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A Classification of the White-sided Jack Rabbits of Mexico

By Sydney Anderson[1] and Abbot S. Gaunt[2]

Four species of white-sided jack rabbits are currently recognized (Hall and Kelson, 1959, p. 288, based largely on Nelson, 1909, p. 115). Their geographic ranges do not overlap (see fig. 1). *Lepus alleni* occurs at lower elevations from southern Arizona south along the coastal plain into Nayarit. *Lepus gaillardi* occurs at higher elevations in plains along the eastern side of the Sierra Madre Occidental from southwestern New Mexico south into northern Durango. *Lepus callotis* occurs at similar elevations to the south of the range of *L. gaillardi* from southern Durango to Oaxaca. *Lepus flavigularis* has a restricted range in southeastern Oaxaca. The acquisition of a number of white-sided jack rabbits from Chihuahua, Durango, and Jalisco by the University of Kansas Museum of Natural History in the last decade makes a reëvaluation of the relationships of these species possible. The study of these and other specimens reveals intergradation between *Lepus gaillardi* Mearns, 1896, and *Lepus callotis* Wagler, 1830, which we therefore regard as conspecific. No evidence of intergradation between either of these two forms and *Lepus alleni* has been discovered. *Lepus flavigularis* is more like *Lepus callotis* than either of these two species is like *Lepus alleni*, but available evidence indicates that *L. flavigularis* is geographically and morphologically separate from *L. callotis* and should continue to be regarded as a distinct species.

[1] Assistant Curator, Department of Mammalogy, the American Museum of Natural History.

[2] The University of Kansas Museum of Natural History.

The study reported here was begun by Gaunt, who examined specimens in the University of Kansas Museum of Natural History and a few specimens from critical areas borrowed from other museums. The study was continued jointly by Gaunt and Anderson, and Anderson examined additional specimens in other museums. Anderson was aided in his study by a National Science Foundation grant, G-10874.

We are grateful to the following persons who have made specimens available for study: Dr. Barbara Lawrence, Museum of Comparative Zoölogy at Harvard College (M.C.Z.), Cambridge, Massachusetts; Dr. Rollin H. Baker, the Museum, Michigan State University (M.S.U.), East Lansing; Dr. Seth B. Benson, Museum of Vertebrate Zoology (M.V.Z.), University of California, Berkeley; and Dr. David H. Johnson, United States National Museum (U.S.N.M.), Washington, D. C. The initials noted are used in the lists of specimens examined to designate collections in which specimens are preserved. The initials K.U. for the University of Kansas Museum of Natural History, Lawrence, and A.M.N.H. for the American Museum of Natural History, New York City, are also used.

We are grateful to Miss Brigitte Millik of the Berlin Academy of Sciences for providing photocopies of manuscript records of 1830 and 1831, and to Mrs. Josephine Peters of the Archbold Expeditions who translated these records.

Dr. E. Raymond Hall called our attention to the problem of the relationships of the white-sided jack rabbits and reviewed the manuscript. His assistance in these ways and his diligence in obtaining support (from the Watkins Fund of the Kansas University Endowment Association and from the National Science Foundation, grants 7 and 1312) for the field work that yielded many of the specimens are gratefully acknowledged.

Specimens of *Lepus callotis* and of the black-tailed jack rabbit, *Lepus californicus*, from Chihuahua were compared in order to learn how to identify skulls without skins. Although no single measurement, or pair of measurements used as a ratio, enabled us to separate all specimens of *L. callotis* from all specimens of *L. californicus*, a number of differences were noted. By considering all the differences, we had little difficulty in assigning skulls to the correct species. In comparison with *L. californicus*, *L. callotis* has a higher nasal aperture, a smaller and more inclined supraorbital surface, more ventral placement of the posteriormost point of the skull and consequently more inclined parietal, lesser breadth across the auditory bullae, a less compact appearance of the skull in posterior view, more prominent supraorbital ridges in posterior view, smaller

auditory meatuses, deeper rostrum, smaller bullae, and less constriction in the basioccipital. In addition, if external measurements accompany the skull, the ears of *L. callotis* (mean of 30 adults from various states is 118.2 ± S.D. of 7.4, range 102 to 136 mm.) which are smaller than those of *L. californicus* (mean of 56 adults from Chihuahua is 131.9 ± S.D. of 10.7, range 120 to 147 mm.) aid in identification. The skins are quite distinct in all cases.

Specimens of *L. callotis* from northwestern Chihuahua (nearly typical *L. c. gaillardi*, group A in fig. 1) were compared with specimens from Jalisco (nearly typical *L. c. callotis*, group E in fig. 1). The following average differences were observed. The Chihuahuan specimens have paler and buffier pelage, including the fringe of hair along the inner margin of the ear, the circumorbital ring, the throat patch, and the hue of the subterminal band on dorsal cover hairs. The Chihuahuan specimens also have paler rump patches that contrast less with the whitish flanks, and paler patches on the shoulders that tend to contrast with (rather than match or blend with) the darker middorsal pelage.

A typical dorsal cover hair has a terminal black band, a subterminal colored band, then another blackish band, and a basal part that is essentially pale gray or whitish. The colored band and the distal part of the basal gray band have a more orange hue in Chihuahuan specimens than in those from Jalisco, and the medial blackish band tends to be narrower and paler. This orange (or buffy) hue occurs also in the terminal band of guard hairs, which typically are blackish basally and pale distally.

Skulls from northwestern Chihuahua differ most conspicuously from skulls from Jalisco in having larger and more elevated supraorbital processes and therefore a greater frontal depression, and in having a greater breadth at the basioccipital constriction.

Specimens from group A were compared with specimens from group B. Specimens from group B are darker on the average than those from group A. Some specimens from group B have the buffy hue found in group A. The nape patch in group B varies from pale and matching the dorsal pelage (as in typical *L. c. gaillardi*) to black and contrasting with the dorsal pelage (as in typical *L. c. callotis*), and the basal dark band of the hairs of the nape patch varies from gray to black. The color of the fringes of the inner margins of the ears also varies in group B, some matching typical *L. c. gaillardi* (group A) and others matching *L. c. callotis* (group E). Specimens from group B are intermediate in color on the average between group A and group D, but are nearer group A. Specimens from groups D and E are essentially alike in color, size, and cranial proportions.

The above comparisons and the statistics presented in figures 2 and 3

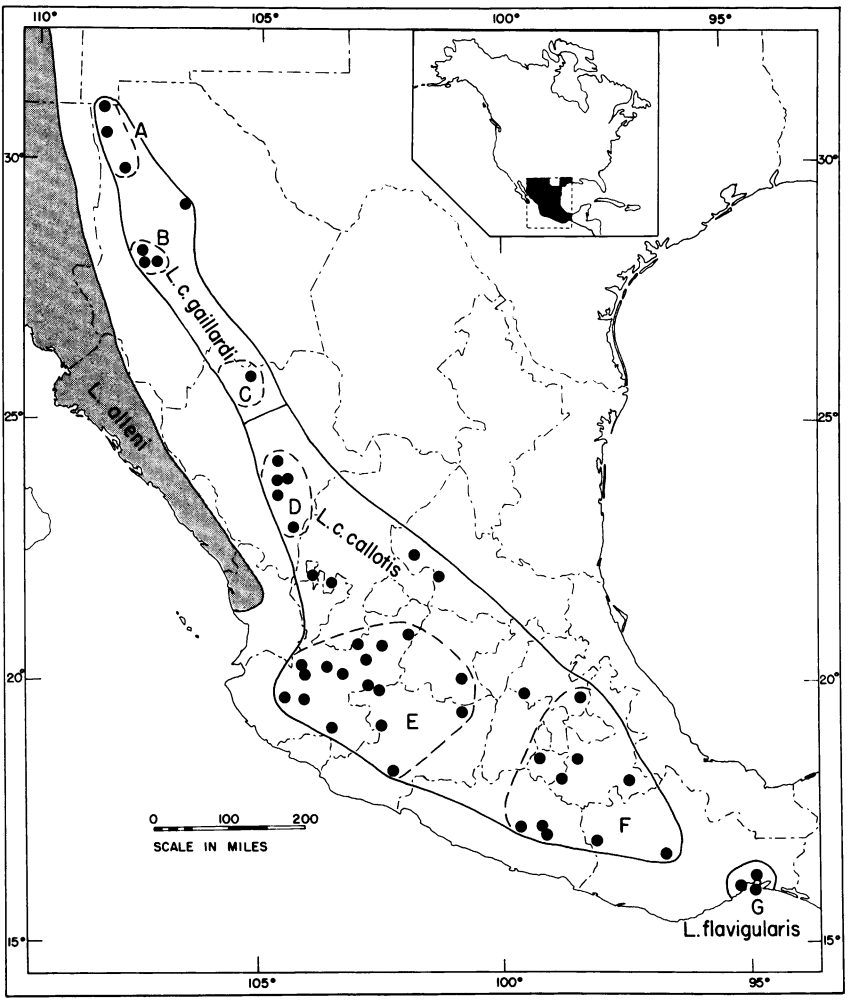

FIG. 1. Map showing the distribution of white-sided jack rabbits in Mexico. Dots show localities from which specimens have been preserved. The range of *Lepus alleni* is indicated by the shaded area. A combined sample for statistical treatment was derived from within each lettered area (A to G). Major geographic variation within any one of these lettered areas was not evident.

reveal that samples of *L. c. gaillardi* overlap samples of *L. c. callotis* in color and measurements. Three external measurements and five cranial measurements of adults representing the different geographic areas that are labeled with the letters A to G in figure 1 are plotted in figures 2

and 3. The cranial measurements were selected, after study, because they best represented the differences that we observed between the samples. The external measurements are from the collectors' original labels. The cranial measurements were measured with dial calipers reading to tenths of millimeters, except the "frontal depression," which was measured as follows: A depth gauge was constructed by gluing a threaded nut in a hole in a flat sheet of plexiglas (a transparent plastic). A bolt was threaded through the nut. The surface of the plastic was placed so as to rest against the nasal bones and the supraorbital processes, and with the nut and bolt centered over the frontal depression. The bolt was adjusted until it touched the deepest point of the depression on either the left or the right side. The length of the bolt protruding beyond the surface of the plastic was measured with calipers.

The designations of localities in italics in the paragraphs on specimens examined are not mapped in figure 1, because each locality is within 10 miles of a locality that is mapped, or because the location of the place designated is not known, in which case the uncertainty is noted. Localities are listed from north to south within each state.

The only major geographic discontinuity in the measurements is between group C and group D in the frontal depth. The southernmost two samples (group F and group G) show a clinal trend towards larger size and towards greater frontal depression. The southernmost sample (group G) is distinct in coloration of the nape as discussed below in the account of *Lepus flavigularis*. We conclude that two subspecies of *Lepus callotis* are recognizable, and that *Lepus flavigularis* is specifically distinct.

Lepus callotis gaillardi Mearns, new combination

Lepus gaillardi MEARNS, 1896, p. 560; type locality designated on original label as "near White Water," Chihuahua, on Mexican boundary line and in original description as "west fork of the Playas Valley near monument No. 63, Mexican Boundary Line"; type specimen, U.S.N.M. No. 20525/35714. J. A. ALLEN, 1903, p. 607. NELSON, 1909, p. 120.

Lepus gaillardi gaillardi, BAILEY, 1931, p. 53. HALL, 1951b, p. 188. HALL AND KELSON, 1959, p. 286.

Lepus (*Microtolagus* [*sic*, = *Macrotolagus*]) *gaillardi battyi* J. A. ALLEN, 1903, p. 607; type specimen, A.M.N.H. No. 21257, from Rancho Santuario, Durango.

Lepus gaillardi battyi, NELSON, 1909, p. 121. HALL, 1951b, p. 188. HALL AND KELSON, 1959, p. 285.

The distinctive characters of *L. c. gaillardi* are its pale buffy hue, brown rather than black nape, and large supraorbital processes (and consequently greater frontal depression).

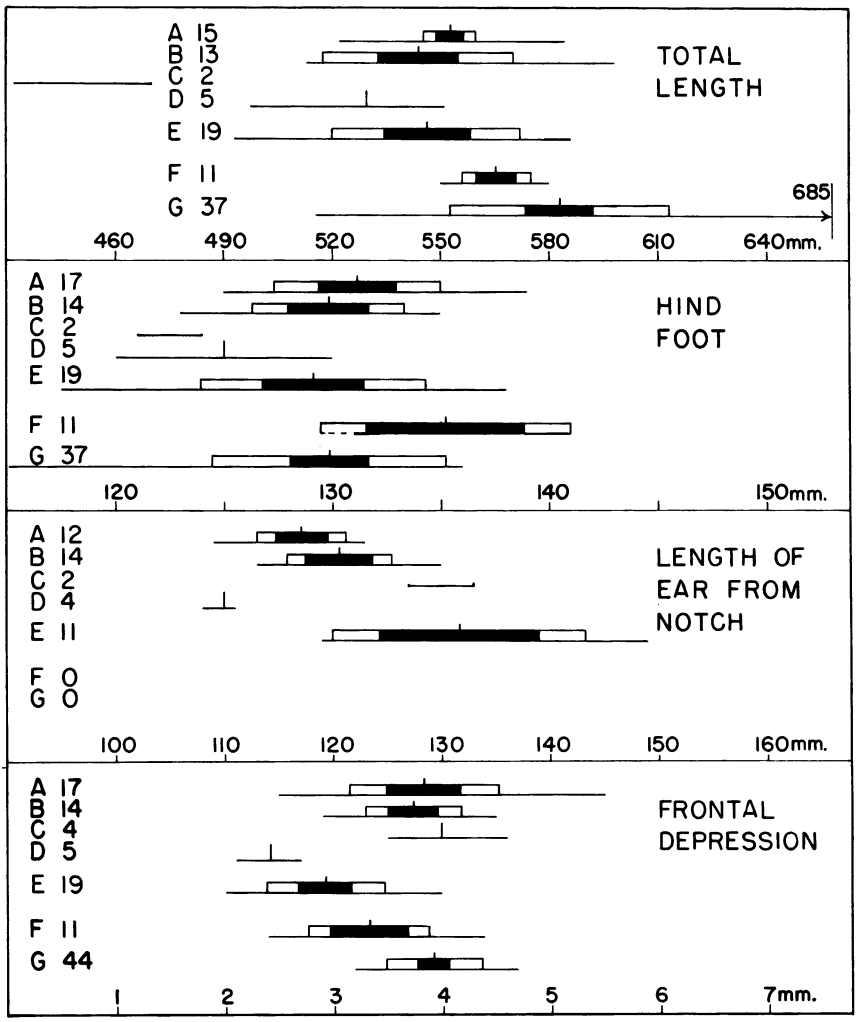

FIG. 2. Graph showing statistics for external measurements, and the cranial measurement of frontal depression. Measurements are in millimeters. The areas from which the lettered samples (A to G) came are shown in figure 1. The size of each sample is shown by a number. The range is shown by a horizontal line, the mean by a vertical line, one standard deviation on each side of the mean by boxes, and two times the standard error on each side of the mean by a bar. The vertical distances between the symbols are in proportion to the geographic distances between the sources of the samples.

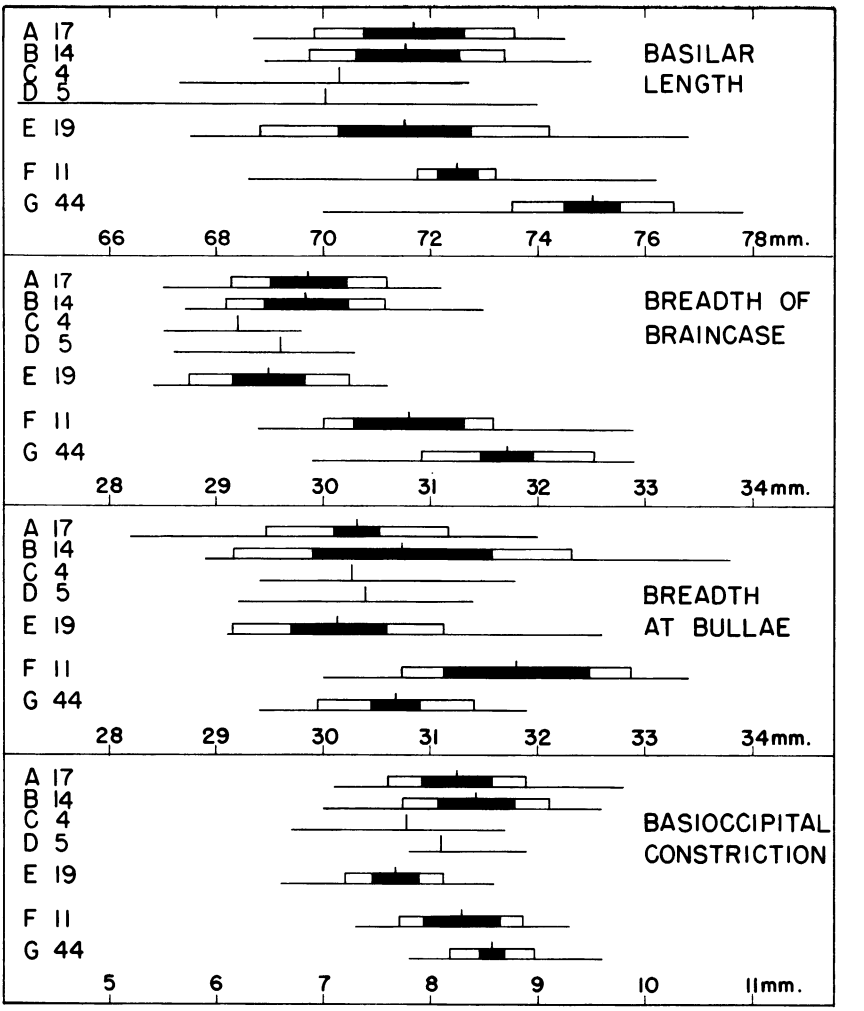

FIG. 3. Graph showing statistics for four cranial measurements. Measurements are in millimeters. The areas from which the lettered samples (A to G) came are shown in figure 1. The size of each sample is shown by a number. The range is shown by a horizontal line, the mean by a vertical line, one standard deviation on each side of the mean by boxes, and two times the standard error on each side of the mean by a bar. The vertical distances between the symbols are in proportion to the geographic distances between the sources of the samples.

TABLE 1

EXTERNAL MEASUREMENTS (IN MILLIMETERS) OF ADULT *Lepus callotis* AND *Lepus flavigularis*

(For each measurement and each group—a "group" is a sample from an area shown by a letter in fig. 1—the mean and standard deviation are shown on one line; the minimum and maximum are shown, in parentheses, on a second line; and the number in each sample is shown on a third line. Some of these data are omitted for small samples.)

Group	Total Length	Length of Tail	Length of Hind Foot	Length of Ear (from Notch)
L. c. gaillardi				
A	552.6 ± 7.5	73.9 ± 12.7	131.2 ± 3.78	117.2 ± 4.16
	(522–585)	(51–92)	(125–139)	(109–123)
	$N = 15$	$N = 17$	$N = 17$	$N = 12$
B	544.0 ± 25.6	71.2 ± 11.8	129.8 ± 3.46	120.4 ± 4.87
	(513–598)	(53–89)	(123–135)	(113–130)
	$N = 13$	$N = 14$	$N = 14$	$N = 14$
C	(432–470)	(both 60)	(121–124)	(127–133)
	$N = 2$	$N = 2$	$N = 2$	$N = 2$
L. c. callotis				
D	529.8	68.0	125.0	110.0
	(497–551)	(63–71)	(120–130)	(108–111)
	$N = 5$	$N = 3$	$N = 5$	$N = 4$
E	545.9 ± 25.7	69.2 ± 12.0	129.2 ± 5.13	131.7 ± 11.7
	(493–586)	(47–90)	(118–138)	(119–149)
	$N = 19$	$N = 19$	$N = 19$	$N = 11$
F	566.0 ± 9.11	71.5 ± 9.92	135.2 ± 5.76	—
	(550–580)	(58–88)	(131–141)	—
	$N = 11$	$N = 11$	$N = 11$	—
L. flavigularis				
G	583.5 ± 30.2	78.6 ± 9.18	129.8 ± 5.42	—
	(515–685)	(60–100)	(115–136)	—
	$N = 37$	$N = 37$	$N = 37$	—

SPECIMENS EXAMINED: Total, 46. New Mexico: *South end of west side of Playas Valley, 4600 feet*, two (M.V.Z. Nos. 50925, 50926), September 6, 1931; Mexican boundary line, near Monument 63, west arm of Playas Valley, one (U.S.N.M. No. 20525/35714, holotype), June 17, 1892; *east fork of Playas Valley, Mexican boundary line*, one (U.S.N.M. No. 36342/58914), September 15, 1893. Chihuahua: "*Northern Mexico*" [probably within Chihuahua], one (M.C.Z. No. 5456), date unknown; *Mexican boundary, near White Water*, four (U.S.N.M. Nos. 20522/35697, 20527/35709, 20530/35706, 20531/35725), June 16–29, 1892; 35 miles northwest of Colonia Dublán, 5300 feet, nine (K.U. Nos. 82363–82371),

May 17, 18, 1960; *Llano de las Carretas, 27 miles west of Cuervo, 4700 feet*, one (M.V.Z. No. 76200), May 16, 1936); *Dapasitas Ranch* [=*Tapiecitas*], one (U.S.N.M. No. 250848), October 10, 1932; Colonia Juarez, 5000 feet, two (U.S.N.M. Nos. 98484, 98485), June 20, 1899; Arroyo del Nido, 30 miles southwest of Gallego, 6000 feet, one (K.U. No. 76311), June 18, 1957; Rancho San Ignacio, 4 miles south, 1 mile west of Santo Tomás, two (K.U. Nos. 74154, 74160), September 4, 1957; *5 miles south, 1 mile west of Santo Tomás*, three (K.U. Nos. 74157–74159), September 4, 1957; 2 miles west of Miñaca, 6900 feet, nine (K.U. Nos. 81063–81071), July 1–6, 1959; 4 miles east-southeast of La Junta, 7200 feet, one (K.U. No. 82372), May 3, 1960. Durango: Seven and one-half miles southeast of Torreon de Canas, one (K.U. No. 66519), January 9, 1955; *Rancho Santuario*, three (A.M.N.H. Nos. 21254, 21456, 21257), February 21, 1919, and March 5, 1903, exact location unknown, but probably within the area encircled for group C in figure 1; Río *Campo*, four (A.M.N.H. Nos. 21578–21581), August 29, 30, 1903, exact locality unknown, but probably within the area encircled for group C in figure 1.

Lepus callotis callotis Wagler

Lepus callotis Wagler, 1830, p. 23; type locality, "Mexico"; 1831, col. 510. Wagner, *in* Schreber, 1844, p. 106. Waterhouse, 1848, p. 138. Audubon and Bachmann, 1851, p. 95 (part). Saussure, 1860, p. 56. Giebel, 1880, p. 340, pls. 8–11. Nelson, 1909, p. 122. Hall and Villa, 1949, p. 469. Hall, 1951b, p. 186. Davis and Russell, 1953, p. 143. Dalquest, 1953, p. 77. Davis and Russell, 1954, p. 77. Davis and Lukens, 1958, p. 360. Leopold, 1959, p. 345.

Lepus mexicanus Lichtenstein, 1830, p. 101, based on specimens from "Mexico" in the museum at Berlin, and on the earlier pre-Linnaean descriptions and names of Hernandez. Richardson, 1837, pp. 150, 158. Hall and Kelson, 1959, p. 285.

Lepus nigricaudatus Bennett, 1833, p. 41. Wagner, *in* Schreber, 1844, p. 106.

Lepus callotis callotis, Goldman, 1951, p. 375.

The distinctive characters of *L. c. callotis* are its blackish hue, black nape patch, and moderate supraorbital processes (and moderate frontal depression).

The name *Lepus callotis* was used for a time to refer to specimens now referred to several subspecies of *Lepus californicus*, for example, by Baird (1858, p. 590) and Allen (1877, p. 350, part).

The name *Lepus callotis* Wagler was used by most authors from 1830 until 1959, when Hall and Kelson (1959, p. 285) used *Lepus mexicanus* Lichtenstein because of supposed priority. The dates of "prior to May," 1830, for *L. mexicanus*, and "August," 1830, for *L. callotis* were not documented. These dates were based (E. R. Hall, verbal communication) on

information received from Philip Hershkovitz. Mr. Hershkovitz has kindly provided one of us (Anderson) with a copy of a letter that he wrote to Hall on September 4, 1958, in which two places (columns 418 and 1250) in *Isis von Oken* for 1831 are cited as sources for the dates of *L. mexicanus* and *L. callotis*. The articles cited were examined (by Anderson), and no evidence was found there of date of publication other than the year 1830. We have found evidence (Oken, 1830, col. 944) that Wagler's description of *L. callotis* was published in August, 1830. Photocopies of relevant parts of the records of the Berlin Academy of Sciences for 1830 and 1831 were sent to us by the librarian, and were examined by us in an attempt to date the publication of Lichtenstein's proposal of *L. mexicanus*. These records include a complaint dated August 10, 1830, which notes that the members of the Historisch-philologische Klasse had submitted the papers read during 1827, and that the printing of these had been finished long ago, but that the entire *Abhandlungen* had not yet been distributed ("*so sind gleichwohl die gesammten Abhandlungen unserer Akademie aus jenem Jahre bis jetzt noch nicht ausgegeben worden*"), presumably because manuscripts by members of some other Klasse had not been submitted. Papers by members of the Historisch-philologische Klasse appear last in the entire *Abhandlungen*. The above statement is ambiguous in that it may mean either that no parts had been distributed, or that only some of the parts had been distributed. If the former is true, Lichtenstein's paper was not distributed until after August 10, but if the latter is true his paper might have been one of the papers distributed earlier. In summary, we have been unable to learn the exact date, or even the month, of publication of Lichtenstein's name *L. mexicanus*. Therefore, (1) because the name *Lepus callotis* has been used since 1830 by most authors, (2) because the basis for the use of a different name by Hall and Kelson in 1959 has not been documented, and (3) because the name *Lepus callotis* was used by the first reviser of the group (Nelson, 1909, p. 122), we use the name *Lepus callotis*.

Specimens Examined: Total, 85. The specimens reported previously but not examined by us total nine. Durango: Southeast end of Laguna de Santiaguilla, "Santa Cruz," six (K.U. Nos. 62387–62392), May 31, June 1, 1954; 1 mile north of Chorro, two (K.U. Nos. 48412, 48413), July 10, 1952; 2 miles south of Sauz, 6200 feet, three (K.U. Nos. 62393–62395), June 1, 3, 1954; Durango City, one (U.S.N.M. No. 95577), July 2, 1898; Rancho Las Margaritas, 28 miles south, 17 miles west of Vicente Guerrero, 8350 feet, one (M.S.U. No. 934), July 2, 1957. Zacatecas: Monte Escobedo, 6900 feet, one (U.S.N.M. No. 90968), August 27, 1897. San Luis Potosí: Four and one-half miles southwest of Herradura,

7200 feet, two (K.U. Nos. 58020, 58021), February 10, 1954; west of Arenal, 7000 feet, two (U.S.N.M. Nos. 36871/49255, 36872/49256), August 30, 1892. Jalisco: Huehuquilla, one (U.S.N.M. No. 90904), August 24, 1897; Lagos [de Moreno], 6150 feet, one (U.S.N.M. No. 78975), June 29, 1896; *3 miles north of Yahualica*, two (K.U. Nos. 38661, 38662), May 31, 1950; 5 miles west of Yahualica, two (K.U. Nos. 38665, 38666), June 14, 1950; 14 miles southwest of San Juan de Los Lagos, two (K.U. Nos. 39738, 39739), October 7, 1950; 4 miles north, 1 mile west of Tepatitlán, one (K.U. No. 38663), May 31, 1950; Etzatlán, 3500 feet, two (U.S.N.M. Nos. 34474/46559, 34475/46560), June 16, 18, 1892; *Teuchitlán, 3500 feet*, one (U.S.N.M. No. 34486/46571), June 24, 1892; 18 miles west, 5 miles north of Guadalajara, one (K.U. No. 36920), February 15, 1950; *Guadalajara*, two (U.S.N.M. Nos. 20457/35678, 20458/35679), June 1, 28, 1892; 7 miles southeast of Guadalajara, one (K.U. No. 38557), June 15, 1950; Ameca, 4500 feet, two (U.S.N.M. Nos. 82181, 82182, February 23, 1897; Ocotlán, one (U.S.N.M. No. 127870), June 26, 1903; La Barca, one (U.S.N.M. No. 46433), June 1, 1892; 11 miles northwest of Ayutla, one (K.U. No. 38664), April 19, 1950; 3.5 miles south of Tecolotlán, one (K.U. No. 31842), February 10, 1949; *Las Canoas*, three (A.M.N.H. Nos. 26143, 26144, and 26152), August 18, 1905; *Artenkiki* [=Atenquiqui], one (A.M.N.H. No. 26145), September 10, 1905; Zapotlán, 4000 feet, one (U.S.N.M. No. 34110/46187), April 29, 1892; "*Arroyo de Gavalan*," exact location unknown, nine (A.M.N.H. Nos. 25023, 25279–25283, 25285, 25286, 25997), December, 1904; *La Laja*, exact location unknown, seven (A.M.N.H. Nos. 25864–25867, 25952, 35131, 35152), May, June, 1905; "*Jalisco*" [exact locality unknown], one (A.M.N.H. No. 35158), October 18, 1907. Guanajuato: Celaya, 5700 feet, one (U.S.N.M. No. 78467), May 29, 1896. Hidalgo: Marqués, 8000 feet, one (U.S.N.M. No. 78482), May 26, 1896; Tulancingo, 7200 feet, one (U.S.N.M. No. 55596), August 24, 1893. Michoacán: Querendaro, 5800 feet, one (U.S.N.M. No. 36871/49249), August 8, 1892; Los Reyes, 4800 feet, one (U.S.N.M. No. 125678), February 12, 1903; *5 miles north of Las Cruces* (= 19 miles south of Apatzingán), 1100 feet, two (K.U. Nos. 39740, 39741), December 5, 1950; *3 miles north of Las Cruces* (= 21 miles south of Apatzingán), 1100 feet, one (K.U. No. 39742), December 4, 1950; 0.5 mile south of Las Cruces (= 24 miles south of Apatzingán), 1150 feet, one (K.U. No. 39743), December 4, 1950. Puebla: *San Martín* [*Texmelucan*], 7400 feet, one (U.S.N.M. No. 55586), August 12, 1893; Atlixco, 5400 feet, four (U.S.N.M. Nos. 55329–55332), July 22 to August 5, 1893; Tehuacán, 5400 feet, one (U.S.N.M. No. 53639), May 4, 1893. Morelos: Cuernavaca,

TABLE 2

CRANIAL MEASUREMENTS (IN MILLIMETERS) OF ADULT *Lepus callotis* AND *Lepus flavigularis*

(For each measurement and each group—a "group" is a sample from an area shown by a letter in fig. 1—the mean and standard deviation are shown on one line; the minimum and maximum are shown, in parentheses, on a second line; and the number in each sample is shown on a third line. Some of these data are omitted for small samples.)

Group	Basilar Length	Breadth of Braincase	Breadth at Bullae	Basioccipital Constriction	Frontal Depression
L. c. gaillardi					
A	71.68 ± 1.86	29.86 ± 0.73	30.31 ± 0.86	8.25 ± 0.64	3.84 ± 0.68
	(68.7–74.5)	(28.5–31.1)	(28.2–32.0)	(7.1–9.8)	(2.5–5.5)
	$N = 17$	$N = 17$	$N = 17$	$N = 17$	$N = 17$
B	71.58 ± 1.81	29.82 ± 0.74	30.74 ± 1.58	8.43 ± 0.69	3.74 ± 0.43
	(68.9–75.0)	(28.7–31.5)	(28.9–33.8)	(7.0–9.6)	(2.9–4.5)
	$N = 14$	$N = 14$	$N = 14$	$N = 14$	$N = 14$
C	70.32	29.20	30.27	7.77	4.00
	(67.3–72.7)	(28.5–29.8)	(29.4–31.8)	(6.7–8.7)	(3.5–4.6)
	$N = 4$	$N = 4$	$N = 4$	$N = 4$	$N = 4$
L. c. callotis					
D	70.04	29.60	30.40	8.10	2.42
	(64.3–74.0)	(28.6–30.3)	(29.2–31.4)	(7.8–8.9)	(2.1–2.7)
	$N = 5$	$N = 5$	$N = 5$	$N = 5$	$N = 3$
E	71.53 ± 2.66	29.49 ± 0.75	30.14 ± 0.99	7.68 ± 0.47	2.93 ± 0.55
	(67.5–76.8)	(28.4–30.6)	(29.1–32.6)	(6.6–8.6)	(2.0–4.0)
	$N = 19$	$N = 19$	$N = 19$	$N = 19$	$N = 19$
F	72.46 ± 0.74	30.80 ± 0.81	31.80 ± 1.07	8.29 ± 0.58	3.34 ± 0.56
	(68.6–76.2)	(29.4–32.9)	(30.0–33.4)	(7.3–9.3)	(2.4–4.4)
	$N = 11$	$N = 11$	$N = 11$	$N = 11$	$N = 11$
L. flavigularis					
G	75.01 ± 1.66	31.71 ± 0.81	30.69 ± 0.74	8.57 ± 0.40	3.92 ± 0.45
	(70.0–77.8)	(29.9–32.9)	(29.4–31.9)	(7.8–9.6)	(3.2–4.7)
	$N = 44$	$N = 44$	$N = 44$	$N = 44$	$N = 44$

5000 feet, six (U.S.N.M. Nos. 51113–51119), January 5, 9, 1893; Axochiapan (one specimen cited by Davis and Russell, 1953, p. 143, and Davis and Russell, 1954, p. 77). Guerrero (total of eight specimens cited by Davis and Lukens, 1958, p. 361): Five miles east of Omiltemi, 6800 feet, three; 2.5 miles south of Almolonga, 5600 feet, two; *6 miles west of Colotlipa, 2700 feet*, one; *1 mile southwest of Colotlipa, 2700 feet*, one; 1 mile west of Quechultenango, 3000 feet, one. Oaxaca: Tlapancingo, 5200 feet, one (U.S.N.M. No. 70295), December 7, 1894; Oaxaca City, 5200 feet, one (U.S.N.M. No. 68216), September 24, 1894.

Lepus flavigularis Wagner

Lepus callotis var. γ *flavigularis* WAGNER, *in* Schreber, 1844, p. 106; type locality, "Mexico."

Lepus flavigularis, NELSON, 1909, p. 125. GOLDMAN, 1951, p. 440. HALL, 1951b, p. 188. HALL AND KELSON, 1959, p. 285.

Lepus callotis flavigularis, ELLIOT, 1905, p. 543. GOLDMAN, 1951, p. 337.

The distinctive characters of *Lepus flavigularis* are its large size, its yellowish throat, and the coloration of its nape, which has a brownish longitudinal band bordered laterally by black spots that are covered by the ears when they are laid back. This coloration of the nape is present in all *Lepus flavigularis* examined, and was seen in no *Lepus callotis* examined. The significance (either functional or genetical) of the coloration of the nape is not known. Approximately the same coloration occurs also in some subspecies of *Lepus californicus*, being present in all *L. c. altamirae*, in all *L. c. curti* (Hall, 1951a, p. 45), in many *L. c. asellus*, and in some *L. c. merriami* from as far north as Texas. *Lepus altamirae* was at one time recognized as a distinct species of white-sided jack rabbit by Nelson (1909, p. 124), but was later (Hall, 1951a, p. 45) reassigned to *Lepus californicus*, as a subspecies. The series of *L. altamirae* in the United States National Museum was reëxamined (by Anderson), skulls were compared with those of *L. flavigularis* (from Oaxaca), *L. callotis* (from Jalisco), and *L. californicus merriami* (from Texas), and the same conclusion drawn by Hall was reached, namely, that the black-tailed jack rabbit, represented by *Lepus californicus merriami*, is more like *Lepus altamirae* than *L. altamirae* is like either of the white-sided jack rabbits, *Lepus callotis* or *Lepus flavigularis*. The differences noted earlier between skulls of *L. californicus* and those of *L. callotis* in Chihuahua were considered in making the above comparisons of *L. altamirae* with other forms. The length of the anterior palatal spine, commented upon by Hall (1951a, p. 45) as possibly distinguishing black-tailed and white-sided jack rabbits, is too variable to be of use.

SPECIMENS EXAMINED: Total, 57. Oaxaca: Santa Efigenia, 550 feet, one (U.S.N.M. No. 74601), July 19, 1895; Tehuantepec, four (U.S.N.M. Nos. 8653, 8982, 13860, 13861), date unknown, December 3, 1869, and "1874"; "Tehuantepec?," one (A.M.N.H. No. 143474), 1943 or 1944; *Huilotepec, 100 to 200 feet*, 24 (U.S.N.M. Nos. 73504–73508, 73512–73518, 78334–78345), April 2 to May 11, in 1895 and 1896; *San Mateo del Mar, 25 feet*, one (A.M.N.H. No. 144586), three (U.S.N.M. Nos. 73509–73511), February 1, 1946, May 15, 1895; Santa María del Mar, 23 (A.M.N.H. Nos. 145167–145174), March 17, 1947, A.M.N.H. Nos. 145601–145610 on February 5–9, 1948.

RELATIONSHIPS: We studied 187 specimens of white-sided jack rabbits of the nominal species *Lepus gaillardi*, *Lepus callotis*, and *Lepus flavigularis*. *Lepus gaillardi* Mearns, 1896, and *Lepus callotis* Wagler, 1830, intergrade and are regarded as conspecific. *Lepus flavigularis* is more like *Lepus callotis* than either of these two species is like *Lepus alleni*. The ranges of the three species do not overlap. The range of *Lepus californicus* overlaps the northern parts of the ranges of *Lepus alleni* and *Lepus callotis*. On morphological and distributional criteria, we judge that the white-sided jack rabbits are more closely related to *Lepus californicus* than to any other species of *Lepus*. A population of *L. californicus* probably became isolated in Mexico and diverged to specific distinction (*L. callotis*). Then one population of this divergent stock was isolated on the western coastal plain, where it diverged even further from the *Lepus californicus* stock to become *Lepus alleni*. Later, in a small area in southeastern Oaxaca, a second population was isolated from the main stock of white-sided jack rabbits and diverged to become *Lepus flavigularis*.

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