parts of his race are paler; this appears due more to a replacement of much of the gray by buff rather than to a mere lightening of the gray tone. The original description represents the throat and chin as white, not gray as in nominate *caspius*. This is not apparent in these specimens, but the gular, loreal, superciliary, and breast feathers are broadly tipped with buff, not wholly gray, as they are in *caspius*. Nominate *caspius*, moreover, has the malar stripe and hind border of the throat solid gray; this area is strongly flecked with brown in *semenow-tianschanskii*.

The differences between the two races are also observable in the juvenals. Young of the nominate form are much grayer, less buffy, and more strongly barred on the upper parts and tail than young of the Zagros subspecies.

*Tetraogallus caspius challayi* Oustalet, 1875, is said to occur in the Agri Dagh of Turkish Armenia (discussion in Bobrinskoï, 1933). In 1933, Buturlin (*vide* Dementiev, 1934) described a new race, *tauricus*, from the Caucasus (*sic!*); Dementiev believed this new form to be inseparable from *challayi*. Buturlin's name, however, is a homonym of *tauricus* Dresser, 1876, and the latter name is itself a synonym of *challayi*. The description of a subspecies of *caspius* from the Caucasus must be in error, as no species of *Tetraogallus* other than *caucasicus* has ever been reported from there. It would seem that the Taurus Mountains and not the Caucasus were intended for the type locality; since Dementiev commented on the validity of the race it may be presumed that he actually saw the specimens and that their identification as *caspius* is correct. No specimens from Turkey are available at the American Museum.

MEASUREMENTS: *Tetraogallus caspius caspius*: Male, wing, 314, tail, 198, bill, 31; female, wing, 274, tail, 167, bill, 29.5. The weight of the male is given as 2.5 kilos, or 5.5 pounds.

*Tetraogallus caspius semenow-tianschanskii*: Two females, wing, 286, 287, tail, 171.5, 185, bill, 27, 29.

### ***Tetraogallus himalayensis himalayensis* G. R. Gray**

SYNONYM: *Tetraogallus himalayensis sewerzowi* Sarudny.

INDIA: Kashmir: Baltistan, Lal Pir, August 10, 1936, 1 juv. ♀, Karzong Pass, September 14, 2 subad. ♂, 1 subad. ♀; Ladak, Taklung La, September 25, 1936, 1 subad. ♂, 1 subad. ♀. Punjab: Lahul, Kolung, June 10, 1936, 1 ad. ♀, June 13, 2 fledgling ♂, 3 fledgling ♀; Kyelang, August 9, 1933, 1 ?ad. ♀; Spiti, La Dasa, September 5, 1933, 1 ?ad. ♀, Lara, September 15, 1933, 3 ?ad. ♀; Rampur-Bushahr, Lipe, Chuniapak, November 20, 1930, 2 ad. ♂, 1 ad. ♀, 1 subad. ♀.

AFGHANISTAN: Eastern Afghanistan: Sanglech, July 27, 1937, 1 fledgling ♂, 1 fledgling ♀, Munjan Pass, July 28, 1 ad. ♀.

### ***Tetraogallus himalayensis bendi* Koelz**

*Tetraogallus himalayensis bendi* KOELZ, 1951, Amer. Mus. Novitates, no. 1510, p. 1 (Safedsang, northwestern Afghanistan).

AFGHANISTAN: Northwestern Afghanistan: Safedsang, September 20-22, 1939, 3 ad. ♀, 1 subad. ♀, Burchao Pass, October 12, 1 ad. ♀.

*Tetraogallus himalayensis sewerzowi* from the mountains of Semiretschensk is recognized by Peters (1934), but there are no constant differences between two topotypes of *sewerzowi* in the Rothschild Collection and Tian Shan and Himalayan examples of the nominate race. Hartert (1921) has already made *sewerzowi* a synonym of *himalayensis*.

There are several reasons why the name *incognitus* Sarudny (1911b) (type locality, Kuljab and Darwas, eastern Buchara) is not applicable to *bendi*. Sarudny separated *incognitus* from both *sewerzowi* and *himalayensis* in the following manner: the brown malar stripes do not meet on the back of the neck which instead has a weak, brown patch, resembling in this respect the subspecies *grombczewskii* and *kosłowi*; in one specimen, the hind neck, like the crown, is gray; leg feathers are dark gray, similar to the coloring of the midline of the abdomen, but blackish in two specimens; the feathers of the flanks and sides are more broadly edged with black.

None of the characters applies to *bendi*. The diagnosis mentions none of the ways in which *bendi* does differ from nominate *himalayensis*, and especially lacks reference to the most obvious difference between the two races, that of the color of the upper parts. Furthermore, some of the stated differences appear to depend on the makeup of the skin, and, finally, the alleged differences fall within the normal range of variation of Indian birds.

On ecological and geographical grounds it is more likely that Kuljab and Darwas birds resemble *himalayensis* rather than *bendi*. The mountains of eastern Buchara are continuous with the main Hindu Kush-Himalaya-Pamir trident but are cut off by several low valleys from the Bend i Turkestan. The snowcocks are notably alpine zone birds for whom valleys must present a not unimportant ecological barrier. Analogously, it is known that the Bend i Turkestan is the home of several north Afghan endemics, whereas in the same species the birds of the Tian Shan, Pamirs, and western Himalayas are frequently sub-specifically identical.

In the absence of specimens from the range of *incognitus* its distinctness is indeterminable, but both Hartert (*op. cit.*) and Peters (*op. cit.*) list the name as a synonym of *himalayensis*. It is evident, however, that *bendi* is the correct name for the Afghan race. That race differs from the nominate one in being much buffier above and averaging larger. Its range may in-



clude most of the Bend i Turkestan, although at present it is known only from the two localities at which Koelz obtained specimens.

Between subadults from Ladak and from Baltistan a slight difference appears; specimens from the former locality are gray, as expected, but those from the latter area are quite buffy above, strikingly similar to the coloration of *bendi*. Baltistan is well within the range of *himalayensis*, to which they are referred, but the unusual appearance requires comment.

**MOLT AND PLUMAGES:** As late as July 28 there is no evidence of molt in adults from the Himalaya, yet by mid-September fresh-plumaged birds were taken in northern Afghanistan. October specimens from the Tian Shan and November specimens from Punjab had also completed the postnuptial molt. Birds of the year from Kashmir were in full postjuvenile molt in mid-September.

The postnuptial molt is complete. Primaries 8, 9, and 10 are retained by first-year birds; the seventh primary is slow to gain maximum length. As in several other phasianid genera, the postnatal and postjuvenile molts overlap, the distal juvenile primaries first appearing with the newly grown postjuvenile (subadult) proximal primaries.

Wear, through abrasion of the light tips of the feathers, serves to darken the plumage and to increase the amount of barring on breast and crown. Individual, seasonal, and perhaps age variation is extensive. The dark subterminal bar on the rectrices may be broad, narrow, obscure, or even absent in birds of the same sex from a single locality. All intermediates exist between examples with a clear, unbarred gray breast and examples with a heavily barred, mottled, and flecked gray breast. Similarly, the degree of flecking on the tips of the secondaries and innermost primaries is quite variable. None of this variation is geographical.

**MEASUREMENTS:** *Himalayensis*: Punjab: adult female (worn), wing, 290, tail, 184, bill, 28.5; adult female (fresh), wing, 282, tail, 172, bill, 30; adult male (fresh), wing, 305, tail, 200, bill, 33.5; five (?adult) females, wing, 274, 276, 277, 283, 294, tail, 163.5, 165, 178.5, 180, 189.5, bill, 28, 28, 29, 31. Afghanistan: adult female (worn), wing (broken), tail, 179, bill, 29. Tian Shan (Rothschild Collection): seven adult females (fresh), wing, 280–307 (294.4), tail, 166–201 (175.3), bill, 29–34.5 (30.8).

*Bendi*: Afghanistan: adult females (fresh), wing, 295,  $\pm$  296, 297, 301, tail, 178, 180, 181, 182, bill, 31, 34, 35, 35.

These measurements show that *bendi* averages slightly larger than *himalayensis*.

### ***Tetraogallus tibetanus tibetanus* Gould**

INDIA: Kashmir: Ladak, Taklung La, September 25, 1936, 1 ad. ♂, 1 subad. ♀, Taklung Pass, September 25, 1 subad. ♂, 1 ad. ♀. Punjab: Rupshu, Polokonka, July 4, 1931, 2 ad. ♂, Debring, September 27, 1936, 1 ad. ♀, 1 subad. ♀.

These appear to be the first specimens from as far south in northwest India as Punjab; they may have been breeding birds. The American Museum has no specimens of nominate *tibetanus* with which these skins can be compared, but it is most unlikely that they would be found to differ from the typical form. Compared with two old specimens of *aquilonifer* from Sikkim, these birds are somewhat more sandy-colored and not so dark. On the other hand, they bear considerable resemblance to specimens of *centralis* from Jyekundo in Tsinghai and "North Tibet," but are less red on the mantle, rump, and upper side of the tail.

Variation in the breadth and confluence of the pectoral bands seems not to depend on wear, sex, or immaturity. In a series of 13 specimens the breast is either wholly gray or crossed by two narrow gray bands; evidence of an intermediate condition is lacking. One of eight skins of nominate *tibetanus*, one of three *aquilonifer*, and both of two *centralis* have a wholly gray, single wide-banded breast. It would be interesting to know if the frequencies of the two types of banding vary geographically.

MOLT: The postnuptial molt seemed to be almost completed at the end of September; at that time the postjuvenile molt was at its height.

MEASUREMENTS: *Tibetanus*: Kashmir: one adult male, wing, 274, tail, 166.5, bill, 28; one subadult male, wing, 265, tail, (molting), bill, 26; one adult female, wing, 267, tail, 163.5, bill, 27; one subadult female, wing, 256, tail, (molting), bill, 26.5. Punjab: two adult males (worn), wing, 260, 293, tail, 160, 174, bill, 28, 28; one adult female, wing, 259, tail, (molting), bill, 28; one subadult female, wing, 257, tail, 148, bill, 26.

*Centralis*: West China: one adult male, wing,  $\pm$  266, tail, 170, bill, 30. North Tibet: one adult female, wing, 270, tail, 165, bill, 27 (Rothschild Collection).

*Aquilonifer*: Tibet: one adult male, wing, 268, tail, 161, bill, 29. Sikkim: one adult male, wing, 274, tail, 162, bill, 30.5; one subadult male, wing, 259; tail, (damaged), bill, 27 (Rothschild Collection).

TABLE 2  
MEASUREMENTS OF ADULTS AND IMMATURES OF *Pavo cristatus* IN INDIA

Locality	Wing	Tail	Bill <sup>a</sup>	Crest	Train
Adult males					
Nepal	458.0	483.0	50.0	59.0	1600
Bengal <sup>b</sup>	467.0	496.0	57.5	56.5	1615
Assam <sup>b</sup>	467.0	498.0	52.0	60.0	—
	451.0	485.0	50.0	65.0	1630
Surguja	472.0	457.0	54.0	—	—
	472.0	410.0	—	—	—
	462.0	434.0	53.0	—	—
Central Provinces	478.0	492.0	54.5	58.0	1440
	471.0	500.0	52.0	57.0	1450
	467.0	539.0	54.0	61.0	—
	461.0	466.0	51.0	63.0	1590
Adult females					
Punjab	381.0	279.0	46.0	60.0	—
United Provinces	416.5	297.0	50.5	59.0	—
Assam <sup>b</sup>	387.0	308.0	50.0	64.0	—
Surguja	414.5	314.0	48.5	—	—
	400.0	315.0	49.0	64.0	—
	395.0	312.0	45.0	57.0	—
Central Provinces	432.0	345.0	48.0	59.0	—
	422.0	322.0	46.5	—	—
	399.0	324.0	48.5	58.0	—
Immature males					
Nepal	448.0	434.0	50.0	—	—
	371.0	302.0	49.0	—	—
United Provinces	408.0	374.0	53.5	—	—
Surguja	444.0	420.0	53.0	—	—
Central Provinces	470.0	441.0	51.5	—	—

<sup>a</sup> Measured from base of skull.

<sup>b</sup> From the Rothschild Collection.

### ***Pavo cristatus* Linnaeus**

INDIA: Punjab: Sirsa, January 29, 1931, 1 ad. ♀; Hissar, Parwali, February 28, 1933, 1 ♂, March 1, 1 ♀. Kathiawar: Junagadh, Sasan, February 4, 1949, 1 imm. ♀ [?♂]. United Provinces: Malasa, April 1, 1948, 1 ad. ♀, 1 imm. ♂. Nepal: Hitaura, June 5-9, 1947, 1 ad. ♂, 2 imm. ♂, 1 imm. ♀, July 6, 1 fledgling ♂, 1 fledgling ♀ [?♂]. Surguja: Khuri, October 16, 1947, 2 ad. ♀, October 24-27, 2 ad. ♂, 1 imm. ♂, 1 ad. ♀, Ramanujganj, November 2, 1 ad. ♂.

Central Provinces: Bheraghat, March 3-5, 1946, 2 ad. ♀, April 2, 1 ad. ♀, April 10-12, 2 ad. ♂, April 16, 1 ?imm. ♀, May 4, 1 imm. ♂, May 8, 1 ad. ♂, Kanha, August 12, 1 juv. ♀, August 17, 1 ad. ♂.

There is no noticeable geographic variation in this peafowl, although the train of specimens from Central Provinces seems to average smaller than birds from northern India (see table 2). *Pavo cristatus* is indigenous to India from Ceylon to Kashmir in the northwest and to the valley of the Brahmaputra in eastern Assam; the polytypic *Pavo muticus* replaces *cristatus* in Burma and Malaysia.

**MOLT AND PLUMAGES:** Three years are said to be required for the acquisition of the fully adult plumage, characterized in the male by the enormously elongate upper tail coverts. As the plumages are not well described in the literature, an attempt is here made to do so.

First-year males have a light buff-brown abdomen sparsely barred with dark brown, the barring becoming heavier on the lower breast; the upper breast, nape, neck, and crown are green, with an admixture of purple and brown; the tertials, scapulars, and back are buff-brown, with dark brown barring, the upper back also with some green bars passing into the green of the nape; the throat is white, but possesses a few scattered green feathers; the expanded tips of the crest quills are green; the primaries are chestnut, the rectrices dark gray-brown; the secondary coverts are brown, barred with buff. A complete molt seems to precede this first-year dress.

Except for the postnatal and postjuvenile molts, which come within the first year, peafowl appear to have but one complete molt each year following breeding. There is no regular season of molt in India as a whole, for as far as can be determined from museum specimens wild birds are to be found in molt in every month of the year. Almost all of the listed Koelz specimens and most of the other American Museum specimens were molting some part of their dress.

Second-year males still lack the train, although a tarsal spur may appear by this time; the under parts are green, purple, and black, the throat, crown, and nape mostly purple. Both the entire back and the short upper tail coverts are barred with green and brown; the crest plumes are glossed with purple; the secondary coverts are dark purple.

The well-known adult plumage is that of the third-year male.

In the Surguja specimens, the upper tail coverts were almost all appearing simultaneously and overlying the remnants of the barred immature coverts.

Immature females closely resemble adult females and are probably best distinguished by their somewhat smaller size. One specimen from Kathiawar, sexed as a female and apparently a first-year bird, is very similar to a first-year male but is less conspicuously barred on the back, rump, and upper tail coverts. It also possesses a chestnut patch, formed by the alula and primary coverts, at the bend of the wing. Since all males have, and all other females lack, this patch, the specimen may have been sexed incorrectly; if not, then the first-year plumage of both sexes must be exceedingly alike.

#### WING AND TAIL MOLTS AS TAXONOMIC CRITERIA IN THE PHEASANTS

Frequent attempts have been made to break up the large pheasant family into a number of subfamilies that will have nomenclatorial standing. So many intermediate forms exist to connect otherwise discrete subgroups that no satisfactory criteria have yet been developed for more than a primary division between the American Odontophorinae and the Old World Phasianinae, and the suggestion has been made that even this is not a natural dichotomy. The failure of morphological characters to discriminate at the subfamily level has directed attention to the possible use of such physiological characters as the wing and tail molts. One system, based upon the caudal molt, has been in more or less general use as an auxiliary method for separating some groups of Eurasian pheasants. The kind of wing molt has never actually been employed as a criterion, but Petrides (1945) has called attention to its potential value for the systematist.

**TAIL MOLT:** In his monograph of the pheasants, Beebe (1918) was the first to propose the division of the family on the basis of the caudal molt. This resulted in the establishment of four subfamilies, the Pavoninae, Argusianinae, Phasianinae, and Perdicinae, according to whether the molt of the rectrices commenced with the first, third, outermost, or central pair. In Beebe's system, a centrifugal tail molt beginning with the innermost rectrices characterizes the group of genera comprising the Perdicinae. For the purposes of his monograph, he referred

only to *Tragopan* and *Ithaginis* (not now considered as partridges) as members of this subfamily, but noted that there were other perdicine genera which he did not intend to treat. *Perdix* and *Ammoperdix* obviously would have to have been included by him; modern authors would probably mention *Lerwa* as a partridge.

In two of these genera it is known that at the postjuvenal molt the third (*Perdix perdix*, McCabe and Hawkins, 1946) and the third or fourth (*Ammoperdix griseogularis*, personal observation) pair of rectrices from the center initiates the tail molt, and replacement proceeds at the same time both laterally and medially. These observations certainly do not prejudice the possibility of a centrifugal rectricial ecdysis in adults of these species; this point bears investigation. In one adult specimen of *Lerwa lerwa* it was recorded (personal observation) that the pair of tail feathers immediately lateral to the central pair had dropped first, then the central pair were renewed; thereafter, the molt was centrifugal. This case may be anomalous, based as it is upon a single instance.

Nevertheless, Delacour (1949) feels that the types of tail molt are consistently associated with groups as they have been defined on other grounds, although not by themselves such puissant criteria as might be thought. Both the above-noted data and Beebe's might profitably be reexamined, preferably upon birds in zoological parks and aviaries, as preserved skins are not the most reliable for studies of this kind.

WING MOLT: The retention of some of the distal juvenal primaries through the postjuvenal molt in some of the game birds is a well-known phenomenon; the extent to which it occurs in this order has been the subject of a recent summary by Petrides (*op. cit.*). *Ammoperdix* can be added to his tabulation, which of Old World Phasianidae included only the seven genera *Perdix*, *Alectoris*, *Tetraogallus*, *Tetraophasis*, *Phasianus*, *Syrmatiscus*, and *Francolinus*. Throughout the Galliformes two seems to be the maximum number of juvenal remiges reported carried over until the first complete molt of flight feathers; this is also the condition that obtains in *Ammoperdix griseogularis*. For *Tetraogallus himalayensis*, however, the retention of the three outermost primaries is the rule; in no case were only two found to be held. (Petrides discussed *Tetraogallus* and its relative *Tetraophasis* under the Tetraonidae and stated that in these genera two outer primaries appear to be retained.)

Confirmation of some of Petrides' remarks on the wing condition in the Phasianinae include the following: for *Alectoris graeca*, Stresemann (1920); for *Perdix perdix*, Stresemann (*op. cit.*), McCabe and Hawkins (1946); for *Phasianus colchicus*, which sheds all the juvenal primaries, Buss (1946), Salomonsen (1946).

In an early paper on galliform molt cycles, Dwight (1900) reported that all of a number of species of North American quail, grouse, and ptarmigan typically retained two outermost juvenal primaries. Salomonsen (1939) found this to be true also in *Lagopus mutus*.

It has been said that the Old World partridges and quail and the American quail agree in retaining the outermost juvenal remiges, in contrast to the so-called "true" pheasants which replace all of the juvenal primaries at the postjuvenal molt. This is a little over-simplified, for *Francolinus*, morphologically a partridge, is alleged to have a complete postjuvenal molt, thus allying it with the "true" pheasants. Moreover, of those long-tailed, brilliantly plumaged fowl comprising the "true" pheasants, only *Phasianus* itself has been well studied. A strict correlation of the type of wing molt with any taxonomic category above the genus is premature, especially since almost nothing is known of the molt situation in more than one or two species of any single genus and too few genera have been examined.

The present investigation does not confirm the value of molt characters as useful taxonomic criteria, at least until the molt of many more forms have been studied.

#### ACKNOWLEDGMENTS

Drs. Dean Amadon, Ernst Mayr, and Charles Vaurie have given generously of their time and knowledge, and I am indeed grateful for their many critical suggestions. Capt. Jean Delacour discussed with me the section on molts as taxonomic criteria, but responsibility for the conclusions rests with the author. Dr. William Tavalga very kindly translated some Russian references. Mr. R. W. Storer of the University of Michigan Museum of Zoology forwarded data on the Koelz specimens that are in the collection of that institution. Specimens of *Lerwa lerwa* under their care were very courteously lent by Dr. Herbert Friedmann of the United States National Museum and Mr. R. M. deSchauensee of the Academy of Natural Sciences of

Philadelphia. The permission of Dr. Koelz to study his collection is deeply appreciated.

## REFERENCES CITED

- BAKER, E. C. STUART  
1928. The fauna of British India. Birds, second edition. London, vol. 5.
- BEEBE, WILLIAM  
1918. A monograph of the pheasants. London, vol. 1.
- BOBRINSKOĬ, N. A.  
1933. Note sur la position systématique de *Tetraogallus chalayei* Oustalet. *Alauda*, vol. 5, pp. 397-398.
- BUSS, IRVEN O.  
[1946]. Wisconsin pheasant populations. Wisconsin Conserv. Dept. Publ., no. 326, A-46, pp. 1-184.
- BUXTON, P. A.  
1921. Notes on birds from northern and western Persia. *Jour. Bombay Nat. Hist. Soc.*, vol. 27, pp. 844-882.
- DELACOUR, JEAN  
1949. Die Fasenen. In Mayr, Ernst, and Ernst Schuz, Ornithologie als Biologische Wissenschaft, Festschrift zum 60 Geburtstag von Erwin Stresemann. Heidelberg, pp. 17-22.
- DEMENTIEV, GEORGES  
1934. La littérature ornithologique russe en 1933. *Alauda*, vol. 6, pp. 130-135.
- DWIGHT, JONATHAN, JR.  
1900. The moult of the North American Tetraonidae (quails, partridges, and grouse). *Auk*, vol. 17, pp. 34-51, 143-156.
- HARTERT, ERNST  
1921. Die Vögel der paläarktischen Fauna. Berlin, vol. 3.
- LUDLOW, F., AND N. B. KINNEAR  
1934. A contribution to the ornithology of Chinese Turkestan. Part 4. *Ibis*, pp. 95-125.
- MCCABE, ROBERT A., AND ARTHUR S. HAWKINS  
1946. The Hungarian partridge in Wisconsin. *Amer. Midland Nat.*, vol. 36, pp. 1-75.
- MEINERTZHAGEN, RICHARD  
1927a. [Description of *Lerwa lerwa major*, subsp. nov.] *Bull. Brit. Ornith. Club*, vol. 47, p. 101.  
1927b. Systematic results of birds collected at high altitudes in Ladak and Sikkim. Part 2. *Ibis*, pp. 571-633.  
1938. On the birds of northern Afghanistan. Part 2. *Ibid.*, pp. 671-717.
- PALUDAN, KNUD  
1938. Zur Ornithologie des Zagrosgebietes, W.-Iran. *Jour. Ornith.*, vol. 86, pp. 562-638.
- PETERS, JAMES L.  
1934. Check-list of birds of the world. Cambridge, vol. 2.
- PETRIDES, GEORGE A.  
1945. First winter plumages in the Galliformes. *Auk*, vol. 62, pp. 223-226.



RILEY, J. H.

1931. A second collection of birds from the provinces of Yunnan and Szechwan, China, made for the National Geographic Society by Dr. Joseph F. Rock. Proc. U. S. Natl. Mus., vol. 80, art. 7, pp. 1-91.

SALOMONSEN, FINN

1939. Moults and sequence of plumages in the rock ptarmigan [*Lagopus mutus* (Montin)]. Videnskabelige Meddel. fra Dansk Naturhist. Forening, Copenhagen, vol. 103, pp. 1-491.
1946. Moults of primaries in the juvenile pheasant (*Phasianus colchicus* L.). Dansk Ornith. Forenings Tidsskr., vol. 40, pp. 257-258. (In Danish with English summary.)

SARUDNY, NICHOLAS A.

1908. *Tetraogallus caspius semenow-tianschanskii*, subsp. nov. Ornith. Monatsb., vol. 16, pp. 28-29.
- 1911a. [*Ammoperdix bonhami bucharensis*, subsp. nov.] *Ibid.*, vol. 19, pp. 83-85.
- 1911b. Mitteilungen ueber die Ornithologie von Turkestan. Mess. Ornith., vol. 2, pp. 311-312. (In Russian.)

SARUDNY, NICHOLAS A., AND H. LOUDON

1904. Einige neue Sutspecies aus Persien und dem transkaspischen Gebiet. Ornith. Jahrb., vol. 15, pp. 221-227.

SCHÄFER, ERNST

1938. Ornithologische Ergebnisse zweier Forschungsreisen nach Tibet. Jour. Ornith., vol. 86, special no., pp. 1-349.

STEGMANN, BORIS

1938. Eine neue Form von *Lerwa lerwa* (Hodgs.). Ornith. Monatsb., vol. 46, pp. 43-44.

STEINBACHER, FRIEDRICH

1938. In Hartert, Ernst, and Friedrich Steinbacher, Die Vögel der paläarktischen Fauna. Berlin, suppl., pt. 6, pp. 523-524.

STRESEMANN, ERWIN

1920. Avifauna Macedonica. Munich.
1938. In Stresemann, Erwin, W. Meise, and M. Schönwetter, Aves Beickiana. Jour. Ornith., vol. 86, pp. 171-221.

TICEHURST, CLAUD B.

1922. In Ticehurst, Claud B., P. A. Buxton, and R. E. Cheeseman, The birds of Mesopotamia, part 4. Jour. Bombay Nat. Hist. Soc., vol. 28, pp. 937-956.
1926. In Ticehurst, Claud B., Percy Cox, and R. E. Cheeseman, Additional notes on the avifauna of Iraq. *Ibid.*, vol. 31, pp. 91-119.

WHISTLER, HUGH

1945. Materials for the ornithology of Afghanistan. Part 5. Jour. Bombay Nat. Hist. Soc., vol. 45, pp. 462-485.

