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## A STUDY OF THE SPOTTED TINAMOUS

Genus *Nothura*

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My interest in the genus *Nothura* began in 1923, when I first became acquainted with some of its members in the field, and since then I have acquired as many specimens as possible, with the hope of making a special study of the group. In 1942, Dr. C. E. Hellmayr and I published a review of the Family Tinamidae (Field Mus. Nat. Hist., Zool. Ser., 13, (1), pp. 6-114), including, of course, this genus, but we were handicapped by the impossibility, because of the war, of comparing certain critical specimens in European and American collections. In 1948, I gathered together from the museums of this country as many specimens as possible, and I also borrowed critical examples from Europe and South America. Altogether, more than four hundred adult specimens have been examined, representing all but one of the known forms. Five species (one doubtful), comprising fifteen races, have been recognized. Of these, I had for study eight types (in addition to the types of two unrecognized forms). Topotypical material of six additional forms was also available. I am indebted to the following institutions for the loan of specimens: the American Museum of Natural History, Carnegie Museum, the Zoologische Sammlung des Bayerisches Staates, the Museum of Comparative Zoology, the Philadelphia Academy of Sciences, Princeton University, the United States National Museum, and the Museum of Vertebrate Zoology, University of California.

There has long been a lack of information about the exact ranges of the species and subspecies of the genus. There are five species, and in several localities their ranges meet (*chacoensis* and *maculosa paludivaga*, Paraguayan Chaco) or even overlap (*darwinii* and *maculosa*, Rio Negro Valley and probably western Argentina; *boraquira* and *chacoensis*, Paraguayan Chaco; *minor* and *maculosa*, Brazil).

<sup>1</sup>Deceased May 5, 1950.

I hope that this paper may correct some of the misconceptions as to the number of species and races, and their ranges, and may also show the parts of South America from which additional material is most urgently needed. It is especially hoped that the paper may help others to identify their material more easily than has been possible in the past.

The genus divides into four groups or complexes: *boraquira*, *minor*, *darwinii*, and *maculosa*. The first two are monotypic, the third consists of one species divided into five races, and the fourth comprises a full species of seven races together with another form that must be considered at least an incipient species, until more is known of its range and its relationship to the neighboring races of *maculosa*.

- A. Lesser under wing coverts barred with dusky and inner webs of primaries immaculate.....*boraquira*
- B. Lesser under wing coverts unbarred.
- a. Toes and tarsus relatively short. Middle toe with claw generally under 28 mm. *N. maculosa cearensis* has a toe measuring 27 mm., but a short wing (110 mm.).
1. Smaller, wing not over 120; middle toe with claw 21-24 mm....*minor*
  2. Larger, wing over 120; middle toe with claw over 24 but generally not over 28 mm.....*darwinii*
- b. Toes and tarsus relatively long and stout. Middle toe with claw generally over 28 mm. except in *N. m. cearensis* where the wing is 110 and the middle toe 27 mm.....*maculosa* and *chacoensis*

### **Nothura boraquira** Spix. Marbled Tinamou.

*Tinamus boraquira* Spix, Av. Spec. Nov. Bras., 2, p. 63, pl. 79, 1825—"in campis petrosis districtus adamantini" [= Minas Geraes], Brazil (type in Munich Museum).<sup>1</sup>

*Nothura marmorata* G. R. Gray, List Spec. Bds. Brit. Mus., 5, p. 104, 1867—Bolivia (cotypes in British Museum);<sup>2</sup> Salvadori, Cat. Bds. Brit. Mus., 27, p. 561, pl. 18, 1895—Bolivia.

*Nothura boraquira* Hellmayr, Field Mus. Nat. Hist., Zool. Ser., 12, p. 478, 1929—Quixada and Jua, near Iguatú, Ceará; Peters, Bds. World, 1,

<sup>1</sup> Hellmayr and Conover (Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 107, footnote) called attention to the fact that Reinhardt (Vidensk. Medd. Naturhist. Foren., 1870, p. 51) denied that this species occurs in Minas Geraes, and they therefore concluded that the type locality was probably erroneous. However, recently I have examined ten specimens from Janaúba, Minas Geraes, so Spix's type locality must stand.

<sup>2</sup> Some years ago Dr. Hellmayr compared two specimens in my collection (Nos. 4634 and 6828), from Buena Vista, Santa Cruz, Bolivia, with the cotypes of *Nothura marmorata* G. R. Gray in the British Museum. Both, he stated, were very like the types, No. 4634 being a trifle lighter and No. 6828 a trifle darker on the upper parts.



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p. 27, 1931 (range); Laubmann, Verh. Orn. Ges. Bay., 20, pp. 281, 282, 1934—west of Puerto Casado, Paraguayan Chaco; Pinto, Cat. Aves Bras., 1, p. 13, 1938—Parnaguá, Piauh; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 107, 1942 (bibliog.; range); Bond and de Schauensee, Proc. Acad. Nat. Sci. Phila., 95, p. 171, 1943—Buena Vista, Chiquitos, Bolivia.

*Nothura spixi* Miranda-Ribeiro, Rev. Mus. Paul., 23, p. 704, pls. 3 and 4a, 1938 (new name for *Tinamus boraquira* Spix on grounds of purism).

?*Nothura schreineri* Miranda-Ribeiro, Rev. Mus. Paul., 23, p. 702, pl. 2, 1938—Minas Geraes (type in Museo Nacional, Rio de Janeiro); Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 95 (footnote), 1942 (disc.); Zimmer and Mayr, Auk, 60, p. 250, 1943 (disc.).

*Nothura maculosa cearensis* (not of Naumburg) Lamm, Auk, 65, p. 263, 1948—Campeña Grande, Paraiba, Brazil (specimen examined).

*Range*.—From northeastern Brazil (Piauh, Ceará, Parahyba) south to Minas Geraes; also eastern Bolivia (Dept. Santa Cruz) and the drier parts of the Paraguayan Chaco (Colonia Fernheim and west of Puerto Casado).

*Characters*.—*Nothura boraquira* can always be identified by the fact that its lesser under wing coverts are distinctly barred with dusky, a feature that distinguishes it from all the other species in the genus. Also, the inner webs of all the primaries are unbarred.

Specimens from Minas Geraes are very dark (fuscous) on the upper parts and in this respect, surprisingly, are nearer to birds from Bolivia and Paraguay than they are to those of northeastern Brazil (Bahia, Piauh, Ceará, etc.). Specimens from these latter localities tend to be more rufescent dorsally. Out of twenty-two examined, seven are indistinguishable from the topotypical series, five are slightly lighter-colored, and ten are distinctly more rufescent. On the other hand, Bolivian and Paraguayan birds are dorsally very like the Minas specimens, but tend to have more buffy upper wing coverts and secondaries, this feature showing up most strongly in Bolivian examples. However, all these differences are so slight and the individual variation is so great that the recognition of any races seems hardly justified.

*Downies*.—A downy specimen from the Paraguayan Chaco differs from several of the *maculosa* complex by having the sides of the head back of the eye, the back and sides of the neck, and the light streaks on top of the head white or buffy white, not ochraceous orange.

Attention should be called here to the fact that in the Paraguayan Chaco west of Puerto Casado *Nothura boraquira* is found living together with *N. (maculosa?) chacoensis*.

*Specimens examined*.—66: Brazil (Manga, Maranhão, 1; Quixada, Ceará, 1; Jua, Ceará, 1; Santa Lucia, Parahyba, 1; Campeña Grande, Parahyba, 1; Feoriano, Piauhy, 1; Corrente, Piauhy, 10; Santa Rita, Bahia, 5; Lamarão, Bahia, 1; Janaúba, Minas Geraes, 10); Bolivia, Santa Cruz (Cercado, 2; Buena Vista, 16; unspecified, 1); Paraguay, Chaco (265 km. west of Puerto Casado, 7; 120 km. west of Puerto Casado, 1; Orloff, 5; Colonia Fernheim, 2).

### **Nothura minor** Spix. Least Spotted Tinamou.

*Tinamus minor* Spix, Av. Spec. Nov. Bras., 2, p. 65, pl. 82, 1825—"in campis prope pagum Tejuco" [=Diamantina], Minas Geraes, Brazil (type, in Munich Museum, examined).

*Nothura assimilis* G. R. Gray, List Spec. Bds. Brit. Mus., 5, p. 105, 1867—"South America" (type in British Museum).

*Nothura media* (not *Tinamus medius* Spix) Salvadori, Cat. Bds. Brit. Mus., 27, p. 563, 1895—Itararé and Chapada.

*Nothura minor* Peters, Bds. World, 1, p. 27, 1931 (range); Pinto, Cat. Aves Bras., 1, p. 13, 1938—São Paulo; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 106, 1942 (descr.; range; bibliog.).

*Range*.—From Minas Geraes (Diamantina, Lagõa Santa, Agua Suja near Bagagem) south to São Paulo (Itatinga, Itapetinga, etc.) and Matto Grosso (Chapada).

*Characters*.—This species can be identified by its very small size (wing 100–120) combined with its short toes (middle toe with claw 21–24 mm.). While *N. maculosa cearensis* has as small a wing (110 mm.), its middle toe and claw are larger (27 mm.). *N. minor* also has much more finely barred upper wing coverts than any of the other species and, in the rufous phase, the intense chestnut-rufous upper parts are diagnostic.

In this species there would appear to be two color phases, one chestnut-rufous and the other rufescent buffy. However, in a large series it is very probable that the gap between the two would be entirely closed by intermediate specimens, as there is great variation even in the small series examined.

In the dark phase the upper parts are chestnut-rufous, vermiculated and blotched with black. Six of the ten birds examined fall into this group, but no two are alike. Two are heavily blotched with black and another is finely vermiculated with this color, while a fourth is almost solid chestnut-rufous from mantle to rump, except for the buffy edges to the feathers and a very occasional spot of black. The other two fall between these extremes. Two are whitish buff below, three are buff washed with rufous, and one is rufous buff.

The feathers of the chest have dark shaft streaks, very narrow in four specimens, much wider in the other two.

The light phase (to which the type belongs) has the upper parts rufescent buff, vermiculated and blotched with black. The under parts are light buff with narrow dark shaft streaks in the feathers of the lower neck and chest.

In both phases the upper wing coverts and flanks are much more finely barred with black than in any form of *maculosa* or *darwinii*.

*Specimens examined*.—10: Minas Geraes ("Tejuco"=Diamantina, 1 [the type]; Agua Suja, near Bagagem, 2); São Paulo (Itapeitinga, 2; Itatinga, 1); Matto Grosso (Serra da Chapada, 1; Chapada, 3).

### *Nothura darwinii* G. R. Gray.

Many authors have considered *darwinii* to be a form of *maculosa*, although long ago W. H. Hudson (Proc. Zool. Soc. Lond., 1872, p. 534) pointed out the fact that the two live together in the lower Rio Negro Valley. According to his account the "Perdiz comun" (*Nothura maculosa nigroguttata*) frequents the grassy, moister, more fertile plains near the river, while the "Perdiz chico" (*N. d. darwinii*) lives in the higher, drier, brush-covered tablelands bordering the valley. I have compared specimens of typical *darwinii* taken by Hudson in the lower Rio Negro Valley ("I advanced altogether not much over a hundred miles from the sea") with examples of *N. maculosa nigroguttata* from Chimpay and Valcheta, Rio Negro, and they are very different both in coloration and in the length and stoutness of their tarsi and feet. There can be no doubt that the two are specifically distinct. Also, I have examined three specimens of *maculosa* from well within the range of *N. darwinii salvadorii*. Two were from Mendoza and one was from Rosario de Lerma, Province of Salta.

That *darwinii* likes the drier regions seems to be borne out by the ranges of its different forms. The species appears to range from the Rio Chubut north through the lower Rio Negro Valley to the Rio Colorado and then west to Mendoza and north again through the western plains of Argentina into the highlands of Bolivia and southern Peru, where it is found at altitudes ranging from 6,000 to 12,000 feet. It has also been supposed to inhabit southern Patagonia, but as stated under the nominate form no specimens have ever been taken and recorded by competent ornithologists south of northern Chubut.

The different forms of this species can be distinguished from those of *maculosa* by the shorter, stubbier legs and feet. Measurements do not give the entire picture, but in *darwinii* the length of the tarsus usually is from 28 to 34 mm. and that of the middle toe and claw from 24 to 29 mm., while in *maculosa* they are from 34 to 40 and 28 to 35 mm., respectively. In *N. maculosa cearensis*, however, the type and only known specimen measures tarsus 29, middle toe with claw 27; but the race is a very small one, with a wing length of only 110 mm. Moreover, no known form of *darwinii* is found within hundreds of miles of Ceará.

An additional character is the tendency in Darwin's Tinamou toward having unbarred *inner* webs of the outermost primaries. In the nominate race the apical half of the first and the apical third of the second primary are generally immaculate or the barring of the inner web is practically obsolescent. This tendency increases in the races toward the north until in the form *agassizii*, from southern Peru, the inner webs of the four outermost remiges are unbarred or nearly so. Still another feature of this species is the more loosely barbed, more hair-like feathers of the rump and sides, another character that tends to become more noticeable in the northern races.

**Nothura darwinii darwinii** G. R. Gray. Darwin's Tinamou.

*Nothura darwinii* G. R. Gray, List Spec. Bds. Brit. Mus., 5, p. 104, 1867—Bahia Blanca, southern Buenos Aires Province (type in British Museum); Selater, Proc. Zool. Soc. London, 1872, p. 547—Rio Negro.

*Nothura darwinii* Salvadori, Cat. Bds. Brit. Mus., 27, p. 562, pl. xix, 1895—part, Bahia Blanca and Rio Negro (bibliog.).

*Nothura darwinii darwinii* Peters, Bds. World, 1, p. 27, 1931 (range).

*Nothura maculosa darwinii* Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 107, 1942—Bahia Blanca, Rio Colorado, Rio Negro and (?) Santa Cruz.

*Range.*—The high, dry country from eastern La Pampa, Bahia Blanca, and the Rio Colorado south through the lower Rio Negro Valley to at least the Rio Chubut.

No properly identified specimens of this form have ever been recorded, as far as I can ascertain, from south of the Golfo Nuevo, Chubut, or from more than a hundred miles inland.

*Characters.*—Typical *darwinii* is characterized by its small size and gray coloration. The dorsal surface is gray, finely vermiculated with black, with few transverse markings of ferruginous and black. The lower neck and chest are pale grayish brown with narrow, *trans-*

verse, dark markings. The flanks are narrowly but thickly barred with dusky.

*N. d. darwinii* is nearest to *N. d. salvadorii* but is paler and grayer above, with the vermiculations finer and the black and ferruginous transverse markings fewer. The lower neck and chest are grayer, with the dark markings less conspicuous. The abdomen is slightly lighter, less buffy. This form differs from *N. maculosa nigroguttata* (the race of the *maculosa* complex that shares its range, at least in part) by having the general tone of its coloration gray, not yellow; the light edges of the feathers of the upper parts white, not yellow or yellowish white; the light vermiculations of the dorsal surface grayish or ferruginous, not yellowish ochraceous; the dark markings of the lower neck and chest in the form of crossbars on a light reddish brown background, not rounded spots or longitudinal streaks on a yellowish background; and the abdomen much whiter, less yellowish. The size is also smaller and the tarsus and toes are much shorter: wing 130–137, against 138–153; tarsus 31–33, against 37–40; middle toe with claw 25–27, against 30–34 mm.

In the *maculosa* complex, this form most nearly resembles in coloration the race *N. m. submontana*, whose range it or *N. d. salvadorii* may overlap. However, in *darwinii* the upper parts are purer, less olivaceous gray, much more finely vermiculated and less blotched with black. The feathers of the flanks and thighs are more hairlike. It is also smaller, wing 130–137, against 154 mm., with the tarsus and toes much shorter and lighter.

*Specimens examined*.—10: La Pampa (Laguna Colorado Grande, Dept. Caleu-Caleu, 2); Buenos Aires (San Blas, 1); Rio Negro (“not much over 100 miles from the sea,” 4); Chubut (Golfo Nuevo, 1; between Gaiman and Trelew, 1); “Patagonia,” 1.

### ***Nothura darwinii salvadorii* Hartert. Salvadori's Tinamou.**

*Nothura salvadorii* Hartert, in Hartert and Venturi, Nov. Zool., 16, p. 266, 1909—Arenal, Salta, Argentina (type, in Tring Collection, now in the American Museum of Natural History, New York, examined).

*Nothura boraquira* (not of Spix) Salvadori, Cat. Bds. Brit. Mus., 27, p. 561, 1895—part, western Argentina near Mendoza.

*Nothura darwini mendozensis* Chubb, Bull. Brit. Orn. Club, 38, p. 31, Dec. 29, 1917—Mendoza, Argentina (type in British Museum); Wetmore, Bull. U. S. Nat. Mus., 133, p. 39, 1926—part, Tunuyan, Mendoza and Cordoba (specimen examined).

*Nothura darwinii salvadorii* Peters, Bds. World, 1, p. 27, 1931 (range).

*Nothura maculosa salvadorii* Laubmann, Verh. Orn. Ges. Bay., 20, p. 280, 1934—Salta; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 97, 1942—part, except northern Neuquen (Chos-Malal).

*Nothura maculosa mendozensis* Laubmann, Verh. Orn. Ges. Bay., 20, p. 280, 1934—Mendoza.

*Range*.—Western Argentina from Salta and Tucumán south to Mendoza (Tunuyan) and east to western Santiago del Estero (Lavalle), western Cordoba (Sierra de Cordoba; Cosquin) and central La Pampa.

*Characters*.—Very close to the typical race but general tone of the dorsal surface darker, more ferruginous, less grayish. The upper parts are more coarsely vermiculated and have more numerous and heavier transverse markings of ferruginous and black; the dark markings on the lower neck and chest are more conspicuous and in general take the form of longitudinal streaks rather than transverse bars; the dark bars on the flanks are coarser and the abdomen is slightly more buffy. Averages larger, wing 130–152 mm.

Differs from *N. d. boliviana* by having the upper parts and the lower neck and chest darker and grayer, much less rufescent, the abdomen lighter, less buffy, and the flanks perhaps slightly more heavily barred. Size larger, wing 130–152, against 126–138 mm.

*Remarks*.—The specimens from San Juan, surprisingly, are noticeably lighter dorsally than those from Salta, Tucumán, and even Tunuyan, Mendoza. They rather resemble in coloration the two lightest of four specimens of *N. d. boliviana* examined from Tarija, Bolivia. It may be that west of the range of *salvadorii*, in the foothills of the Andes, there is another race of *darwinii*, lighter in coloration and somewhat resembling the form *boliviana*.

Of seven specimens with the locality marked only as Mendoza, one, a bird collected by Chapman and Miller in 1916, resembles the San Juan series, while the other six are darker and very like a series that I collected in Tunuyan, Mendoza. These six darker specimens, however, may not have come from the immediate vicinity of the city of Mendoza, as they were collected by Carlos Reed, who, as I know from personal experience, sometimes bought specimens in the market. Chapman and Miller's example, therefore, may more truly show the characters of the birds from near that city.

*Specimens examined*.—44: Tucumán (Tapia, 1; unspecified, 1); Salta (Arenal, 1; Rosario de Lerma, 3); Santiago del Estero (Lavalle, 4); San Juan (Media Agua, 2; Angaco Sud, 12); Mendoza (Mendoza, 7; Tunuyan, 8); Cordoba (Cordoba, 1; El Carrizal, Sierra de Cordoba,

1; Cosquin, 1); San Luis (unspecified, 1); La Pampa ("Region central," 1).

**Nothura darwinii boliviana** Salvadori. Bolivian Tinamou.

*Nothura boliviana* Salvadori, Cat. Bds. Brit. Mus., 27, p. 561, 1895—Bolivia and Cinti [=Camargo] (cotypes from "Bolivia" in British Museum).

*Nothura maculosa agassizii* (not of Bangs) Peters, Bds. World, 1, p. 26, 1931—part, highlands of southwestern Bolivia.

*Nothura maculosa boliviana* Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 97, 1942 (range; descr.); Bond and de Schauensee, Proc. Acad. Nat. Sci. Phila., 95, p. 171, 1943—Tiraque, San Lorenzo.

*Range*.—Highlands of southwestern Bolivia from Cochabamba south to Tarija at elevations from 6,000 to 11,500 feet.

*Characters*.—This race of *darwinii* is characterized by its small size, rufescent upper parts, ochraceous abdomen and scantily barred flanks. Its feathers are very hairlike and the first four primaries usually have little or no barring on their inner webs.

Closest to *N. d. agassizii*, from which it differs by being more rufescent above and more ochraceous below. It has less barring on the flanks, and the dark markings on the neck, chest and upper parts are much more reduced. Size much smaller, wing 126–138 (against 130–147), tarsus 28–34, middle toe (with claw) 24–28.

Differs from *N. d. salvadorii* by being lighter in coloration, more rufescent on the upper parts, lower neck and chest, more ochraceous on the lower breast and abdomen, and less barred on the flanks. Size smaller, wing 126–138 (against 130–152).

*Remarks*.—Before the war two specimens in my collection, Nos. 6830 and 6831, from Tiraque, Cochabamba, Bolivia (alt. 10,000 feet), were compared by Dr. Hellmayr with the cotypes in the British Museum. According to him these specimens "agree perfectly in coloration except that your birds, due probably to their being in fresher plumage, have the white lateral edges to the interscapulars more pronounced." As several forms of *Nothura* are known from Bolivia, I suggest Tiraque, Cochabamba, as a restricted type locality for *N. boliviana* Salvadori. T. Bridges, who collected the cotypes, is known to have traveled in that region and his specimens could well have come from that vicinity.

*Specimens examined*.—33: Bolivia (Tiraque, Cochabamba, 9; Vacas, Cochabamba, 5; Cerro San Benito, Cochabamba, 2; Zotora, Cochabamba, 2; Chocaya, Cochabamba, 1; Chuchacancha, Cocha-

bamba, 4; Cochabamba, 2; Mizque, Cochabamba, 1; Coloni, Cochabamba, 3; San Lorenzo, Tarija, 3; Tarija, 1).

**Nothura darwinii agassizii** Bangs. Agassiz's Tinamou.

*Nothura agassizii* Bangs, Proc. Biol. Soc. Wash., 23, p. 107, June 24, 1910—Moho, northern border of Lake Titicaca, Peru (type in Museum of Comparative Zoology, Cambridge, Mass.).

*Nothura maculosa agassizii* Peters, Bds. World, 1, p. 26, 1931—part, highlands of southeastern Peru and northwestern Bolivia; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 96, 1942 (range; descr.); Bond and de Schauensee, Proc. Acad. Nat. Sci. Phila., 95, p. 170, 1943—Callipampa, Oruro, Bolivia.

*Nothura maculosa oruro* Bond and de Schauensee, Not. Nat. Acad. Sci. Phila., No. 93, p. 2, Oct. 14, 1941—Callipampa, Lake Poopo, Oruro, Bolivia, alt. 12,200 feet (type, in the Academy of Natural Sciences of Philadelphia, examined).

*Range*.—Highlands of extreme southeastern Peru from the southern Cuzco region (where it is said to intergrade with *peruviana*) and the Titicaca basin, south through western Bolivia at least to Lake Poopo (Callipampa, Oruro), where specimens show certain characters that indicate intergradation with *boliviana*.

*Characters*.—The chief characters of this race are the very hair-like texture of the feathers, the large size, and the yellowish rufescent coloration of the upper parts, which are also conspicuously blotched with dark brown. The first four primaries have their inner webs immaculate or very scantily barred with buff. Wing 130–147, tarsus 29–35, middle toe with claw, 24–29.

*Nothura darwinii agassizii* is closest in coloration and size to *N. d. salvadorii*, from which it differs by having the upper parts yellower and more rufescent, less grayish. It also has the dark markings of the upper parts, lower neck and chest larger and more conspicuous and the barring on the flanks heavier. The feathers on the flanks and thighs are also much more hair-like.

It is much less rufescent than *boliviana* and has the dark markings both above and below larger and more conspicuous. The abdomen is paler, less ochraceous. Size larger (wing 130–147 against 126–138).

No specimens of *peruviana* have been available for comparison and there may be no difference between the two. However, Berlepsch and Stolzmann (Ornis, 13, p. 105, 1906) seem to think that a specimen from Puno was not the same as others from Santa Ana, Urubamba Valley, Cuzco, Peru. If a difference does exist it would



seem that *agassizii* is lighter, less ochraceous on the abdomen, and larger in size (wing 130–147 against 126–133).

*Specimens examined*.—24: Peru (Puno, Puno, 7; Lake Titicaca, 3; Zotorani, Puno, 3; Sorapa, Puno, 1; Chucuito, Puno, 1); Bolivia (Desaguadero, La Paz, 2; Mercado, La Paz, 3; Guaqui, La Paz, 1; Callipampa, Lake Poopo, Oruro, 3).

**Nothura darwinii peruviana** Berlepsch and Stolzmann. Peruvian Tinamou.

*Nothura maculosa peruviana* Berlepsch and Stolzmann, *Ornis*, 13, p. 101, 1906—Santa Ana, Urubamba Valley, Cuzco, Peru (type in collection of Count Branicki, formerly in Warsaw Museum, now probably destroyed); Peters, *Bds. World*, 1, p. 26, 1931 (range); Hellmayr and Conover, *Field Mus. Nat. Hist., Zool. Ser.*, 13, (1), p. 95, 1942 (range; descr.).

*Range*.—Southeastern Peru in the Department of Cuzco.

*Characters*.—No specimens of this race were available for examination. From the remarks of others it would seem to be very similar to, if not identical with, *N. d. agassizii*. It is said, however, to be smaller (wing 126.5–133) and to have a darker abdomen. The inner webs of the primaries are immaculate, rarely barred with reddish buff.

**Nothura maculosa** Temminck.

*Nothura maculosa*, as stated before, differs from *darwinii* by its stouter and longer tarsi and toes.

This species covers a greater extent of territory and lives in a wider variety of climates than the preceding one. For these reasons it breaks up into more forms. However, since the range is practically continuous from the Rio Negro, Argentina, to at least Minas Geraes, Brazil, the boundaries of the races are often hard to define, as most forms grade gradually from one to the other. Individual variation, which is very great, adds to the confusion. When more specimens are at hand from such places, among others, as central Argentina (Santiago del Estero to La Pampa) the ranges of some of the subspecies will undoubtedly have to be revised.

In this paper *Nothura chacoensis* is kept in the *maculosa* complex but given specific status. The truth or falsity of this concept probably will have to be worked out by ornithologists in the field. However, it seems to me that a very good case can be made out for the belief that the parent stock of this species was long ago completely cut off from all other forms of *maculosa* by the flood basins of the

Pilcomayo and Paraguay rivers. Later, as these basins became silted in, spotted tinamous from the east bank of the Paraguay probably drifted across and developed into the form here named *N. maculosa paludivaga*. That this separation lasted long enough for speciation to occur in *chacoensis* is proved, I believe, by the fact that in this same arid Chaco is found another tinamou, *Eudromia mira*, which was probably cut off from its parent stock at the same time. This *E. mira* is very distinct from its only known relative, *E. elegans*, which inhabits the more arid parts of Argentina, from eastern Tucumán and Santiago del Estero south.

### **Nothura maculosa nigroguttata** Salvadori. Patagonian Spotted Tinamou.

*Nothura nigroguttata* Salvadori, Cat. Bds. Brit. Mus., 27, p. 560, 1895—"Central Pampas, Argentine Republic" (type from Choele Choel, Rio Negro Territory, Argentina, formerly in Warsaw Museum [cf. Stolzman and Domaniewski, Ann. Zool. Mus. Pol. Hist. Nat., 6, p. 98, 1927], now probably destroyed).

*Nothura maculosa* (not of Temminck) Wetmore, Univ. Calif. Pub. Zool., 24, p. 410, 1926—Valcheta, Rio Negro, specimen examined.<sup>1</sup>

*Nothura maculosa nigroguttata* Peters, Bds. World, 1, p. 27, 1931—part, Rio Negro only; Deautier, Obr. Cinc. Mus. La Plata, 1, p. 147, 1935—part, Bahia de San Blas; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 100, 1942—part, Chimpay, Rio Negro and Collon Cura, Neuquen.

*Range*.—From the valley of the Rio Negro and perhaps the Rio Colorado south an unknown distance, but probably as far as the Rio Chubut; and from near the Atlantic coast west to the western part of the Territory of the Rio Negro and southeastern Neuquen, where it appears to intergrade with *N. m. submontana*.

*Characters*.—The distinctive feature of this race is its rather bright yellow and black appearance. When compared with a series of *annectens* from the provinces of Buenos Aires and Cordoba, the seven specimens from the Rio Negro Territory have the upper parts lighter and much yellower; the upper wing coverts with the light bars wider and yellower and the dark bars narrower; the flanks slightly less heavily barred; the lower neck and chest less heavily spotted; and the under parts brighter, more ochraceous buff.

<sup>1</sup> Wetmore speaks of this specimen as being very immature, although it was taken on May 7, which is late fall for those latitudes. While it has the appearance of a bird of the year, it seems fully grown, having a wing of 139 mm. The example agrees in coloration with the series from Chimpay.

*Nothura m. nigroguttata* differs from *N. m. submontana* by its lighter, yellower, much less olivaceous appearance. It is also much darker and more yellowish, less grayish, than *N. d. darwini*, whose range it shares in part, and the upper parts are more blotched and much less vermiculated.

*Remarks.*—The name *nigroguttata* heretofore has generally been assigned to the birds ranging from the Rio Negro north through the provinces of Buenos Aires and Cordoba. However, six practically topotypical specimens of *nigroguttata* from Chimpay, Rio Negro Territory, about thirty miles west of Choele Choel, are much yellower than birds from the more northern localities mentioned. As a single specimen from Valcheta, a locality somewhat to the south of Choele Choel, is even yellower, it would appear that the true range of the form *nigroguttata* is from the Rio Negro (or perhaps the Rio Colorado) south. In this connection attention is called to the fact that Salvadori himself in the British Museum Catalogue lists examples from Uruguay and Buenos Aires as typical of *maculosa*, although he must have had the opportunity of comparing these specimens with the types of *nigroguttata*. Two specimens in my collection from Collon Cura, southern Neuquen, are somewhat darker than those from Chimpay and are probably intergrades with *N. m. submontana*.

*Specimens examined.*—9: Argentina (Chimpay, Rio Negro, 6; Valcheta, Rio Negro, 1; Collon Cura, Neuquen, 2).

***Nothura maculosa submontana* subsp. nov. Neuquen Spotted Tinamou.**

*Nothura maculosa salvadorii* (not of Hartert) Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 97, 1942—part, northern Neuquen (Chos-Malal).

*Type.*—From Chos-Malal (37° 20' S.—70° 15' W.), Rio Neuquen, Neuquen, Argentina, elevation 2,500 feet; No. 4796, adult male in the Conover Collection, Chicago Natural History Museum; collected in May, 1926, by E. Budin. Original number 3138.

*Characters.*—The distinctive characters of this race are its light olive grayish appearance above, coupled with its pale whitish buff coloration below. It differs from *nigroguttata*, its nearest neighbor geographically, by having the general tone of the upper parts olive gray rather than yellow, with the light longitudinal streaks to the feathers much whiter, less yellowish; the under parts very much paler, whitish buff rather than ochraceous yellow; the dark markings

of the chest much duller, less clearly defined, and the flanks less heavily barred. It is much lighter (olive gray rather than ochraceous brown) dorsally when compared to *N. m. annectens* from Buenos Aires Province and also much paler ventrally. From all the members of the *darwinii* complex, *submontana* can be easily told by its much longer tarsus and toes.

*Description of type.*—Top of head dark brown, each feather tipped with brownish buff; throat buffy white; sides of head, superciliary stripe and neck all around light dull buff with dark brown shaft streaks to each feather; feathers of mantle, back, scapulars and upper tail coverts dark brown, vermiculated with rufous brown and olive gray, with a broad edge of olive gray inside of which is generally a longitudinal streak of white that is often yellowish toward the base; tail feathers light buff, faintly barred with dusky; upper wing coverts barred with dark brown and ochraceous buff; primaries dark brown, the outer web broadly notched with buffy white and the inner web broadly barred with ochraceous buff; under wing coverts and axillaries rich ochraceous buff, the outermost coverts dotted with dusky; secondaries broadly barred with dark brown and ochraceous buff; chest whitish buff, each feather with a dark brown shaft streak that is spotted with rufous brown; flanks and thighs dirty light buff, the former broadly barred with dusky; abdomen, vent, and under tail coverts dirty light buff. Wing (flat) 153, tarsus 41, middle toe (with claw) 35.

*Range.*—Northern Neuquen. Known only from the type.

*Remarks.*—It is with some hesitation that I describe this new form from a single specimen. However, several facts point to the probability that the individual at hand represents a new race and is not simply an aberrant example. In the first place the type is very different in coloration from any other specimen of the genus that I have examined, and the two specimens from Collon Cura, Neuquen, listed under the previous race, are somewhat intermediate between it and *nigroguttata*, as their under parts are lighter and the light longitudinal streaks on the feathers of the mantle, back, etc., are whiter than those of the Chimpay birds. Finally, the locality at which the type was taken is much farther to the west than any from which specimens of the *maculosa* complex have previously been known. In fact, except for Collon Cura, mentioned above, the nearest places at which examples of *Nothura maculosa* have been taken are some three or four hundred miles to the east at Chimpay, Rio Negro Territory, or in the western part of Buenos Aires Province.

Indeed from such a western and Andean locality as Chos-Malal one would rather expect to find a form of *darwini*.

*Specimens examined*.—1: Argentina (Chos-Malal, Neuquen, 1).

**Nothura maculosa annectens** subsp. nov. Pampa Spotted Tinamou.

*Nothura maculosa* (not *Tinamus maculosus* Temminck) Salvadori, Cat. Bds. Brit. Mus., 27, p. 559, 1895—part, Buenos Aires.

*Nothura maculosa nigroguttata* (not of Salvadori) Wetmore, Bull. U. S. Nat. Mus., 133, p. 33, 1926—Buenos Aires (Dolores to Lavalle; Carhué; Guamini) (crit.); Peters, Bds. World, 1, p. 27, 1931—part, southern Santa Fé, Cordoba and Buenos Aires; Laubmann, Verh. Orn. Ges. Bay., 20, p. 280, 1934—part, southern Santa Fé (Las Rosas) to southern Buenos Aires Province; Steullet and Deautier, Obr. Cinc. Mus. La Plata, 1, p. 147, 1935—part, Buenos Aires (Pigué, Christiano Muerto, La Plata, Bahia de San Blas); Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 100, 1942—part, southern Santa Fé to southern Buenos Aires Province and eastern Cordoba.

*Nothura darwini salvadorii* (not of Hartert) Laubmann, Wiss. Erg. Deuts. Gran Chaco Exp., Vögel, p. 74, 1930—part, Est. La Germania and Est. Wildermuth, near Las Rosas, Santa Fé.

*Type*.—From Cambaceres, Province of Buenos Aires, Argentina; No. 2556, adult female in the Conover Collection, Chicago Natural History Museum; collected on June 22, 1923, by Boardman Conover. Original number 697.

*Characters*.—Nearest to typical *maculosa*, from which it differs by having the upper parts less rufescent, more ochraceous brown; the dark markings on the chest and flanks darker (brownier, less tinged with rusty), heavier, and more numerous; and the belly and abdomen lighter, more ochraceous, less rufescent. Size slightly larger (wing 132–146 mm.).

Differs from *nigroguttata* by having the dorsal surface darker, brownier and grayer, *much less yellowish*, and the under parts dull buff rather than bright ochraceous, with the dark markings much more numerous, especially on the chest.

*Description of type*.—Top of head dark brown, each feather tipped with rusty buff and edged with light buff; throat white; sides of head, superciliary stripe and neck all around light buff with dark brown shaft streaks to each feather; feathers of mantle, back, scapulars and upper tail coverts dark brown, vermiculated with rufous brown, and with broad edges of grayish buff inside of which are longitudinal streaks of white often tinged with dull buff; tail feathers light buff

barred with dusky; upper wing coverts barred with dark brown and ochraceous buff; primaries dark brown, the outer web broadly notched with buffy white and the inner web broadly barred with ochraceous buff; under wing coverts and axillaries ochraceous buff, the very outermost coverts spotted with dusky; secondaries broadly barred with dark brown and ochraceous buff; chest dull buff, the feathers with longitudinal streaks and spots of dusky; flanks dull buff, heavily marked with broad bars of dark brown; abdomen, vent and under tail coverts dull ochraceous buff. Wing (flat) 141, tarsus 41, middle toe with claw 29 mm.

*Range.*—Argentina, from central Cordoba (Noetinger) and southern Santa Fé (Las Rosas) south through Buenos Aires Province to Bahia Blanca.<sup>1</sup>

*Remarks.*—The group of birds here named *annectens* has formerly been included in the race *nigroguttata* by all authors except Salvadori (Cat. Bds. Brit. Mus., 27, p. 560, 1895). However, as explained under that race, a series from near the type locality of *nigroguttata* proves to be quite different from birds taken in the Province of Buenos Aires.

This is an intermediate form, showing great individual variation and possessing rather slight characters of its own. Yet it cannot be united with the races found to the north or south and inhabits too great an extent of country to be ignored or considered simply as a series of intergrades.

*Specimens examined.*—49: Cordoba (Noetinger, 9); Santa Fé (Las Rosas, 5); Buenos Aires (Cambaceres, 3; Henderson, 1; Papin, near Bonifacio, 3; Las Ingleses, 1; Torrecito, 1; Alvarez Yonte, 2; General Lavalle, 3; San Vicente, 1; Buenos Aires, 2; Barracas al Sud, 2; Quilmes, 1; Conchitas, 1; Mar del Plata, 7; Dorrego, 5); (?)Mendoza, 2.

### **Nothura maculosa maculosa** Temminck. Spotted Tinamou.

*Tinamus maculosus* Temminck, Hist. Nat. Fig. Gall., 3, pp. 557, 748, 1815—based on "Ynambui" Azara, No. 327, Paraguay and two specimens (of unrecorded locality) in the Paris Museum (type locality restricted to Bernalcue, near Asuncion, Paraguay; cf. Laubmann, Verh. Orn. Ges. Bay., 20, p. 273, 1934).

*Cryptura fasciata* Vieillot, Nouv. Dict. Hist. Nat., nouv. ed., 34, p. 109, 1819—based on "Ynambui" Azara, No. 327; Paraguay.

<sup>1</sup>This form may range west through San Luis and La Pampa to Mendoza, though two specimens from the latter province, one in my collection and one (No. 14113) in the Munich Museum, while not typical, are closest to *annectens*.

*Nothura maculosa savannarum* Wetmore, Journ. Wash. Acad. Sci., 11, p. 435, Nov. 4, 1921—San Vicente, Rocha, Uruguay (type, in U. S. National Museum, examined); Peters, Bds. World, 1, p. 27, 1931 (range); Laubmann, Verh. Orn. Ges. Bay., 20, p. 279, 1934.

*Nothura maculosa maculosa* Peters, Bds. World, 1, p. 27, 1931—range, in part; Laubmann, Verh. Orn. Ges. Bay., 20, p. 279, 1934—part, except Minas Geraes; idem, Vögel Paraguay, p. 120, 1939—part, except Minas Geraes; Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 102, 1942—part, except the Paraguayan and Argentine Chaco and Formosa.

*Nothura maculosa nigroguttata* (not of Salvadori) Laubmann, Verh. Orn. Ges. Bay., 20, p. 275, 1934—part, Santa Fé (Estancias Ines and La Geraldina, near Hersilia; Galvez).

*Nothura maculosa boliviana* (not of Salvadori) Laubmann, Verh. Orn. Ges. Bay., 20, p. 280, 1934—part, northern and northeastern Paraguay; idem, Vögel Paraguay, p. 120, 1939—part, except Paraguayan Chaco.

*Range.*—Southern Brazil from southern Matto Grosso (Vaccaria), São Paulo and Rio de Janeiro (Campos) south through Paraguay and Uruguay to northeastern Argentina in the provinces of Misiones, Corrientes, Entre Rios and northern Santa Fé (south to Galvez).<sup>1</sup>

*Characters.*—Typical *maculosa* is characterized by its rufescent (mikado brown) and black appearance above and its ochraceous (sometimes rufescent) buff coloration below. The dark spotting on the chest and the barring of the flanks is moderately heavy. There is, however, great variation even in specimens from the same locality, but, in general, examples from the range given above have the rusty yellow coloration of this form.

Specimens from Colonia Nueva Italia (near Villeta) and Villa Rica, Paraguay, are the most rufescent of any examined, and for purposes of comparison are taken as being typical of the race. Examples from Rosario are darker (blackier) on the dorsal surface, approaching in coloration the race from the west bank of the Rio Paraguay (that is, *N. m. paludivaga*) in this respect, but they are much brighter ochraceous below than that form. Birds from Horqueta are very variable, some being typically dark rufescent and others considerably lighter, especially on the breast. Specimens

<sup>1</sup> Some form of *maculosa* probably inhabits the country from western Salta through Santiago del Estero. One specimen from Rosario de Lerma, Salta, belonging to the American Museum, has been examined. The example is in rather poor condition, but the upper parts are quite rusty, as in typical *maculosa*, while the under parts are light ochraceous with heavy dark spotting on the chest and lower neck. It may represent an unnamed form, as it is not at all like *paludivaga*, its nearest neighbor geographically.

It may be well to call attention to the fact that Miller and Boyle, the collectors of the above specimen, also obtained three examples of *Nothura darwinii salvadorii* at this same locality.

in the series from Capitan Bado, Cerro Amambay, are as rufescent as Villa Rica birds above, but on the average are lighter below and have the flanks and chest less heavily marked.

Examples from Vaccaria, Matto Grosso, are typically rufescent above, but slightly lighter below. The birds from São Paulo on the average are not quite so typically rufous above, average lighter below and show a tendency toward *N. m. major*. Dorsally, specimens from Rio Grande do Sul are like typical Paraguayan examples, although birds from the southern part of the state average lighter than a series from the north. The under parts are slightly lighter buff but the spotting is as heavy as that of Villa Rica birds, and much heavier than that of those from São Paulo.

Birds from northern and western Uruguay (9 specimens) are like typical *maculosa* in their rufescent coloration, although one or two show a tendency toward specimens from Buenos Aires Province.

Four specimens (including the type of *N. m. savannarum*) from San Vicente, Rocha, Uruguay, have been examined. The type and one other are yellower, less rufescent, dorsally than typical Paraguayan examples and are lighter buff, less heavily marked with dusky below. A third has the typically rufescent coloration of *maculosa* while the fourth is intermediate between the two extremes. Despite the fact that two out of four birds from Rocha are very light-colored and a third has tendencies that way, *savannarum* would not seem to be a good race. It is probably only a local color phase. Birds from western and northern Uruguay are typical of *maculosa*, as are a series of six specimens from the Rio Grande do Sul seacoast (Santa Vitoria) near the Uruguayan border.

In Argentina three specimens from Santa Ana, Misiones, are very rufescent and typical in every respect, and a specimen from Corrientes, although old and rather faded, appears to belong to this form. Five examples from Entre Rios (Concepción del Uruguay, 4; Santa Elena, 1), while most like this race, show strong tendencies toward *N. m. annectens* from Buenos Aires Province. Six others, however, from La Soledad, Entre Rios, are very aberrant, being bright buff below with very sparse dark markings on chest and flanks and yellowish brown above except for one specimen, which is rather blackish. However, they have an appearance of being young and as they were collected during midsummer (January and February) this may account for their curious coloration. In Santa Fé, three specimens from Hersilia are very dark above and approach *N. m. paludivaga* in coloration, while one from Galvez is very rufescent,



like typical *maculosa*. Five others, however, from Las Rosas, only fifty kilometers farther south, can be referred only to *N. m. annectens*.

*Downies*.—Five specimens from Villa Rica, Paraguay, are much more rufescent about the head and neck than four specimens of *chacoensis* and one of *boraquira*.

*Specimens examined*.—133: Paraguay (Colonia Nueva Italia, near Villeta, 5; Asuncion, 1; Bernalcúe, near Asuncion, 1; Villa Rica, 12; Colonia Independencia, east of Villa Rica, 1; Rosario, 5; Horqueta, 12; Colonia Nuevo Germania, 1; San Luis de la Sierra, Apa Hills, 3; Sapucay, 1; Cambyreta, 1; Capitan Bado, Cerro Amambay, 12; La Fonciere, San Luis de la Sierra, 1; Caaguasú, eastern Paraguay, 1); Brazil (Vaccaria, Matto Grosso, 8; Aracassu, São Paulo, 5; Rio Tiete, São Paulo, 6; Ypiranga, São Paulo, 1; Itapetininga, São Paulo, 2; Victoria, São Paulo, 1; Campos, Rio de Janeiro, 1; Santa Vitoria, Rio Grande do Sul, 6; Tahym, Rio Grande do Sul, 2; Palmares, Rio Grande do Sul, 6; Vaccaria, Rio Grande do Sul, 2; Candiota, Rio Grande do Sul, 1; Conceicao do Arroyo, Rio Grande do Sul, 1; Passo Fundo, Rio Grande do Sul, 1; Rio Jaguarao, Rio Grande do Sul, 1); Uruguay (Mercedes, Soriano, 4; Caraguata, Tucarembó, 3; Fraile Muerto, Cerro Largo, 2; San Vicente, Rocha, 4); Argentina (Santa Ana, Misiones, 3; Corrientes, 1; Concepción del Uruguay, Entre Rios, 4; Santa Elena, Entre Rios, 1; La Soledad, Entre Rios, 6; Hersilia, Santa Fé, 3; Galvez, Santa Fé, 1).

***Nothura maculosa paludivaga* subsp. nov.** Swamp Spotted Tinamou.

*Nothura maculosa boliviana* (not of Salvadori) Wetmore, Bull. U. S. Nat. Mus., 113, p. 36, 1926—Argentina (Las Palmas, Chaco; Kilometer 182 [Riacho Pilaga], Formosa) and Paraguay (Kilometer 80, west of Puerto Pinasco); Peters, Bds. World, 1, p. 26, 1931—part, Argentine Chaco and eastern Paraguayan Chaco; Laubmann, Verh. Orn. Ges. Bay., 20, p. 280, 1934—part, Formosa, Argentina and eastern Paraguayan Chaco; Steullet and Deautier, Obr. Cinc. Mus. La Plata, 1, p. 146, 1935—Chaco and Formosa, Argentina; Laubmann, Vögel Paraguay, pp. 120, 121, 1939—part, Formosa, Argentina and eastern Paraguayan Chaco (145 km. west of Puerto Casado).

*Nothura darwini salvadorii* (not of Hartert) Laubmann, Wiss. Erg. Deuts. Gran Chaco Exp., Vögel, p. 74, 1930—part, Formosa (San José; Mision Tacaaglé; Lapango).

*Nothura maculosa chacoensis* Conover, Proc. Biol. Soc. Wash., 50, p. 227, 1937—part, Paraguay (Puerto Pinasco), Argentina (Formosa and the Chaco).

*Nothura maculosa maculosa* (not of Temminck) Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 102, 1942—part, Paraguayan and Argentine Chaco and Formosa.

*Type*.—From seven kilometers southwest of Laguna General Diaz, Paraguayan Chaco (22° 15' S.—59° 5' W.); No. 17653, adult male in the Conover Collection, Chicago Natural History Museum; collected July 24, 1945, by Jacob Unger. Original number 119.

*Characters*.—The distinctive feature of this new race is its dark, rather grayish black and dull yellow appearance dorsally. It is nearest to typical *maculosa* and like that form has the upper parts and chest rather heavily blotched with dark brown, but it is much less rufescent brown above and duller (grayer) much less yellowish ochraceous below. It is darker than *N. chacoensis* (whose range it may slightly overlap), the dorsal surface being much more heavily blotched, the chest more heavily streaked and the flanks more heavily barred with dark brown. The under parts are duller, paler, and less ochraceous; in many specimens the center of the abdomen is whitish. Its general appearance is grayish black, in contrast to the ochraceous buff of *chacoensis*.

*Description of type*.—Top of head dark brown, each feather tipped with brownish buff; throat white; sides of head, superciliary stripe and neck all around light yellowish buff with broad dark brown shaft streaks to each feather; feathers of mantle, back, scapulars and upper tail coverts blotched with dark brown and unevenly vermiculated with grayish buff, with a broad edge of smoky grayish buff, inside of which is generally a longitudinal streak of buffy white; tail feathers hair-like, and light smoky buff broadly barred with dusky; upper wing coverts barred with dark brown and ochraceous buff; primaries dark brown, the outer web broadly notched with buffy white and the inner web broadly barred with ochraceous buff; secondaries broadly barred with dark brown and ochraceous buff; under wing coverts and axillaries whitish buff; chest smoky ochraceous buff, each feather with a broad dark brown shaft streak on basal two thirds and a dark brown spot near tip; flanks and thighs smoky ochraceous buff, the former broadly barred with dark brown; abdomen smoky whitish buff (many individuals are smoky buff without any whitish tinge). Wing (flat) 130, culmen (exposed) 20, tarsus 33, middle toe (with claw) 28.

*Range*.—The marshy country along the west bank of the Paraguay River from Puerto Casado (and probably the Bolivian border) south at least to the Argentine Chaco (Las Palmas; General Pinedo).

Also west up the valley of the Pilcomayo for 235 kilometers and probably farther.

In the northern Paraguayan Chaco, west of Puerto Casado, the range of this tinamou does not seem to extend west from the River Paraguay much over 150 kilometers, where it meets and may overlap the range of *N. chacoensis*. At this point, according to the collectors, the climate, soil and vegetation change rather abruptly, although there is no appreciable change in elevation. "The part near the river," they write, "is swampy and covered with a sweet grass, whereas the more western portion is dry, and the soil alkaline and covered with what they call a salt grass. Other types of vegetation change also."

*Specimens examined*.—29: Paraguayan Chaco (145 km. west of Puerto Casado, 1; 30 km. northeast of V. Militar [Islapoi], 1; 80 km. west of Puerto Pinasco, 1; Laguna General Diaz, 6; 17 km. west of Laguna General Diaz, 5; 7 km. southwest of Laguna General Diaz, 2; Fort Wheeler, 1; Makthlawarija, Mission Vieja, 3; 235 km. west of Riacho Negro, 2; Monte Alto, 1); Argentina (10 miles northwest of Riacho Pilago, Kilometer 182, Formosa, 2; San José, Formosa, 1; Las Palmas, Chaco, 1; General Pinedo, Chaco, 2).

### *Nothura maculosa major* Spix. Spix's Spotted Tinamou.

*Tinamus major* Spix, Av. Spec. Nov. Bras., 2, p. 64, pl. 80, 1825—"in campis Minas Geraes, prope pagum Tejuco [=Diamantina] et Contendas" Brazil (type, in Munich Museum, examined).

*Tinamus medius* Spix, Av. Spec. Nov. Bras., 2, p. 65, pl. 81, 1825—"in campis prope pagum Tejuco" [=Diamantina], Minas Geraes, Brazil (type, in Munich Museum, examined).

*Nothura maculosa maculosa* (not of Temminck) Laubmann, Verh. Orn. Ges. Bay., 20, pp. 279, 281, 1934—part, Minas Geraes (Tejuco, Agua Suja, Pocos de Caldas); Pinto, Rev. Mus. Paul., 20, p. 30, 1936—Fazenda Bôa Vista, Jaraguá, Goyaz.

*Nothura maculosa major* Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 104, 1942 (range; bibliog.).

*Range*.—Interior of Brazil in the states of Minas Geraes (Diamantina, Agua Suja, Pocos de Caldas), Goyaz (Jaraguá, Veadeiros) and probably southern Bahia.

*Characters*.—This is a very poor subspecies. When compared with the typical race it has the dorsal surface slightly lighter and yellower; under parts paler; dusky markings on foreneck more indistinct and flanks less heavily barred. Even these differences are

apparent only when series are compared. Wing 124-140, tarsus 36-39, middle toe (with claw) 30-33.

While individual specimens of this form may not appear to be very different when compared to specimens of *maculosa* from São Paulo, it is a fact that birds of this complex average lighter in coloration as one goes north from Paraguay. Therefore the name *major* may be useful in designating these paler northern examples from Minas Geraes, Goyaz, and southern Bahia.

*Remarks.*—The types of *Tinamus major* and *T. medius* Spix look somewhat aberrant when compared to the other seven specimens in the series examined and they are entirely unlike each other, although they come from the same locality. The type of *major* has the dorsal surface blotched, with very few ochraceous vermiculations, while the type of *medius* has these parts strongly vermiculated. For some reason this latter specimen has its label marked "juv." and the description of *medius* has been quoted in synonymy as being that of an immature specimen of *major*. However, to my mind there is nothing about this example that speaks of immaturity. The feathers of its dorsal surface are very badly worn, and its wing, although the primaries are much frayed at the tip, measures 140 mm., the longest in the series examined.

*Specimens examined.*—10: Brazil (Agua Suja, near Bagagem, Minas Geraes, 4; Pocos de Caldas, Minas Geraes, 1; Diamantina, Minas Geraes, 2; Pirapora, Minas Geraes, 1; Veadeiros, near Cavalcanti, Goyaz, 2).

### **Nothura maculosa cearensis** Naumburg. Ceará Spotted Tinamou.

*Nothura maculosa cearensis* Naumburg, Amer. Mus. Nov., 554, p. 1, Aug. 22, 1932—Lavras, Ceará, Brazil (type, in the American Museum of Natural History, examined); Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 105, 1942 (disc.).

*Range.*—Known only from the type specimen taken at Lavras, Ceará, Brazil.

*Characters.*—Size very small. Upper parts ochraceous, with dark brown and rufous brown blotches. Neck and upper chest with narrow longitudinal dark streaks. Rest of under parts light buff. Sides of chest lightly barred, flanks practically immaculate. Wing 110, tarsus 29, middle toe (with claw) 27.

In size closest to *N. minor* Spix but inner webs of outer primaries broadly notched with buff, and upper wing coverts much more coarsely barred. Upper parts more ochraceous and rufous brown

blotches much less rufescent. Lower breast and abdomen brighter, cream-colored rather than dull buff.

In some respects such as size and general appearance the type is very like some specimens of *N. darwinii boliviana*, but it can be distinguished immediately by the barred inner webs of the outer primaries and the much less hair-like texture of the flank feathers. In general the dorsal surface is much less rufescent.

From *N. maculosa major*, its nearest relative geographically, it can be told by its diminutive size, lighter, much more buffy ochraceous upper parts, and lighter, creamy buff breast and belly.

*Specimens examined*.—1: Brazil (Lavras, Ceará, 1).

### **Nothura chacoensis** Conover. Chaco Spotted Tinamou.

*Nothura maculosa chacoensis* Conover, Proc. Biol. Soc. Wash., 50, p. 227, Dec. 28, 1937—265 km. west of Puerto Casado, Paraguayan Chaco (type in the Conover Collection, Chicago Natural History Museum) (exclusive of Puerto Pinasco and Argentine specimens); Hellmayr and Conover, Field Mus. Nat. Hist., Zool. Ser., 13, (1), p. 98, 1942 (range).

*Nothura maculosa boliviana* (not *N. boliviana* Salvadori) Peters, Bds. World, 1, p. 26, 1931—part, western Paraguayan Chaco.

*Range*.—Arid part of the Paraguayan Chaco, which begins about 150 kilometers west of the Rio Paraguay. Known only from west of Puerto Casado and Puerto Pinasco but probably ranges west and north to at least the Bolivian border and south to the more humid strip of country along the north bank of the Rio Pilcomayo.

*Characters*.—Differs from both *N. m. maculosa* and *N. m. paludivaga* by its much lighter appearance. Where the general type of coloration of the upper parts is dusky rufescent in typical *maculosa* and grayish black in *paludivaga*, in *chacoensis* it is ochraceous buff. On the under side the dark markings of the chest are not nearly as bold and prominent, being duller and generally taking the form of narrow shaft streaks, and the lower breast and belly are much lighter and brighter (purer buff).

*Downies*.—Four specimens from 195 kilometers west of Puerto Casado, Paraguayan Chaco, are much less rusty about the head and neck and paler on the dorsal surface than a series of the young of typical *maculosa*.

*Remarks*.—The exact relationship of *chacoensis* is very problematical. While in general appearance, size and proportion of tarsus and toes it seems to belong to the *maculosa* complex, the fact must be taken into consideration that its range abruptly meets and may

slightly overlap that of *N. m. paludivaga* and that there appears to be no area of intergradation between the two. However, in my collection there are two specimens of *paludivaga* that could be hybrids. They are much grayer, less blackish, dorsally than usual, because their upper parts are very finely vermiculated (not blotched), which is a characteristic of many specimens of *chacoensis*. The dark markings of their chests are also less prominent than is normal for the race.

*Specimens examined*.—29: Paraguayan Chaco (265 km. west of Puerto Casado, 14; 195 km. west of Puerto Casado, 5; 170 km. west of Puerto Casado, 1; 120 km. west of Puerto Pinasco, 4;<sup>1</sup> Orloff, 2; 16 km. east of Philadelphia, 3).

<sup>1</sup> These four specimens are typical of *Nothura chacoensis* and may have been taken farther west of Puerto Pinasco than indicated. If not, they were collected fifty kilometers east of the western boundary of the range of *Nothura maculosa paludivaga*, as shown by actual specimens examined (Fort Wheeler; 30 km. north-east of V. Militar [= Islapoi]).













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