

AN ACCOUNT OF THE YELLOW-GREEN VIREO
(*VIREOSYLVA FLAVOVIRIDIS* CASSIN)

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THE Yellow-green Vireo enjoys a place in the Check-list of the American Ornithologists' Union on the basis of three instances of accidental occurrence within the limits covered by the Check-list.

To the bulk of ornithologists and bird-students in this country this bird is a name only, and for that reason an account of its history, range, geographic variation, migrations, etc. may prove of some interest.

This study is based on the series of sixty-five skins of the species in the Museum of Comparative Zoology, supplemented by over fifty from the main collection and fifty-three from the Dwight Collection of the American Museum of Natural History. In addition I have examined single birds or small series from the collections of the Biological Survey, Academy of Natural Sciences of Philadelphia and Mr. Donald R. Dickey.

It is now generally conceded that the Yellow-green Vireo is divisible into three subspecies as follows: *Vireo flavoviridis flavoviridis* (Cassin), *Vireo flavoviridis forreri* Madarász, and *Vireo flavoviridis insulanus* Bangs.

The species belongs to that group of more or less closely related Vireos including *Vireo magister* and subspecies, from the islands off the coast of Yucatan and in the Gulf of Honduras; *V. caymanensis* from the island of Grand Cayman; *V. olivaceus* and subspecies (Black-whiskered Vireo) of the West Indies, *Vireo olivaceus*¹ (Red-eyed Vireo) from North America, and *Vireo chivi*² and subspecies from South America. Of this group it is most nearly related to *Vireo olivaceus*, apparently representing it in Mexico and Central America as does *Vireo calidris*¹ in the West Indies, but the differences separating the three groups are certainly of more than subspecific value.

¹ While these are the names adopted in the A. O. U. Check-list the author considers that *olivaceus* Linn. is based on the West Indies bird and replaces *calidris* which would require the use of *virescens* Vieillot for the Red-eyed Vireo.

² Mr. Todd's paper (Auk, July 1931) appeared long after the present paper was submitted.—Ed.

Vireo flavoviridis (CASSIN)

Description.—Pileum and hind neck mouse gray or neutral gray the anterior part with a dusky border, more or less distinct; superciliary stripe grayish-white; rest of upper parts and tail olive green; wings dusky, the feathers margined with yellowish olive; lores grayish-white like the superciliary, becoming dusky in front of the eye. Below white, flanks and sides of neck and chest olive yellow, becoming lemon yellow on the under tail coverts; under wing coverts pale lemon yellow or sulphur yellow. Bill, legs and feet bluish gray or grayish blue in life; iris "red."

Wing (males) 74.5–86.5; females 71–78.5.

Breeding Range.—Mexico from Sonora and Tamaulipas south to the Canal Zone and the Pearl Islands but absent from the Caribbean coast of Central America south of Guatemala; Tres Marias Islands.

Vireo flavoviridis flavoviridis (CASSIN)

Vireosylva flavoviridis Cassin, Proc. Ac. Nat. Sci. Phila., 5, 1851, p. 152, pl. 11 (Panama and Nicaragua).

Subspecific Characters.—Superciliary stripe distinct, dusky border of pileum usually well defined; size medium. Wing (males) 77–83; average of 39 breeding birds 78.2 mm.; females 73–80, average of 14 breeding birds 76.5.

Range.—Mexico from Sonora, Nuevo Leon and Tamaulipas south on the Pacific coast to northwestern Costa Rica and on the Caribbean slope to eastern Guatemala. Apparently absent from the Caribbean rain forest from Honduras southward except that summer birds from eastern Costa Rica (Carillo, 1500 feet and Mojon, 3500 feet) are referable to this form. Winters in upper Amazonia. Accidental at Godbout, Quebec (Merriam, 1883), Brownsville, Texas (Merrill, 1878, p. 125) and Riverside, California (Price, 1888).

Cassin based his original description on four specimens in the Academy of Natural Sciences, of Philadelphia but these cotypes no longer exist (Stone, 1899, p. 31). His description applies equally to *f. flavoviridis* or *f. insulanus*, but the wing measurement of 3.2 inches is equivalent to 81.5 mm. and can apply only to the form breeding in Mexico and northern Central America.

Most persons who have studied the birds of Central America in recent years are now convinced that the Yellow-green Vireo is migratory, but practically nothing has been published concerning the dates of migration or the winter home of the species. Cherrie (1890, p. 329) appears to have been the first to recognize the fact that the bird is not a permanent resident in Costa Rica, stating that it disappeared from the neighborhood of San José with the

beginning of the dry season at the end of September and reappeared again in April. Also as far back as 1881 Salvin and Godman (1881, p. 190) suggested that the birds taken in winter in South America were there only at that season, this observation being prompted by a specimen taken at Yquitos, Peru by Whitely on 16 October, 1878, together with the lack of records of its occurrence in Mexico and Central America outside of the period from April to August inclusive.

That the winter home of the species is in Amazonian Colombia, Ecuador, Peru and Bolivia, is, I think well established. Early references in literature of its occurrence in South America for the most part fail to give the dates when the specimens were secured. The first published instance of its occurrence in Amazonia was by Taczanowski (1874, p. 509) who records a specimen collected at Monterico, Peru by Jelski; the same author (1882, p. 7) lists an example taken by Stolzmann 23 February 1881 at Yurimaguas, Peru. Gadow (1883, p. 295) lists skins in the British Museum collection taken at Guayango, Peru; Rio Napo, Ecuador; and "Bolivia." Todd (1922, p. 434) in detailing the records of *V. flavoviridis* from the Santa Marta region, shows that all the dates of occurrence there are between 12 August and 20 October, when the birds are common throughout the lowlands below 1000 feet, especially in that part of the region lying westward of the mountains. The fact that there are no winter or spring records may indicate that the bird passes further south and possibly returns northward by another route.

Chapman (1917, p. 539) gives only two records from Colombia, both from Chicorá in the Magdalena Valley, 23 August and 13 October. For Ecuador Chapman (1926, p. 586) records *Vireo flavoviridis* from San José 11 March-11 April and from Rio Suno, 7 and 8 March; both localities situated on affluents of the Rio Napo. Besides this published evidence I have examined specimens in the American Museum of Natural History and the Museum of Comparative Zoology as follows:—Eastern Ecuador, Rio Curaray and Lagarto Cocha 8, 10 November and 18 January. Southeastern Peru: 15, 22 October; 10, 13 December; 2 February. Bolivia: 23 February, 5 March. Ménégau (1911, p. A 70) records a specimen of *Vireo flavoviridis* from Santo Domingo, Ecuador, a locality

in the humid tropical zone of the Pacific slope. I have doubts however as to the correctness of the identification, the bird is given as a ♂ with a wing of only 68 mm. and a bill of 12 mm., the wing is much too small even for *V. f. insulanus*, but corresponds with the smaller birds of the *Vireo chivi* group.

At this point it is important to remember that there is not a single record for any form of *Vireo flavoviridis* in Mexico or Central America between 7 October and 14 February.

Northward Migration.—As will be shown later, *V. f. insulanus* arrives in the Canal Zone ahead of *V. f. flavoviridis* so the dates of arrival of one race or the other must rest upon actual specimens. *V. f. flavoviridis* puts in its appearance in Panama at the end of February or the first week in March. February arrivals are most unusual, the only certain date being for a male taken in Chiriqui, 4800 feet, 26 February, 1901 by W. W. Brown; the same collector also secured two females at the same place 3 and 4 March 1901; a specimen in the Biological Survey collection was shot at Tabernilla, Canal Zone, by E. A. Goldman, 12 March 1911. In 1904 when Brown was collecting on Saboga Island, one of the Pearl Islands, he shot six males and two females between 2 and 12 April, all referable to *f. flavoviridis* and did not get the resident *insulanus* at all. Evidently the spring migration was then at its height.

In the vicinity of San José, Costa Rica, Cherrie says that the bird has returned to its usual haunts by the tenth of April. On the Pacific slope of Nicaragua the earliest date is 9 April, a specimen taken by Miller and Griscom in 1917.

The earliest date for anywhere in Central America north of Panama is that of a specimen collected at Mazatenango, western Guatemala by Ned Dearborn between 15 and 21 March, 1906 (Dearborn, 1907, p. 124); A. W. Anthony shot two males at La Perla, eastern Guatemala 1 and 2 April 1927. On 28 March 1912, I killed a singing ♂ at Camp Mengel, Quintana Roo. Cole (1906, p. 136) took a male at Chichen Itza, Yucatan 3 April 1904. From Vera Cruz there is a male in the M. C. Z. taken at Presidio 6 April 1925, by W. W. Brown and from Oaxaca, a male taken by the same collector 15 April 1927. As is to be expected the first arrival in every case was a male. On the other hand, a belated migrant from Darien, a female, was taken on Mt. Sapo at Cana, 26 April 1928 by R. R. Benson.

Song.—The song of the Yellow-green Vireo is practically indistinguishable from that of the Red-eye. In Central America the birds usually frequent tall trees in the river valleys, but are never found in the rain forest regions, except when it seems to be one of the species that works in if the forest is cleared away.

Nesting.—Very little is known about the breeding habits of this bird or either of its subspecies, beyond Cherrie's (1890, p. 329–331) account. He first noted birds near San José, Costa Rica, carrying nesting material 24 April 1889, and discovered a nest with 2 fresh eggs 12 May; a second nest containing three fresh eggs was taken 21 May and a third nest with three heavily incubated eggs 26 May. These nests were all suspended between small twigs hanging either above a stream or low ground at a height of from four to ten feet, and were composed of a lining of very fine dry grass, the outside covered with soft dry leaves, and shreds of papery bark all bound in place with spider webs. The eggs are described by Cherrie as being "white, speckled chiefly at the larger end with spots varying in color from a dark chestnut to an orange rufous, the chestnut predominating." They measured as follows (dimensions in inches and hundredths): .81 x .57, .81 x .58, .76 x .58, .75 x .57, .79 x .60, .83 x .56, .84 x .55 and .84 x .56.

The first fledgling was secured 30 June and by 20 July family parties were noted. Carriker (1910, p. 784) describes a nest and three fresh eggs taken 8 June 1907 at Punta Arenas, Costa Rica, as follows. "The nest was a beautiful structure, very compact, and well made of weed-fibres and bark, covered over on the outside with golden and white spider-webs and spider egg-cases, and lined with fine, round pale brown fibres exactly after the manner of the Warbling Vireo. The eggs are white, speckled and dotted sparingly over the whole surface with deep burnt-umber. The nest was suspended from a horizontal fork among the foliage of a fruit-tree of some tropical variety, about fifteen feet from the ground, and not more than a hundred feet from a house on the outskirts of the town."

In the M. C. Z. there is a set of four eggs collected 12 May 1926 by A. W. Anthony at the Finca Carolina, 10 miles south of Tumbador, Guatemala; one of the eggs is broken, the other three measure 21.5 x 15; 21.0 x 15; 21.5 x 15 mm. respectively. The collector's

notes describe the nest as "typical vireo, in coffee tree six feet from the ground." There is in the Dwight collection (no. 61037) a fully fledged juvenal moulting into immature plumage collected at Finca Cipres, western Guatemala, 28 June, 1925.

Southward Migration.—Lawrence (1874, p. 272) quoting Grayson (Ms.) writes "none are seen after August [at Mazatlan] migrating probably to Central America after breeding." In the large series taken by A. W. Anthony in western Guatemala during the years 1924–1927 are five birds from the Hacienda Carolina, taken as follows: 1 ♀, 27 September, 1927; 1 ♂, 29 September 1927; 1 ♀, 30 September 1927; 1 ♂, 1 October 1927; 1 ♀, 6 October 1925. In this connection it is interesting to note that the Riverside California specimen was shot 29 September. Cherrie (1890 A, p. 331) writes that the resident birds had disappeared from the vicinity of San José by August 20th, though during the night of 28 September 1889 a number of Yellow-green Vireos were among other species killed by flying against wires in the city of San Jose. At the time a considerable southward movement of many species of North American migrants was in progress. There is the skin of a male in the Museum of Comparative Zoology collection taken at San Jose, 7 October 1902 by C. F. Underwood. The only fall dates at present available from Panama are: 27 September 1927, a ♂, Changuinola; a ♀ from Perme, eastern Panama, 3 September 1929 both taken by H. Wedel.

Moult and Plumages.—**JUVENILE**.—No specimens in fresh juvenile plumage seen, but judging from partly moulted juvenals the bird has a plumage like that of *V. olivaceus*, but the lateral underparts with a much more extensive and deeper yellowish wash.

IMMATURE.—Acquired by a complete post-juvenile moult involving all tracts except the primaries, secondaries, greater wing coverts and tail. In Guatemala this plumage is complete by the beginning of the third week in August.

ADULT WINTER.—Not distinguishable from immature plumage; acquired by a complete post-nuptial moult beginning about the middle of July and complete before the first of September.

NUPTIAL.—The number of wintering specimens available is not sufficient to determine with any exactness how extensive the

pre-nuptial moult is. I have examined specimens in the American Museum taken in western Amazonia between 2 February and 3 April which were undergoing a moult of the primaries. A pre-nuptial moult of the primaries is an exception among oscine birds. Dwight (1900, p. 235-240) makes no mention of it at all, nor does Stone (1896, p. 156-157), where these authors discuss the plumages of the Vireos found in north-eastern North America.

***Vireo flavoviridis forreri* MADARÁSZ**

Vireo forreri Madarász, Termes. Fuzetek, 9, pt. 1, 1885, p. 85, pl. 6 (Tres Marias Islands).

Subspecific Characters.—Superciliary stripe indistinct, dusky border of the pileum only indicated; size large, wing ♂, 82-86.5 (83.6).

Range.—Probably only a summer resident on the Tres Marias Islands off the west coast of Mexico. If migratory, dates of migration and winter home are unknown.

Salvin and Godman (1881, p. 189) first recorded this Vireo from the Tres Marias Islands under the name of *Vireo flavoviridis*. They had but a single specimen, a bird sent them by Alfonse Forrer, which he shot 4 May 1881. Salvin and Godman noted the characters, but did not deem them of sufficient importance in only one example to recognize by name. Forrer also sent a specimen collected 5 April 1881 to the Hungarian National Museum. Madarász did not entertain the doubts that Salvin and Godman held, but named the bird as above.

All that is known to date of the life history of Forrer's Vireo was gleaned by Nelson and Goldman on their visit to the Tres Marias Islands between 2 and 31 May 1897. Nelson writes as follows (1899, p. 54):

"It is very common in the small trees in the patio of the custom house and elsewhere about the settlement on Maria Madre. Like its mainland relative, its habits are very similar to those of the Red-eyed Vireo. Its favorite range was in the smaller growth of forest along the lower slopes from near the sea up to an altitude of 600 or 700 feet, but some were seen up near the summits of Maria Madre and Maria Magdalena. Next to the Tres Marias Warbler, Forrer's Vireo was probably the most abundant bird on Maria Madre, and its restless habits while fluttering and peering about in search of food among the small tree tops added greatly to the animation of the forest."

Nelson (op. cit.) expresses astonishment at the fact that Grayson did not obtain this bird on any of his three voyages to the Tres Marias Islands. Thinking that perhaps Grayson did not visit the islands during the spring and summer months I asked Dr. Joseph Grinnell if he could supply me with the actual dates of Grayson's three voyages. This Dr. Grinnell has most kindly done, after consulting the Grayson manuscripts in the Bancroft Library at the University of California. The manuscripts give explicit dates for specimens of various birds taken on the islands as follows: 1865, January, March, March 10 and April. 1867, April, May, June 1. No dates were found for the voyage supposed to have been made in 1866. Dr. Grinnell has also discovered that Grayson had trained a boy to collect for him, and suggests the possibility that Grayson might have sent the boy on short trips to the islands when he did not go there himself.

There is as yet no direct evidence that Forrer's Vireo is really migratory, on the other hand there is no special reason for considering that an insular form close to the northern limit of the range of the species is sedentary. More weight could be attached to Grayson's failure to secure the bird in January, February and March if he had succeeded in securing it in April, May and June. Perhaps the inclusive dates of Forrer's visit, if obtainable, might shed some light on the subject.

A specimen of *V. flavoviridis* in the American Museum collected 9 April in western Nicaragua has a wing of 84.5 which is 1.5 mm. larger than the maximum for *V. f. flavoviridis*, and while on basis of size might be referred to *forreri*, it is perhaps better to consider as the extreme of *f. flavoviridis*.

***Vireo flavoviridis insulanus* BANGS**

Vireo insulanus Bangs, Proc. N. E. Zool. Cl., 3, 1902, p. 73 (San Miguel Island, Pearl Islands).

Subspecific Characters.—Superciliary usually distinct, but dusky border of pileum generally obsolete; size smaller, wing, ♂ 74–79, average 21 ♂, 76; ♀ 71–77.5, average 13 ♀, 74.25.

Range.—Térraba Valley in southwestern Costa Rica, Canal Zone (chiefly Pacific side) and probably other suitable localities on the Pacific coast of Panama; Pearl Islands (recorded definitely only from San Miguel Island). Probably migratory, but winter home unknown.

This form was originally recorded by Bangs (1901, p. 30) from San Miguel Island as *Vireo chivi agilis* (Licht.) but was separated by him as a distinct species the following year. Its specific status remained unquestioned until Rendahl (1920, p. 43-45) reduced it to subspecific rank. Up to now however no one seems to have recognized the fact that it is this race and not true *flavoviridis* that breeds in south-western Costa Rica and in the Canal Zone.

A female in worn plumage was secured by Barbour, Brooks and Underwood on Mt. Sapo, Darien, 25 April 1922, recorded by Bangs and Barbour (1922, p. 223) as *f. flavoviridis*. With a wing of 74 mm. combined with its abraded plumage and entire absence of a dusky border to the pileum, identification as *insulanus* is certain. The differences between this bird and a specimen (M. C. Z. 140896) taken at Cana, eastern Panama, 26 April 1928, are very noticeable; the latter sexed as a female by its collector, Benson, and marked as having the ovaries not enlarged, is in fresh plumage with a dusky border to the pileum and has a wing of 80 mm.

The probabilities are that Barbour, Brooks and Underwood collected their bird in some extensive clearing on the lower slopes of the mountain; I much doubt whether the bird occurs in the heavy rain forest of that region.

Unfortunately in none of the localities where *insulanus* occurs as a breeding bird has any collecting been done the "year around" by any one man. Rather the efforts of many have been concentrated during the period of February to April inclusive, though Goldman worked practically continuously in the Canal Zone from the end of December 1910 until July 1911 and Hallinan made his collections intermittently over a period of years. It is significant nevertheless that none of the collectors in the Canal Zone have met with the bird there before the middle of February, but numerous instances of occurrence exist from then on until May. The Costa Rican range of *V. f. insulanus* has been worked in April, May and June where the bird was present throughout that period. Thus while the date of departure is not known and the bird's winter range equally unknown the dates of spring arrival can be given, as well as a limited amount of information on the subject of breeding.

Northward Migration.—*V. f. insulanus* arrives on its breeding

ground in the Canal Zone and the Pearl Islands, and probably also southwestern Costa Rica, ahead of the main flight of *V. f. flavoviridis*. Actual dates based on specimens are as follows: Canal Zone: Empire, 1 ♂, 14 February 1912, E. A. Goldman. Hallinan (1924, p. 324) records (as *V. f. flavoviridis*) a ♂, 21 February 1916 from Juan Mina, C. Z. This specimen, now in the American Museum, has been examined in this connection; it proves to be *insulanus*. Pearl Islands: San Miguel Island, 1 ♂, 1 ♀, 16, 17 February 1926, L. Griscom, specimens in American Museum; 2 ♂, 23 February 1904, W. W. Brown. Goldman secured a ♀ at Tabernilla, C. Z. 10 March 1911 and Brown took additional specimens on San Miguel Id. 3-17 March. Mr. Griscom has generously supplied me with the dates on which he has seen Yellow-green Vireos in Panama. Since observations are not supported by specimens, it is by no means certain whether *insulanus* was the bird in every case, though it is probable that the bulk of them are. February 1924: 14, Ancon; 15, Old Panama; 17 Taboga Id., 21, Santiago de Veraguas "common"; 25, Tole, "common"; 27, Remedios "common." February 1926: 15, Ancon.

V. f. insulanus has never previously been attributed to the Canal Zone, but has been recorded as *flavoviridis* on several occasions. I have been able to examine the two birds recorded by Hallinan (1924, p. 324) and find them to be *insulanus* as is likewise the specimen collected by Jewel at Agua Clara, 19 May 1912 (Stone, 1918, p. 273). Unrecorded examples definitely referable to this subspecies, were secured by Goldman in the Canal Zone as follows: Tabernilla, 18, 20, 29 April 1911; Gatun, 22 April 1911; Frijoles, 9 May, 1911; Miraflores, 13 May 1911.

Nesting.—There is practically no information available regarding the nest dates or eggs of this subspecies. The plumage of Pearl Island birds collected in late April is much more abraded than that of examples of *f. flavoviridis* taken in Mexico and northern Central America at the corresponding season, indicating that breeding on the islands at least commences a couple of weeks or more earlier than on the mainland. Underwood took fledglings in the Térraba Valley, Costa Rica, 23 June 1908 and 25 June 1906.

Southward Migration.—No data available because of lack of field work in the breeding range of the subspecies after 1 July.

Moult and Plumages.—Probably not different from those of *V. f. flavoviridis*. A bird collected 23 June, 1908 has the immature plumage partly complete, but with some juvenile feathers on the head, scapulars, interscapulars and throat, the yellow flank feathers not fully grown out. Another example from Barranca, Boruca shot 25 June 1906 has the immature plumage fully developed except for scattered traces of the juvenile on back and nape.

An adult (sex not determined) collected by C. F. Underwood at Paso Real, Boruca, 14 July 1906 has nearly completed the moult, part of the body plumage is fresh with many pin feathers scattered through; the primaries have been renewed, but the two outermost are not fully grown out; the tail has also been renewed but only the two middle pair are fully grown out, the outer pair is but a little more than half as long as the middle ones.

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